NSW GOVERNMENT
Department of Primary Industries

Weed control in winter crops 2014

NSW DPI MANAGEMENT GUIDE

Greg Brooke and Colin McMaster

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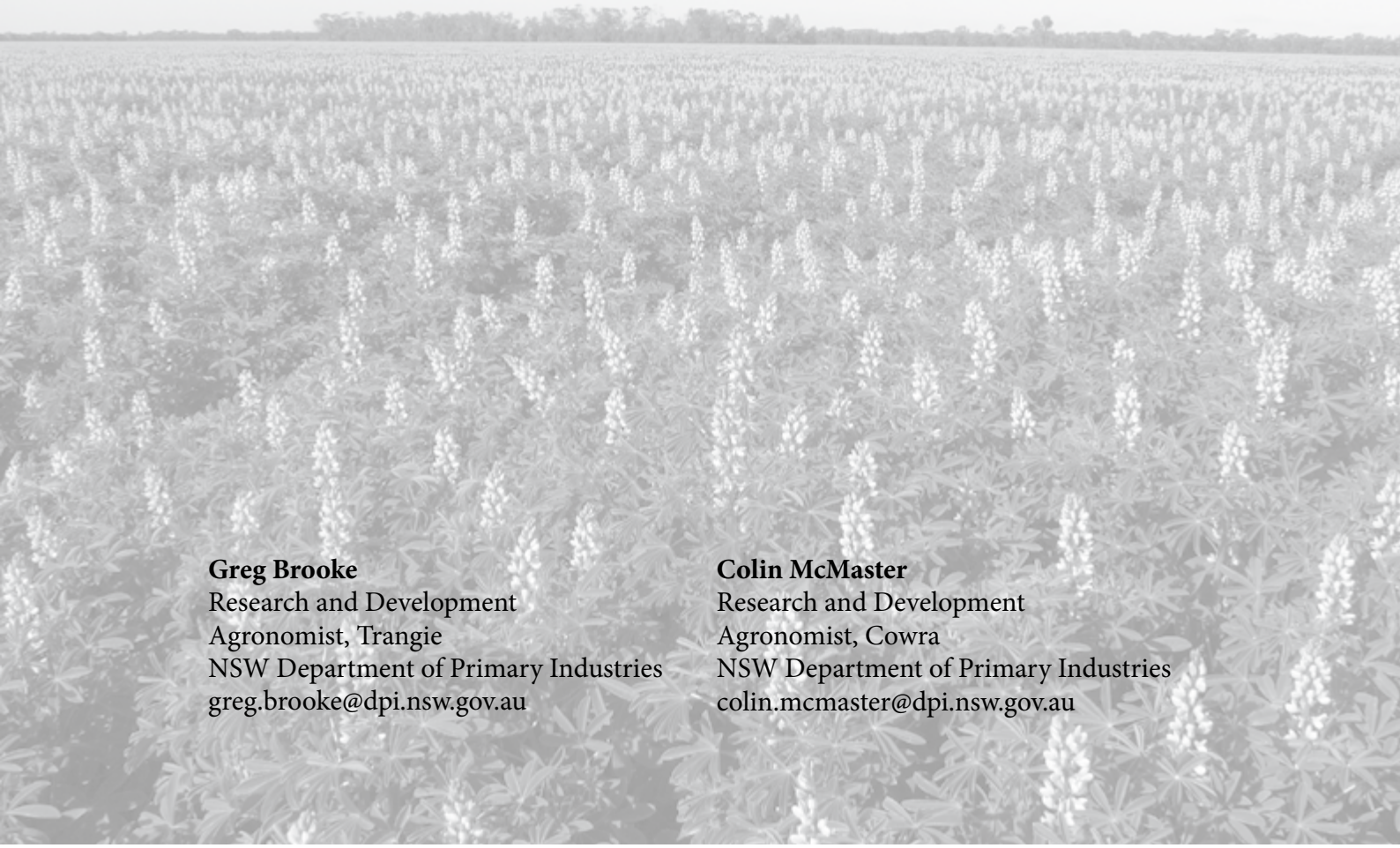

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Disclaimer

The information contained in this publication is based on knowledge and understanding at the time of writing (March 2014). However, because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate officer of the Department of Trade and Investment, Regional Infrastructure and Services or the user's independent adviser.

The product trade names in this publication are supplied on the understanding that no preference between equivalent products is intended and that the inclusion of a product name does not imply endorsement by the department over any equivalent product from another manufacturer.

Recognising that some of the information in this document is provided by third parties, the State of New South Wales, the author and the publisher take no responsibility for the accuracy, currency, reliability and correctness of any information included in the document provided by third parties.

Always read the label

Users of agricultural chemical products must always read the label and any permit before using the product, and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from any compliance with the directions on the label or the conditions of the permit by reason of any statement made or omitted to be made in this publication.

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Front cover, main photo: Albus lupin crop, Wass Bros, "The Plains", Nyngan. Greg Brooke, NSW DPI, Trangie.

Small photos, from left: Wild radish seedlings emerging with wheat crop; Paterson's curse in oats, Dubbo NSW; Canola seedling crop, Wellington NSW; Sheep grazing dual purpose wheat, Wellington NSW. All pictures, Greg Brooke, NSW DPI, Trangie NSW.

Illustrations: originals by Alison Chambers and Dianne Gardoll, formerly NSW DPI. Redrawn on computer by Michel Dignand.

The Pulse crop growth stages diagrams are reproduced with the permission of Di Holding and Annabel Bowcher, formerly CRC for Australian Weed Management.

This publication is a companion to the following guides available in 2014 from your local NSW Department of Primary Industries office:

Winter Crop Variety Sowing Guide 2014 and *Insect and Mite Control in Field Crops 2013*.

What's new in 2014?

Axial® in wheat and barley now has a seed sterilization technique registration for selective spray topping of wild oats (black oats) (*Avena* spp.) (GS30-47) to reduce panicle numbers and/or weed seed viability. 200 mL/ha Axial® (Group A) plus 500 mL Adigor™/100 L water.

DO NOT apply later than the flag leaf fully emerged stage (GS39) of the crop. Application timing: Apply Axial® when the majority of wild oats are at the stem elongation stage, up to and including when the flag leaf sheath is just at opening stage (GS30-47). Applications during early stem elongation will provide good control and are most effective in reducing panicle numbers but are less effective in reducing the viability of any weed seed produced. Applications at and beyond the flag leaf fully emerged stage (GS39) will reduce weed seed viability and contribution of seed to the weed seed bank. Carefully monitor weed growth stage to ensure optimum timing of herbicide application and always consider the range in weed growth stages present at application. Late germinating weeds not present at application, will not be controlled.

Garlon™ Fallow Master (755 g/L triclopyr) (Group I) replaces Garlon™ 600.

Lontrel™ Advanced (600 g/L) (Group I) added to the Lontrel™ armoury of 300 g/L Liquid and Lontrel™ 750 SG. Extended label use patterns to cover volunteer pulses.

Outlook® (dimethenamid-P) (Group K). A new IBS herbicide for use in chickpeas and field peas for ryegrass resistance management.

Label requirements include only using in low weed populations and the use of knife point and presswheel systems only for incorporation.

Sharpen® WG (700 g/kg saflufenacil) (Group G) BASF has been released as a spike to glyphosate in pre-sowing situations (not canola) to give improved control of many weeds including fleabanes.

Amitrole T Herbicide (250 g/L amitrole, 220 g/L ammonium thiocyanate) (Group Q) has been registered for Optical Spot Spray technologies for weed cover between 0 and 30%. If percentage weed cover exceeds 30% use approved boom spray rates.

Stomp® 440 replaces Stomp® 330EC (Group D).

Diuron 900 DF Herbicide (Group C) has had an amended lucerne claim registered post the diuron review. Refer to label.

Terrain™ 500 WG (500 g/L flumioxazin) (Group G) has been released as a spike to glyphosate or paraquat/diquat herbicides for rapid knockdown and control of various grass and broadleafed weeds in pre-sowing situations (not canola).

Weedmaster® DST® (470 g/L glyphosate) (Group M) registration for pre-harvest cutting application in annual pasture for hay/silage production.

Targa® is no longer available and is replaced with Elantra® Xtreme® (200 g/L quizalofop-p-ethyl) (Group A).

SprayWise® Decisions is an innovative internet subscriber service that helps rural landholders and contractors to better plan and match the timing of chemical applications to prevailing local weather conditions. New functionality for Spraywise® Decisions includes:

- the ability to choose spray quality to assist with Spray Planning.
- sunrise and sunset times.
- localised forecasts when using smart devices.

Go to www.spraywisedecisions.com.au

The Cotton Field Awareness Map is an industry initiative which has been designed to highlight the location of cotton fields. The service is provided free of charge with the purpose of minimising off-target damage from downwind pesticide application, particularly during fallow spraying.

Farmers, farm managers, resellers, consultants, agronomists, applicators and contractors are encouraged to input their cotton field(s). Users can also access the Cotton Map to check the location of the paddock(s) they may be planning to spray to assess the proximity of the nearest cotton crop.

The map is a joint collaboration between Cotton Australia, Cotton Research and Development Corporation (CRDC), Grains Research and Development Corporation (GRDC) and Nufarm Australia Limited, developed to meet industry needs. Go to www.cottonmap.com.au

Infopest Free Online: Ag chemicals at your fingertips. Infopest (www.infopest.com.au) is a free online database managed by Growcom and updated weekly with new or updated products, permits and Material Safety Data Sheets that have been registered or approved by the Australian Pesticides and Veterinary Medicines Authority (APVMA). It's a great place to start to find a chemical solution for the pest/disease problem in your crop or animals. Please always consult the label.

Contents

Weed control management in winter crops

Good weed control management in winter crops is a vital part of successful and profitable crop production. Yield losses caused by weeds can vary enormously from being almost negligible to a complete loss.

Weeds lower crop yields by competing for soil moisture, nutrients, space and light and can carry diseases which attack crops. This competition reduces grain yield and quality, and can impede harvesting. Some weeds can restrict cropping options as herbicides for control are sometimes limited. Thoroughly investigate which weed species are likely to germinate in a paddock before sowing crops with limited herbicide control options.

Weed control is a numbers game. Growers should aim to reduce numbers and keep them low with an ongoing program. An integrated weed management system combining all the available methods is the key to successful control of weeds.

- **Crop rotation.** A well managed rotation in each paddock, which alternates pastures, broadleaf and cereal crops, is a very useful technique for controlling weeds. For example grass weeds are more easily and cheaply controlled chemically in broadleaf crops, whereas broadleaf weeds are much easier to control in cereal crops. In parts of northern NSW alternating summer and winter crops is a time honoured strategy for weed control. Good crop rotation management can substantially reduce the cost of controlling weeds with chemicals.
- **Haymaking or silage** making in crops and pastures is a very effective way of reducing weed burdens.
- **Pasture management** techniques such as pasture topping by mowing or using herbicides, spray grazing, strategic heavy grazing or burning can all have a role in weed control programs. Cleaning grasses out of legume pastures in winter is a common practice. This involves spraying grasses such as barley grass and vulpia out of pastures in winter to stop seed set, improve nitrogen build-up and reduce root diseases in following cereal crops.
- **Good agronomic practices** such as using weed-free seed (preferably registered or certified) and sowing on time with optimal plant populations and adequate nutrition all contribute to good weed control management. Be extremely vigilant with new weed incursions, not allowing them to set seed. Some crops and varieties are more competitive against weeds than others. All weeds growing in a field should be controlled before the crop emerges. Large weeds which have not been controlled prior to or by the sowing operation prove most difficult and often impossible to remedy with in-crop herbicides.
- **Timely cultivation** is a valuable method for killing weeds and preparing seedbeds. Some growers use varying combinations of mechanical and chemical weed control to manage their fallows or stubbles.
- **Harvest weed-seed management** is a tool now considered to be imperative in both delaying and dealing with herbicide resistant weed populations. See www.grdc.com.au and follow the links.
- **In-crop weed control.** A wide range of pre-emergent and early post-emergent herbicides are available for in-crop weed control. Weeds should be removed from crops as early as possible and certainly no later than 6 weeks after sowing if yield losses are to be minimised. Yield responses will depend on weed species, weed and crop density and seasonal conditions. The stage of growth of the weed and the crop are vital factors to consider when planning the successful use of post-emergent herbicides. Tolerance to herbicides varies between cereals and between the varieties of each cereal. Read herbicide labels carefully for these details and information on the best conditions for spraying.
- **Herbicide resistance** in weeds is a problem that continues to become more widespread through NSW which growers should be alerted to. It is one of the biggest agronomic threats to the sustainability of our cropping systems. However, this problem can be managed by having a good crop and pasture rotation, by rotating herbicide groups and by combining both chemical and non-chemical methods of weed control. Each table throughout this guide lists the mode of action group for each herbicide (See the section 'Herbicide resistance management' in this guide, page 56.)

Weed glossary (spp. = species)

amaranth ..... *Amaranthus* spp.
amsinckia ..... *Amsinckia* spp.
annual ground cherry ..... *Physalis angulata*
annual ryegrass ..... *Lolium rigidum*
barley grass ..... *Hordeum leporinum*
barnyard grass ..... *Echinochloa crus-galli*
Bathurst burr ..... *Xanthium spinosum*
bedstraw ..... *Galium tricornutum*
black bindweed ..... *Fallopia convolvulus*
blackberry nightshade ..... *Solanum nigrum*
bladder ketmia ..... *Hibiscus trionum*
Boggabri weed ..... *Amaranthus mitchelli*
brome grass ..... *Bromus* spp.
buchan weed ..... *Hirschfeldia incana*
button grass ..... *Dactyloctenium radulans*
caltrop (yellow vine) ..... *Tribulus terrestris*
canary grass ..... *Phalaris canariensis*
capeweed ..... *Arctotheca calendula*
charlock ..... *Sinapis arvensis*
cleavers ..... *Galium aparine*
clovers ..... *Trifolium* spp.
common barbgrass ..... *Monerma cylindrica*
corn gromwell ..... *Buglossoides arvense*
couch ..... *Cynodon dactylon*
crassula ..... *Crassula* spp.
cudweed ..... *Gnaphalium* spp.
datura (thornapple) ..... *Datura* spp.
deadnettle ..... *Lamium amplexicaule*
docks ..... *Rumex* spp.
fat hen ..... *Chenopodium album*
fleabane ..... *Conyza* spp.
fumitory ..... *Fumaria* spp.
heliotrope (white) ..... *Heliotropium europaeum*
Hexham scent ..... *Melilotus indicus*
hoary cress ..... *Cardaria draba*
hogweed ..... *Polygonum aviculare*
horehound ..... *Marrubium vulgare*
Johnson grass ..... *Sorghum halepense*
lesser swine cress ..... *Coronopus didymus*
liverseed grass ..... *Urochloa panicoides*
melon camel/afghan ..... *Citrullus lanatus*
melon paddy/prickly ..... *Cucumis myriocarpus*
mexican poppy ..... *Argemone ochroleuca*
mintweed ..... *Salvia reflexa*
mustards ..... *Sisymbrium* spp.
New Zealand spinach ..... *Tetragonia tetragonoides*
noogoora burr ..... *Xanthium occidentale*
nut grass ..... *Cyperus rotundus*
oxalis ..... *Oxalis* spp.
paradoxa grass ..... *Phalaris paradoxa*
Paterson's curse ..... *Echium plantagineum*
peachvine ..... *Ipomea lonchophylla*
peppercress ..... *Lepidium* spp.
phalaris annual ..... *Phalaris minor*
phalaris annual ..... *Phalaris paradoxa*
phalaris perennial ..... *Phalaris aquatica*
pigweed ..... *Portulacca oleracea*
plantain ..... *Plantago* spp.
potato weed ..... *Solanum* spp.
rough poppy ..... *Papaver hybridum*
saffron thistle ..... *Carthamus lanatus*
scotch thistle ..... *Onopordum acanthium*
Shepherd's purse ..... *Capsella bursa-pastoris*
skeleton weed ..... *Chondrilla juncea*
slender thistle ..... *Carduus pycnocephalus*
sorrel ..... *Rumex acetosella*
soursob ..... *Oxalis pes-caprae*
sowthistle ..... *Sonchus* spp.
spear/black thistle ..... *Cirsium vulgare*
spiny emex ..... *Emex australis*
spurge ..... *Euphorbia* spp.
St Barnaby thistle ..... *Centaurea solstitialis*
star thistle ..... *Centaurea calcitrapa*
stinging nettle ..... *Urtica* spp.
stink grass ..... *Eragrostis cilianensis*
stinking goosefoot ..... *Chenopodium* spp.
storksbill ..... *erodium* spp.
sweet summer grass ..... *Digitaria* spp.
toad rush ..... *Juncus bufonius*
turnip weed ..... *Rapistrum rugosum*
variegated thistle ..... *Silybum marianum*
vetch ..... *Vicia* spp.
vulpia ..... *Vulpia bromoides, Vulpia myuros*
wild/prickly lettuce ..... *Lactuca* spp.
wild oat ..... *Avena fatua, Avena ludoviciana*
wild radish ..... *Raphanus raphanistrum*
wild turnip ..... *Brassica tournefortii*
Wimmera ryegrass ..... *Lolium rigidum*
winter grass ..... *Poa annua*
wireweed ..... *Polygonum aviculare*

Cereal growth stages – the Zadoks Scale

A decimal scale describing cereal crop growth stages is now widely used.

This scale, called the Zadoks decimal code, describes the principal growth stages, labelled 0 to 9:

0 Germination	2 Tillering	5 Ear emergence	8 Dough development
1 Seedling growth	3 Stem elongation	6 Flowering	9 Ripening
	4 Booting	7 Milk development	

Each primary growth stage is further subdivided into secondary stages extending the scale from 00 to 99.

The first number represents the growth stage and the following number indicates the numbers of plant parts, e.g. Z12 indicates a young plant with only two leaves fully unfolded, commonly referred to as 2-leaf stage. See the first diagram in 'Growth stages of cereal crops'.

A series of pairs of numbers can be used to further describe the growth stage. For example Z14/21 indicates the main tiller with 4 fully unfolded leaves, commonly referred to as the 4-leaf stage, but this plant has 1 more tiller. Note that additional tillers are counted separately to the main tiller. See the first diagram in 'Growth stages of cereal crops'.

The main stages of interest to cereal producers applying herbicides are:

1 Seedling growth	2 Tillering	3 Stem elongation	4 Booting

Zadoks scale is based on the individual plant, not the general appearance of a crop. Therefore, to use the scale, a representative selection of plants should be examined from a paddock.

Growth terms used elsewhere in this guide, extracted from registered labels, and their Zadoks equivalents are:

3-leaf 3 fully unfolded leaves on main shoot only. Zadoks 13.

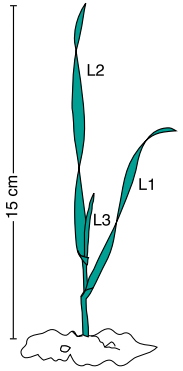
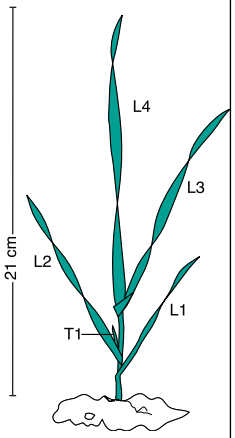
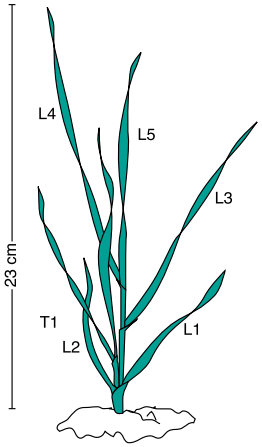
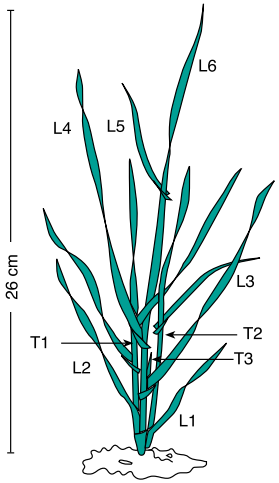
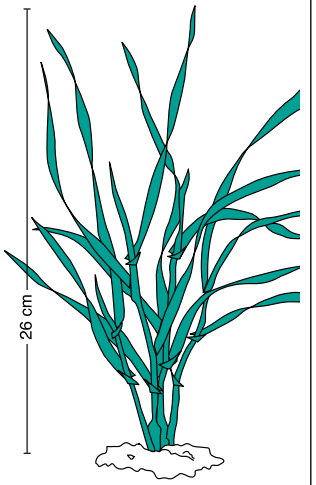
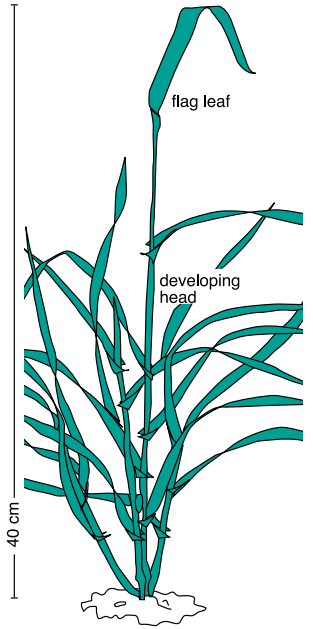
5-leaf 5 fully unfolded leaves on main shoot only. Zadoks 15.

Tillering Tiller formation period. Plants past seedling stage and before stem elongation. Zadoks 21 to 29. See the diagrams in 'Growth stages of cereal crops'.

Jointing Crop becoming erect or booting up to the stage when the flag leaf is just visible. Zadoks 31 to 39. See the fifth diagram in 'Growth stages of cereal crops'.

Boot Head plainly felt in stem before head emergence. Zadoks 35 to 45. See the sixth diagram in 'Growth stages of cereal crops'.

Growth stages of cereal crops

						
Crop growth stage	***2-leaf stage*** Two leaves (L) have unfolded; third leaf present, yet to fully expand.	***Start of tillering*** First tiller (T1) appears from between a lower leaf and the main shoot. Usually 3 or 4 leaves are on the main tiller.	***Tillering stage*** Tillers come from the base where leaves join the stem and continue forming, usually until there are 5 leaves on the main shoot. Secondary roots developing.	***Fully tillered stage*** Usually no more tillers form after the very young head starts forming in the main tiller. Tillering completed when first node detected at base of main stem.	***Start of jointing*** Jointing or node formation starts at the end of tillering. Small swellings – joints – form at the bottom of the main tiller. Heads continue developing and can be seen by dissecting a stem.	**Early boot stage** The last leaf to form – the flag leaf – appears on top of the extended stem. The developing head can be felt as a swelling in the stem.
Zadoks decimal code	2 leaves unfolded (Z12).	4 leaves unfolded (Z14). Main shoot and 1 tiller (Z21).	5 leaves on main shoot or stem (Z15). Main shoot and 1 tiller (Z21).	6 leaves on the main shoot or stem (Z16). Main shoot and three tillers and onwards (Z23–Z30).	First node formed at base of main tiller (Z31).	Z35–Z45.
Herbicide spraying stage	Suitable stage for spraying many herbicides, but too early for 3-leaf stage.	Suitable stage for spraying at the 3–4-leaf stage. Too early for the 5-leaf stage of application.	Suitable for spraying many herbicides at the 5-leaf tillering stage.	Many herbicides can be sprayed up to the end of tillering.	Suitable for 2,4-D spraying.	No herbicide should be applied at this stage. Too late for 2,4-D application.

- There is no difference between spring wheat varieties sown on the same day in the rate of appearance of new leaves.
- At the early boot stage, the last flowering part – the pollen – is being formed. This occurs earlier in barley than in wheat or triticale.

Using the growth stages of cereal crops to time herbicide applications

The recommended timing for application of each herbicide is indicated in the chemical control tables in this guide.

Barley, oats and winter wheat sown in early autumn for grazing develops much more quickly to the tillering stage than cereals sown in May–June. Given adequate moisture and warm weather, early development can be relatively quick.

The terms 'early tillering' and 'late or fully tillered' are not definitive and are commonly used in a very general sense. The number of fully emerged main shoot or stem leaves, together with the number of tillers when there is more than one, is the only accurate definitive description of the growth stage of a cereal plant. See the diagrams in 'Cereal crop growth stages', and 'Cereal growth stages – Zadoks' in this guide.

In many cereal crops:

- 3-leaf (on main stem) stage is before tillering.
- 5-leaf (on main stem) stage coincides with early tillering.
- 6–7-leaf (on main stem) stage coincides with mid to fully tillered stage.
- Jointing or node formation indicates the start of the reproductive phase in the crop, and tillering can be said to be complete.

Product	Chemical	Cereal growth stage							
		2-leaf	3-leaf	4-leaf	5-leaf –Early Till	Mid Till	Late Till	Full Till–Jointing	Booting
	Zadoks Cereal code	12	13	14	15–21	25	29	3	4
Monza® (post-em)	Sulfosulfuron			wheat and triticale only, 1–3-leaf stage					
Glean® (post-em)	Chlorsulfuron								
Achieve®/Pentagon®	Tralkoxydim								
Hoegrass® 500	Diclofop-methyl							wheat	
Wildcat®	Fenoxaprop-p-ethyl							not barley	
Topik®	Clodinafop-propargyl							wheat only	
Axial®	Pinoxaden + Cloquintocet-mexyl								Up to Z49
Tristar® Advance	Diclofop-methyl + Fenoxaprop-p-ethyl							wheat & barley	
Decision®	Diclofop-methyl + Sethoxydim								
Cheetah® Gold	Diclofop-methyl + Sethoxydim + Fenoxaprop-p-ethyl								
Velocity®	Pyrasulfotole + Bromoxynil								
Eclipse® 100 SC	Metosulam							1st node	
Jaguar®	Bromoxynil + Diflufenican								
Intervix®	Imazamox + Imazapyr		Clearfield plus wheat only + barley						
Mataven® 90	Flamprop-m-methyl							wheat	
Agtryne® MA	Terbutryn + MCPA								
Ally®	Metsulfuron-methyl								
Broadside®	Bromoxynil + MCPA + Dicamba								
Bromicide®	Bromoxynil		low rate only at 3–5-leaf stage						
Bromicide® MA	Bromoxynil + MCPA								
Broadstrike™	Flumetsulam								
Diuron ◆	Diuron ◆								
Diuron ◆ + MCPA	280 g + 0.5 L								
Harmony® M	Thifensulfuron + Metsulfuron-methyl								
Atlantis® OD	Mesosulfuron-methyl		wheat only						
Hussar® OD	Iodosulfuron-methyl-sodium								
Crusader™	Pyroxsulam + Cloquintocet-mexyl						wheat only	1st node	
Midas®	Imazapic + Imazapyr + MCPA			Clearfied wheat only				Flag leaf	
Igran®	Terbutryn								
Tigrex®	MCPA + Diflufenican								
Precept® 300 EC	MCPA + Pyrasulfotole		wheat only	wheat only					
Cadence®	Dicamba								
Hotshot™	Aminopyralid + Fluroxypyr							1st node	
Starane™, Starane™ Advanced	Fluroxypyr								
Paragon®	MCPA + Picolinafen								
Flight® EC	MCPA + Picolinafen + Bromoxynil								
Conclude™	MCPA + Florasulam								
Torpedo™	Clopyralid + Florasulam							1st node	
MCPA LVE	MCPA 0.5 L								
	MCPA 0.5 L–2.1 L								
Hoegrass® 500	Diclofop-methyl					barley			
Lontrel™ Advanced	Clopyralid								
Tordon™ 242	Picloram + MCPA								
MCPA amine	MCPA 0.7 L								
	MCPA 0.7–2.1 L								
2,4-DB									
Kamba®	Dicamba								
Kamba® M	MCPA + Dicamba								
FallowBoss™ Tordon™	Picloram + 2,4-D + aminopyralid								
Amicide® Advance 700	2,4-D amine								
2,4-D ester	2,4-D LV ester								
Mataven® 90	Selective spraytopping							wheat only	
Logran®	Triasulfuron							before flowering	

Recommended and preferred timing Less preferred timing ◆ See *What's new in 2014* on page 3.

The recommended timing of application has been determined after significant research by the marketing company, with the aim of minimising crop damage and maximising yield. Pay attention to two vital stages of crop development; at 3–5-leaf stage or commencement of tillering; and at the start of jointing.

Using herbicides successfully

Successful results from herbicide application depend heavily on numerous interacting factors. Many of the biological factors involved are not fully understood, and are out of your control so give careful attention to the factors that you can control.

Annual weeds compete with cereals and broadleaf crops mainly when the crops are in their earlier stages of growth e.g. tillering in cereals. Weeds should be removed no later than 6 weeks after sowing to minimise losses. However, only rarely are selective herbicides completely non-toxic to the crop. See the 'Winter Crop Variety Sensitivity to Herbicides' section of this guide. Early post-emergence control nearly always results in higher yields than treatments applied after tillering of cereals, or branching in broadleaf crops.

Points to remember for the successful use of herbicides:

- Plan the operation. Check paddock sizes, tank capacities, water availability and supply.
- Carefully check crop and weed growth stages before deciding upon a specific post-emergent herbicide. Use the diagrams in *Growth stages of cereal crops* page 8 and *Pulse crop growth stages* on page 70.
- Read the label. Check to make sure the chemical will do the job. Note any mixing instructions, especially when tank mixing two chemicals. This booklet is a guide only; it cannot tell you all the information you need to know.
- Follow the recommendations on the label.
- Conditions inhibiting plant cell growth, like stress from drought, waterlogging, poor nutrition, high or low temperatures, low light intensity and disease or insect attack are not conducive to good herbicide uptake and movement.
- Use good quality water, preferably from a rainwater tank. Water quality is very important. Bore, hard, dirty or muddy water needs special additives or conditioners to improve results with certain herbicides. See *Water quality for herbicide application*, page 16.
- Use good equipment checked frequently for performance and output – see *Boomspray calibration* on page 21.
- Check boom height with spray pattern operation for full coverage of the target.
- Check accuracy of boom width marking equipment.
- Check wind speed. A light breeze helps herbicide penetration into crops. Do not spray when wind is strong.
- Do not spray if rain is imminent or when heavy dew or frost is present. See Table 3 for 'Rainfast Periods', page 14.
- Calculate the amount of herbicide required for each paddock and tank load. Add surfactant where recommended. See *Boomspray calibration* on page 21.
- Select the appropriate nozzle type for the application, see 'Nozzle selection' on page 27. Beware of compromising nozzle-types when tank mixing herbicides with fungicides or insecticides.
- Be aware of spraying conditions to avoid potential spray drift onto sensitive crops and pastures, roadways, dams, trees, watercourses or public places. Note: All chemicals can drift – See *Reducing herbicide spray drift*, page 26.
- Keep a record of each spray operation page 25.

Poison warnings on herbicide labels

The poison schedule

Herbicides are classified into four categories in the Poison Schedule based on the acute health hazard to the user of the herbicide. Each schedule has a corresponding signal heading which appears in large contrasting lettering on the label of the herbicide product.

The Safety Directions specify what personal protective equipment should be worn, and what safety precautions should be taken, e.g. do not inhale spray mist. The First Aid instructions specify what action should be taken in the event of a poisoning. Safety Directions and First Aid Instructions may be different for different formulations of the same pesticide.

Before opening and using any farm chemical, consult the label and Safety Data Sheet (SDS) for specific Safety Directions. The hazardous chemicals section of the Work Health and Safety Regulation requires resellers to provide end users with an SDS.

If you suspect a poisoning, contact the Poisons Information Centre emergency phone (24 hour) 131 126.

Unscheduled: Very low toxicity	(No heading) e.g. Ally®, Brodal®, Diuron, Flame®, Logran®, Simazine, Broadstrike™.
Schedule 5: Slightly toxic	Caution e.g. Achieve®, Agtryne® MA, Atlantis® OD, Avadex® Xtra, Balance®, Kamba® M, Correct®, Dicamba, Dual Gold®, Glean®, Glyphosate, Goal®, Harmony® M, Hotshot™, Hussar® OD, Igran®, Lontrel™ Advanced, Mataven® 90, MCPA, Precept®, Prometryn 900 DF, Raptor®, Weedmaster® DST®, Select®, Sertin®, Sharpen® WG, Sickle®, Spinnaker®, Starane™ Advanced, Stomp® 330 EC, Striker®, Elantra® Xtreme®, Tigrex®, Tordon™ 242, FallowBoss™ Tordon™, Torpedo™, Touchdown® HiTech, Trifluralin, 2,4-DB, Wildcat®.
Schedule 6: Moderately toxic	Poison e.g. Bladex®, Broadside®, Bromoxynil, Bromoxynil + MCPA, Buctril® MA, Cheetah® Gold, Conclude™, Crusader™, Decision®, Eclipse® 100 SC, Flight® EC, Fusilade® Forte, Garlon™ FallowMaster™, Grazon™, Hoegrass®, Jaguar®, Midas®, Paragon®, Reglone®, Sakura®, Sencor®, Sniper®, Terbyne®, Topik®, Tordon™, Tristar® Advance, Valor®, Velocity®, Verdict™ , 2,4-D amine and LV Ester (Note 2,4-D Amine and Ester formulations have now changed to S6 from S5 when active ingredient>200 g/L. Older labels may not reflect this).
Schedule 7: Highly toxic	Dangerous Poison e.g. Gramoxone® 250, Nuquat®, Shirquat®, Spray·Seed® 250.

Table 1. Guidelines for crop rotations – Fallow commencement/maintenance and presowing seedbed weed control

The following plant back periods are a guide only based on label recommendations. The time indicated between application and safe crop rotation intervals may depend on a range of factors including rainfall (amount and intensity), soil type (pH, soil biological activity and organic carbon), soil type variability within a paddock, temperature and herbicide rate. Some crops are more sensitive to various herbicide groups than others. Always take a conservative approach to plant back periods, especially with sensitive or high input crops.

	Ally®[A]	Amicide® Advance (700g/L)[B]			Baton® Low (800 g/kg amine)[B]			Cadence®[B]			Eclipse® 100 SC	LV Ester 680 (680 g/L)[B]			Express®	Flame®	Garlon™	Goal®	Grazon™ Extra[D]					Hotshot™[D]		Kamba® 500[B]			Lontrel™ Advanced 600 g/L[E]			Pyresta®[B]		Starane™ Advanced[F]			Sharpen® WG	Terrain™ 500 WG	Weedmaster® Argo®
Herbicide Group	B	I	I	I	I	I	I	I	I	I	B	I	I	I	B	B	I	G	I	I	I	I	I	I	I	I	I	I	I	I	I	GI	GI	I	I	I	G	G	M
Specific details	pH 5.6–8.5[H]	<0.5 L/ha	0.5–0.98 L/ha	0.98–1.5 L/ha	<0.4 kg/ha	0.4–0.9 kg/ha	0.9–1.3 kg/ha	140 g/ha	200 g/ha	400 g/ha		<0.51 L/ha	0.51–1.0 L/ha	1.0–1.6 L/ha					NNSW 0.2 L/ha	NNSW 0.3 L/ha	NNSW 0.4 L/ha	NNSW 0.6 L/ha	SNSW <0.5 L/ha	NNSW <750 mL/ha	SNSW <500 mL/ha	0.20 L/ha	0.28 L/ha	0.56 L/ha	NNSW <0.0375 L/ha	NNSW 0.0375–0.15 L/ha	NNSW >0.15 L/ha	SNSW <0.15 L/ha	SNSW <0.15–0.25 L/ha	SNSW >0.25 L/ha	250–500 mL/ha	900 mL/ha	0.225 L/ha	0.45 L/ha	0.9 L/ha	9–26 g/ha	30 g/ha	
Crop																																								
Barley	6w	1d	1d	3d	1d	1d	3d	1d	7d	14d		1d	1d	3d	3d		7d		2mo	2mo	4mo	4mo	9mo	4mo	9mo	1d	7d	14d	7d	7d		7d	7d	7d	1d	1d	7d	7d	7d	1hr	1hr	
Canola	9mo	14d	21d	28d	14d	21d	28d	7d	10d	14d		14d	21d	28d	–		–		2mo	4mo	4mo	4mo	9mo	4mo	9mo	7d[G]	10d[G]	14d[G]	7d	7d		7d	7d	7d	14d	21d				16w		
Canola (Clearfield)	10d																																							
Cereal Rye	6w							1d	7d	14d																1d	7d	14d													
Chickpea	9mo	7d	14d	21d	7d	14d	21d	–	21d	28d		7d	14d	21d			7d		4mo	6mo	6mo	6mo	24mo	6mo	20mo	–	21d	28d	3mo	6mo		9mo	12mo	24mo	7d	14d	7d	7d	7d	1hr	1hr	
Cotton		10d	14d	21d	10d	14d	21d	7d	7d	14d		10d	14d	21d			14d							9mo		7d	7d	14d	3mo	6mo					10d	14d	14d	14d	28d	6w	1hr	
Faba Bean	9mo	7d	7d	10d	7d	7d	10d					7d	7d	10d					4mo	4mo	6mo	6mo	24mo	6mo	20mo							9mo	12mo	24mo	7d	7d				1hr	1hr	
Field Pea	9mo	7d	14d	14d	7d	14d	14d	–	14d	21d		7d	14d	14d									24mo		20mo	–	14d	21d				9mo	12mo	24mo	7d	14d				1hr	1hr	
Lentils	9mo	7d	7d	10d	7d	7d	10d					7d	7d	10d																		9mo	12mo	24mo	7d	7d				1hr	1hr	
Linseed	9mo	7d	7d	14d	7d	7d	14d					7d	7d	14d																					7d	7d						
Lucerne	9mo	7d	7d	10d	7d	7d	10d					7d	7d	10d					6mo	9mo	9mo	9mo	24mo	6mo	20mo				9mo	9mo					7d	7d						
Lupins	9mo	7d	14d	21d	7d	14d	21d	7d	14d	21d		7d	14d	21d									24mo		20mo	7d	14d	21d				9mo	12mo	24mo	7d	14d				1hr	1hr	
Maize	14mo							1d	3d	7d					7/21d[C]		7d									1d	3d	7d	7d	14d						7d	7d	7d		1hr	
Medic	9mo	7d	7d	10d	7d	7d	10d	7d	14d	21d		7d	7d	10d									24mo		20mo	7d	14d	21d				9mo	12mo	24mo	7d	7d						
Millet								1d	3d	7d																1d	3d	7d													
Millet (Japanese)	14mo																																							
Millet (Panorama)	14mo																																							
Millet (White French)	14mo																																							
Mungbean								5d	5d	10d					7/21d[C]									5mo		5d	5d	10d												1hr	
Navy Bean		10d	10d	14d	10d	10d	14d					10d	10d	14d																					10d	10d						
Oats	9mo	3d	3d	7d	3d	3d	7d	1d	7d	14d		3d	3d	7d	3d											1d	7d	14d	7d	7d		7d	7d	7d	3d	3d				1hr	1hr	
Pigeon Pea								5d	5d	10d																5d	5d	10d													
Safflower	9mo	7d	14d	21d	7d	14d	21d	14d	21d	28d		7d	14d	21d												14d	21d	28d							7d	14d						
Sorghum	14mo	3d	7d	10d	3d	7d	10d	1d	3d	7d		3d	7d	10d	7/21d[C]		7d							3mo		1d	3d	7d	7d	14d					3d	7d	7d	7d	7d	1d	1hr	
Soybean	14mo	14d	14d	21d	14d	14d	21d	5d	5d	10d		14d	14d	21d	7/21d[C]		7d							5mo		5d	5d	10d	3mo	6mo					14d	14d	7d	7d	14d	1d	1hr	
Sub Clover	9mo	7d	7d	10d	7d	7d	10d	7d	14d	21d		7d	7d	10d									24mo		20mo	7d	14d	21d				9mo	12mo	24mo	7d	7d				1hr		
Sunflower	14mo	7d	10d	14d	7d	10d	14d	1d	7d	14d		7d	10d	14d	7/21d[C]		7d							5mo		1d	7d	14d	3mo	6mo					7d	10d	7d	7d	7d	16w	1hr	
Triticale	6w	1d	3d	7d	1d	3d	7d	1d	7d	14d		1d	3d	7d												1d	7d	14d							1d	3d						
Vetch		7d	7d	10d	7d	7d	10d					7d	7d	10d																		9mo	12mo	24mo	7d	7d						
Wheat	10d	1d	3d	7d	1d	3d	7d	1d	7d	14d		1d	3d	7d	3d		7d		2mo	2mo	4mo	4mo	9mo	4mo	9mo	1d	7d	14d	7d	7d		7d	7d	7d	1d	3d	7d	7d	7d	1hr	1hr	

Do not plant susceptible crops until 9 months after application of Eclipse®. Susceptible crops include canola or other brassica crops, field peas, beans, medics, lucerne and sub-clover.

Minimum recropping periods are influenced by numerous factors. See label for further information.

Goal® herbicide at up to 75 mL/ha may be safely applied 1 day prior to planting wheat, barley, oats, triticale, canola, lupins, fababeans, field peas, lucerne, clover, medics, ryegrass, phalaris and cocksfoot and 7 days minimum prior to planting cotton or soybeans, provided minimal tillage planting equipment is used with minimal soil disturbance.

Susceptible crops should not be sown for at least 2 years when Lontrel™ Advanced at more than 0.15 L/ha has been used in northern Australia.

Do not disturb weeds by cultivation, sowing or grazing for 6 hours of daylight following treatment of annual weeds and 7 days for perennial weeds.

KEY: hr = hours, d = days, w = weeks, mo = months

A For pH 8.6 and above tolerance of crops (grown through to maturity) should be determined on a small scale, in the previous season, before sowing into larger areas.

B When applied to dry soils at least 15 mm of rain must fall prior to the commencement of the plantback period.

C Express® is broken down in soil, primarily by chemical hydrolysis, but to a lesser degree by microbial degredation. Breakdown is fastest in warm, wet acid soils and slower in cold alkaline soils. For these summer crops, if minimum soil temperatures at planting depth are less than or equal to 15°C for three consecutive days, then plantback intervals should be extended to 21 days.

D Black cracking clays. During drought conditions the plantback period may be significantly longer.

E Additional rainfall requirements need to be observed – see label.

F Do not plant susceptible crops, including cotton, pigeon peas and other pulse crops, into irrigated fields with soils containing less than 25% clay content, within 12 months of treatment with Starane™ Advanced.

G Plantback refers to rapeseed not canola.

H Soil pH determined by 1:5 soil:water suspension method.

Table 2. Guidelines for crop rotations – In crop herbicides

	Ally®[A]	Atlantis® OD[D]	Balance® (NNSW)[F]	Broadstrike™[K]	
Herbicide group	B	B	C	B	
Soil pH 1:5 soil:water suspension method	pH 5.6–8.5				
Specific details				(NNSW)	(SNSW)
Crop					
Barley	6w	9mo	10w[G]	3[L]–6[M]mo	3[L]–9[M]mo
Canola	9mo	9mo	9mo[I]	6[L]–9[M]mo	9[L]–12[M]mo
Canola (Clearfield)	10d				
Cereal Rye	6w			0d	0d
Chickpea	9mo	9mo		3[L]–6[M]mo	3[L]–9[M]mo
Cotton		12mo	7mo[I]	6[L]–9[M]mo	–
Faba Bean	9mo	11mo	9mo[H]	6[L]–9[M]mo	9[L]–12[M]mo
Field Pea	9mo	9mo	9mo[H]	3[L]–6[M]mo	3[L]–9[M]mo
Lentils	9mo	11mo	21mo[J]	6[L]–9[M]mo	9[L]–12[M]mo
Linseed	9mo				
Lucerne	9mo	9–21mo[E]	9mo[I]	3[L]–6[M]mo	3[L]–9[M]mo
Lupins	9mo	9mo		6[L]–9[M]mo	9[L]–12[M]mo
Maize	14mo	12mo	10w[G]	0d	0d
Medic	9mo	21mo	21mo[J]	0d	0d
Millet					
Millet (Japanese)	14mo				
Millet (Panorama)	14mo				
Millet (White French)	14mo				
Mungbean		12mo	7mo[H]		
Navy Bean					
Oats	9mo	9mo	10w[G]	3[L]–6[M]mo	3[L]–9[M]mo
Pigeon Pea					
Safflower	9mo				
Sorghum	14mo	12mo	7mo[H]	6[L]–9[M]mo	–
Soybean	14mo	12mo	7mo[H]	0d	0d
Sub Clover	9mo	9–21mo[E]	21mo[J]	3[L]–6[M]mo	3[L]–9[M]mo
Sunflower	14mo	12mo	7mo[H]	6[L]–9[M]mo	–
Triticale	6w	9mo		0d	0d
Vetch		9mo	9mo[H]	6[L]–9[M]mo	9[L]–12[M]mo
Wheat (Clearfield)					
Wheat	10d	1d	10w[G]	0d	0d

	Glean®[N]			Harmony® M[OP]			Hussar® OD	Intervix®	Logran®[CS]			
Herbicide group	B			B			B	B	B			
Soil pH 1:5 soil:water suspension method	< pH 6.5	pH 6.6–7.5	pH 7.6–8.5	pH <7.8	pH 7.9–8.2	pH 8.3–8.5			pH <6.5	pH 6.6–7.5	pH 7.6–8.5	pH >8.6
Crop												
Barley	9mo	9mo	18mo	9mo	9mo	9mo	9mo	10mo[R]				
Canola	12mo	22mo		9mo[V]	9mo[V]	9mo[V]	9mo	34mo	12mo	12mo	12mo	24mo
Canola (Clearfield)	3mo	3mo	3mo					0d				
Cereal Rye	3mo	3mo	18mo	3mo	3mo	3mo		34mo				
Chickpea				9mo	9mo	9mo	9mo	10mo	12mo	12mo	12mo	24mo
Cotton							12mo	34mo	15mo	15mo	18mo	24mo
Faba Bean	12mo	22mo		9mo	9mo	9mo	9mo	10mo	12mo			24mo
Field Pea	12mo	22mo		9mo	9mo	9mo	9mo	10mo	12mo			24mo
Lentils							21mo	34mo				
Linseed	12mo	22mo		9mo	9mo	9mo		34mo	12mo			24mo
Lucerne	12mo	22mo		9mo	9mo	9mo	9mo	10mo	12mo			24mo
Lupins	12mo	22mo		9mo	9mo	9mo	9mo	10mo	12mo			24mo
Maize	18mo	26mo		6mo	6mo	14mo		34mo	15mo	15mo	18mo	24mo
Medic	12mo	22mo		9mo	9mo	9mo	21mo	10mo[W]	12mo			24mo
Millet								34mo				
Millet (Japanese)				4mo	6mo	14mo		34mo				
Millet (Panorama)				14mo	14mo	14mo		34mo				
Millet (White French)				14mo	14mo	14mo		34mo				
Mungbean				4mo	14mo	14mo	12mo	34mo	15mo	15mo	18mo	
Navy Bean								34mo				
Oats	6mo	9mo	18mo	9mo	9mo	9mo	9mo	10mo[R]				
Pigeon Pea								34mo				
Safflower	12mo	22mo		9mo	9mo	9mo		34mo				
Sorghum	18mo	26mo		4mo	6mo	14mo	12mo	34mo	15mo	15mo	18mo	24mo
Soybean	18mo	26mo		4mo	14mo	14mo	12mo	34mo	15mo	15mo	18mo	24mo
Sub Clover	12mo	22mo		9mo	9mo	9mo	9mo	10mo[W]	12mo			24mo
Sunflower	18mo	26mo		4mo	14mo	14mo	12mo	34mo	18mo	18mo		
Triticale	0mo	0mo	0mo	3mo	3mo	3mo	9mo	10mo[R]				
Vetch							9mo	10mo				
Wheat (Clearfield)								0d				
Wheat	0mo	0mo	0mo	3mo	3mo	3mo	1d	10mo[R]				

	Midas®	Monza®[C]		On Duty®		Precept® 300 EC				Sakura® 850 WG[C]
Herbicide group	B	B		B		I + H				K
Soil pH 1:5 soil:water suspension method		pH <6.5	pH 6.5–8.5			All soils	All soils	pH < 6.0	pH 7.0–8.4	
Specific details				20 g/ha	40 g/ha	0.5 L/ha 250 mm[U]	1.0 L/ha 250 mm[U]	1.0 L/ha 250 mm[U]	1.0 L/ha 500 mm	
Crop										
Barley	10mo[R]	12mo	22mo	8mo[R]	8mo[R]	3 w	3 w	3 w	3 w	9mo
Canola	34mo	10mo	22mo	34mo	34mo	9 mo	9 mo	9 mo		9mo
Canola (Clearfield)	0d			0d	0d	9 mo	9 mo	9 mo		
Cereal Rye	34mo		10mo	34mo	34mo					
Chickpea	10mo	10mo	22mo	8mo	8mo	9 mo		9 mo		9mo
Cotton	34mo			34mo	34mo	14 mo		14 mo		5mo
Faba Bean	10mo	12mo	22mo	8mo	8mo	9 mo		9 mo		9mo
Field Pea	10mo	10mo	22mo	8mo	8mo	9 mo	9 mo	9 mo		9mo
Lentils	34mo	10mo	22mo	34mo	34mo	9 mo		9 mo	21 mo	9mo
Linseed	34mo			34mo	34mo					
Lucerne	10mo			8mo	8mo	9 mo	9 mo	9 mo		21mo
Lupins	10mo	10mo		8mo	8mo	9 mo	9 mo	9 mo		9mo
Maize	34mo			34mo	34mo		8 w			5mo
Medic	10mo[W]		22mo	8mo[W]	8mo[W]			9 mo	21 mo	21mo
Millet	34mo			34mo	34mo					
Millet (Japanese)	34mo			34mo	34mo					
Millet (Panorama)	34mo			34mo	34mo					
Millet (White French)	34mo			34mo	34mo					
Mungbean	34mo			34mo	34mo		14 mo			5mo
Navy Bean	34mo			34mo	34mo					
Oats	10mo	10mo	22mo	8mo[R]	8mo[R]	3 w	3 w	3 w	3 w	21mo
Pigeon Pea	34mo			34mo	34mo					
Safflower	22mo			22mo	22mo					
Sorghum	34mo			34mo	34mo		8 w			5mo
Soybean	34mo			34mo	34mo	14 mo		14 mo		5mo
Sub Clover	10mo[W]	10mo		8mo[W]	8mo[W]					9mo
Sunflower	34mo			34mo	34mo	14 mo		14 mo		5mo
Triticale	10mo[R]			8mo[R]	8mo[R]	3 w	3 w	3 w	3 w	0d
Vetch	10mo		22mo	8mo	8mo	9 mo	9 mo	9 mo		9mo
Wheat (Clearfield)	0d			0d	0d	3 w	3 w	3 w	3 w	
Wheat	10mo[R]			8mo[R]	8mo[R]	3 w	3 w	3 w	3 w	0–21mo[T]

Herbicide	Herbicide group	Soil pH / Specific details	All crops
Amicide® Advance (7 00 g/L)[B]	I		See Table 1 (Guidelines for crop rotations – Fallow & presowing seedbed weed control)
Atrazine	C		To avoid triazine carryover maximum rates are stated (based on soil pH) – see label for further information.
Baton® Low (800g/kg amine)[B]	I		See Table 1 (Guidelines for crop rotations – Fallow & presowing seedbed weed control)
Boxer® Gold	J&K		No plantback restrictions except in the case of a failed crop.
Cadence®[B]	I		See Table 1 (Guidelines for crop rotations–Fallow & presowing seedbed weed control)
Eclipse® 100 SC	B		Do not plant susceptible crops until 9 months after application of Eclipse®. Susceptible crops include canola or other brassica crops, field peas, beans, medics, lucerne and sub-clover.
Hotshot™	I		See Table 1 (Guidelines for crop rotations – Fallow & presowing seedbed weed control)
Kamba® 500[B]	I		See Table 1 (Guidelines for crop rotations – Fallow & presowing seedbed weed control)
Lontrel™ Advanced (600 g/L)	I		See Table 1 (Guidelines for crop rotations – Fallow & presowing seedbed weed control)
LV Ester 680 (680 g/L)[B]	I		See Table 1 (Guidelines for crop rotations – Fallow & presowing seedbed weed control)
Prometryn 900 DF	C		Do not plant crops other than celery, chickpeas, peanuts, sunflowers or carrots in areas within 6 months following application of the product at rates above 1.2 kg/ha.
Raptor®	B		Plantback varies depending on what situation chemical was used in – see label.
Simazine	C		To avoid triazine carryover maximum rates are stated (based on soil pH) – see label for further information.
Spinnaker®	B		Plantback varies depending on what situation chemical was used in – see label.
Starane™ Advanced	I		See Table 1 (Guidelines for crop rotations – Fallow & presowing seedbed weed control)
Terbyne®	C		Do not plant crops other than those recommended on this label for at least 6 months following treatments at rates up to 1.4 kg/ha.
Tordon™ 75-D	I		Do not plant susceptible crops within 12 months of applying winter or summer cereal use rates of this product. Cereal crops and grasses can be sown safely after using Tordon 75-D.
Velocity®	H + C	All soils, 0.67 L/ha 250 mm[U]; pH < 7.0, 1.0 L/ha 250 mm[U]; pH < 6.0, 1.0 L/ha 250 mm[U]; pH 7.0–8.4, 1.0 L/ha 500 mm	Minimum recropping period, influenced by several factors – see label.

KEY: d = days, w = weeks, mo = months

A For pH 8.6 and above tolerance of crops (grown through to maturity) should be determined on a small scale, in the previous season, before sowing into larger areas.
B When applied to dry soils at least 15 mm of rain must fall prior to the commencement of the plantback period.
C Additional rainfall/soil moisture requirements need to be observed – see label.
D Rainfall of less than 250 mm following Atlantis® OD use will result in extended re-cropping intervals for winter crops sown the following season. Patchy rain with extended dry periods may also extend this period. Rainfall of less than 500 mm may result in extended re-cropping periods for summer crops in the following year. Rainfall of less than 500 mm may result in extended re-cropping periods for summer crops in the following year. Use in soil above pH 8.5 is not recommnded.
E pH < 8.0 (under conditions of good seasonal rainfall) = 9 months, pH > 8.0 = 21 months.
F Prolonged dry periods or cold conditions may result in extended re-cropping intervals, even if rainfall exceeds the required amount. Use on soils with pH less than 7.0 may result in extend recropping intervals. Cultivation is recommended prior to recropping.
G 100 mm minimum rainfall total between herbicide application and planting of subsequent crop.
H 250 mm minimum rainfall total between herbicide application and planting of subsequent crop.
I 350 mm minimum rainfall total between herbicide application and planting of subsequent crop.
J 500 mm minimum rainfall total between herbicide application and planting of subsequent crop.
K For SNSW a minimum of 25 mm (preferably 50 mm) and NNSW a minimum of 50 mm (preferably 100 mm) must fall over the warmer months of the year. On shallow, duplex, low O.M. soils of less than 30 cm, do not plant until 2 years after application.
L 25 g/ha.
M 50 g/ha.
N Glean® is not recommended on soils of pH 8.6 and above.
O For soils with less than 1.7% organic matter and/or pH 8.6 and above tolerance of crops (grown to maturity)should be detrmined on a small scale, in the previous season.
P 400 mm minimum rainfall total between herbicide application and planting of subsequent crop.
Q Rainfall of less than 250 mm or 500 mm may result in extended recropping periods for winter and summer crops respectively. Patchy rain or extended dry periods will also extend the recropping period. Use on soils with pH 8.5 or above is not recommnded.
R Additional requirements need to be met for certain non clearfield cereals – see label.
S Where Logran® is applied at lower rates with trifluralin or post-emergent additional requirements need to be considered – see label.
T Wheat (0 months), durum wheat (21 months).
U Minimum of 300 mm for summer crops. Minimum 500 mm for Cotton, Soybean and Sunflower where Precept® 300 rate up to 1.0 L/ha. See Precept® label.
V Plantback refers to rapeseed.
W Plantback refers to pasture legumes.

Harvest aid or salvage spraying of winter crops

Salvage spraying or pre-harvest desiccation is required in some years to desiccate weeds and assist timely harvesting of winter crops. Situations do arise due to late establishing weeds combined with wet and prolonged springs or harvest periods, where salvage spraying may be necessary.

Weeds such as skeleton weed, bindweed, melons, sowthistle, prickly lettuce, fat hen and New Zealand spinach can interfere with harvesting whilst weed seeds such as saffron thistle, rough poppy, Mexican poppy and black/field bindweed can contaminate grain.

Chemical	2,4-D LV Ester 680 g/L	2,4-D Amine 700 g/L	Glyphosate 540 g/L	Glyphosate 540 g/L	Glyphosate 540 g/L	Glyphosate 470 g/L	Metsulfuron-methyl 600 g/kg + Glyphosate 540 g/L	Diquat 200 g/L	Diquat 200 g/L	Paraquat 250 g/L
Herbicide product	LV Ester 680	Amicide® Advance 700	Weedmaster® Argo®	Weedmaster® Argo®	Weedmaster® Argo®	Weedmaster® DST®	Ally® + Weedmaster Argo	Reglone®	Reglone®	Gramoxone®
Registered/Permit	Registered	Registered	Registered	Registered	Registered	Registered	Registered	Registered	Registered	Registered
Use	Harvest aid/ Salvage spray	Harvest aid/ Salvage spray	Harvest aid/ Weed control	Harvest aid/Weed control (in-crop spraytopping)	Desiccation/ Weed control	Preharvest cutting application	Desiccation	Pre-harvest crop desiccation	Pre-harvest weed control	In-crop spraytopping
Crop	Winter cereals	Winter cereals	Wheat	Field pea, faba bean	Field pea, faba bean, chickpea, lentil	Hay/silage	Chickpea	Canola, linseed, peas, faba bean, lentil, chickpea, lupin	Wheat	Field pea, lupin, chickpea, faba bean, lentil and vetch
Rate	1.7 L/ha	1.1–1.5 L/ha	1.0–2.1 L/ha	0.365–0.78 L/ha	0.78–2.1 L/ha	1.4–4.1 L/ha	5 g/ha Ally® + 0.58–1.2 L/ha Weedmaster Argo	Canola 1.5–3 L/ha; linseed, peas, faba bean, lentil, chickpea, lupin 2–3 L/ha	1, 2 or 3 L/ha	400 or 800 mL/ha
Weeds	Desiccate broadleaf weeds	Desiccate broadleaf weeds	Annual weeds	Annual ryegrass	Annual weeds	Not applicable	Registered	Not applicable	Not stated	Annual ryegrass
Spraying timing	After the dough stage	After the dough stage	Late dough onwards	At or after crop maturity	At or after crop maturity	Refer to label	At or after crop maturity	Refer to label	Refer to label	When ryegrass is at the optimum timing. Refer to label.
Harvest WHP	Nil when used as directed	Nil when used as directed	7 days	7 days	7 days	Refer to label	7 days	Canola 4 days; peas, lupin, linseed not stated; lentil, chickpea, faba bean 2 days	Nil	7 days
Application	Ground/Aerial	Ground/Aerial	Ground	Ground	Ground/Aerial	Ground/Aerial	Not stated	Ground/Aerial	Ground/ Aerial	Ground
Comments	Beware of sensitive crops nearby	Beware of sensitive crops nearby	Do not use on crops intended for seed or sprouting	Do not use on crops intended for seed or sprouting	Do not use on crops intended for seed or sprouting	–	Not to be applied on crops to be used for seed or sprouting	–	–	Reduction in crop yield may occur if the crop is less advanced relative to the ryegrass

WARNING — When spraying use extreme caution and carefully consider the possibility of spray drift onto susceptible plants – e.g. cotton, canola, lucerne, grapevines, horticultural crops, belah and kurrajong trees.

IMPORTANT NOTE: Before using these products for this use check registration.

Table 3. Rainfastness – stock withholding periods – harvest withholding periods

This table lists:

- **Rainfastness.** The time interval required between herbicide application and rainfall. Avoid applying herbicide when rain is imminent. However, certain herbicides may not be affected by some rain during or after spraying. The table suggests the time needed between spraying and rainfall for each herbicide to be effective.
- **Stock grazing or fodder production withholding periods.** This is the number of days you must wait after spraying before allowing stock to graze the area, to ensure the animal produce is free of pesticide residues. Check latest MRL data with individual companies for produce to be sold on export market.
- **Harvest withholding periods.** This is the number of days you must wait after spraying before harvesting grain, to ensure that grain is free of pesticide residues.

Herbicide	Rainfastness – hours	Stock withholding period – days	Harvest withholding period – days
Achieve®	0.5	14	Not stated.
Agtryne®	6	7	Not stated.
Alliance®	Nil – see label	1, horses 7 – see label	Not required when used as directed.
Ally®	2	Nil	Not required when used as directed.
Atlantis® OD	8	28	56
Atrazine	Rain required after application for best results.	canola (pre-emergent) 105 canola (post-emergent) 42	Not required when used as directed.
Avadex® Xtra	Light rain during or after spraying will not affect results.	11 weeks	Not required when used as directed.
Axial®	0.5	21	Not required when used as directed.
Balance® 750 WG	Light rain during or after spraying will not affect results.	28	Not required when used as directed.
Bladex®	8	Don't graze treated immature crops or cut for stockfood.	Not required when used as directed.
Boxer® Gold	Rain during or after application assists incorporation and activation.	Do not graze or cut for stock feed for 10 weeks.	Not required when used as directed.
Broadside®	3	14	Not required when used as directed.
Broadstrike™	4	Cereals, field pea, vetch, chickpea and lentil 28 days	Field pea, chickpea and lentil not required when used as directed; cereals 28
Brodal® Options	4	14	Not required when used as directed.
Bromicide® 200	3	8 weeks	Not required when used as directed.
Bromicide® MA	4	8 weeks	Not required when used as directed.
Cadence® (dicamba)	4	7	7
Cheetah® Gold	4	7 weeks	Not required when used as directed.
Conclude™	4	7	Not required when used as directed.
Crusader™	6	6 weeks	Not required when used as directed.
Decision®	2	49	Not required when used as directed.
Diuron ◆	6	Not required when used as directed.	Not required when used as directed.
Dual® Gold	Do not apply if heavy rains or storms that are likely to cause run-off are forecast within 2 days of application.	Canola 70; cereals 56	Not required when used as directed.
Duet® 250EC	Light rain following application will not affect results.	Not required when used as directed.	Not stated.
Eclipse® 100 SC®	2	Cereals 14; lupin 28	Not required when used as directed.
Elantra® Xtreme®	3	4 weeks	Canola, field pea 63; Chickpea, faba bean, lentil 84; Lupin 42.
Factor®	0.5	Grazing 14	Not required when used as directed.
Flame®	Rain assists soil incorporation and activation.	28	Not stated.
Flight® EC	4	42	Not required when used as directed.
Fusilade® Forte	1	Linseed, canola 21; lupin, faba bean, field pea, chickpea 49	Canola, lupin, linseed 119; faba bean 35; fieldpea, chickpea 49
Garlon™ FallowMaster™	1	Not required when used as directed.	Not required when used as directed.
Glean®	4 Rain assists soil incorporation and activation.	Nil	Not required when used as directed.
Gramoxone® 250	Light rain during or after spraying will not affect results.	Horses 7; all other stock 1	7 for pulse crops
Grazon™ Extra	1	Not required when used as directed.	Not required when used as directed.
Hammer®	1	14	Not required when used as directed.
Harmony® M	Not stated.	14	56
Hoegrass®	2	49	Not required when used as directed.
Hotshot™	1	7	Not required when used as directed.
Hussar® OD	8	28	Not required when used as directed.
Gramoxone® 250	Light rain during or after spraying will not affect results.	Horses 7; all other stock 1	7 for pulse crops
Grazon™ Extra	1	Not required when used as directed.	Not required when used as directed.

Table 3. Rainfastness – stock withholding periods – harvest withholding periods (continued)

Herbicide	Rainfastness – hours	Stock withholding period – days	Harvest withholding period – days
Hammer®	1	14	Not required when used as directed.
Harmony® M	Not stated.	14	56
Hoegrass®	2	49	Not required when used as directed.
Hotshot™	1	7	Not required when used as directed.
Hussar® OD	8	28	Not required when used as directed.
Igran®	6	7 cereals	7 cereals
Intervix®	2	5 weeks	Not required when used as directed.
Jaguar®	4	14	Not required when used as directed.
Kamba® M	4	7	Not stated.
Logran®/Logran® B-power	Not stated.	pre-emergent 49; post-emergent 14	Not required when used as directed.
Lontrel™ Advanced	3	cereals, canola 7	Cereals 70; canola, not required when used as directed.
Mataven® 90	4	42	Not stated.
MCPA	6	7	Not required when used as directed.
Midas®	6	28	Not required when used as directed.
Monza® (Post)	Immediate rainfall may affect results.	Not required when used as directed.	Not required when used as directed.
Motsa™	1	56	Not required when used as directed on chickpea, faba bean, field pea, lentil and lupin; canola
OnDuty®	2	wheat 28, canola 42	Not required when used as directed.
Paragon®	4	42	Not required when used as directed.
Precept®	2	wheat, oats, triticale, cereal rye 14; barley 28	Not required when used as directed.
Prometryn 900 DF	–	9 weeks	Not required when used as directed.
Pyresta®	6	grazing 7	Not required when used as directed.
Raptor®	2	field pea 42	Not required when used as directed.
Reglone®	Light rain during or after spraying will not affect results.	Horses 7; all other stock 1	Canola 4; lentil, chickpea 2; faba bean, field pea not required.
Weedmaster® DST®	6	Not required when used as directed.	Not required when used as directed.
Weedmaster® Argo®	1	Not required when used as directed.	7 wheat and pulses, other uses not required when used as directed.
Sakura®	2	42	Not required when used as directed.
Shogun®	1	Vetch 3	Faba bean 49; safflower 140; chickpea, field pea, lentil 84; lupin 105; canola, linseed 112
Status®	1	56	Canola; chickpea, faba bean,field pea, lentil, lupin not required when used as directed
Sencor®	6	14	Not required when used as directed.
Sharpen®	1	Do not allow livestock to graze treated weeds.	Not required when used as directed. Refer also to tankmix products.
Simazine	On firm seedbeds light rain after use usually enhances activity.	Chickpea 63; faba bean 56; canola 105	Faba bean 161
Sniper®	4	narrow-leafed lupin 42; fieldpea 28	Not required when used as directed.
Spinnaker® 700 WDG	2	14	Not required when used as directed.
Spray·Seed® 250	Light rain during or after spraying will not affect results.	Horses 7; all other stock 1	Not stated.
Starane™ Advanced	1	7	Not stated.
Stomp® 440	Light rain after application does not generally affect results.	Not required when used as directed.	Not required when used as directed.
Terbyne®	–	6 weeks	Not required when used as directed.
Tigrex®	4	7 refer to label for grazing precautions.	Not required when used as directed.
Topik®	2	28	Not required when used as directed.
Tordon™ 242	4	7	Not required when used as directed.
FallowMaster™ Tordon™	4	7	Cereal 70; canola 84
Torpedo™	3	7	Not required when used as directed.
Touchdown® Hi Tech	2	Cereals and pulses 7; nil other uses	Cereals and pulses 7; nil other uses
Triflur® X	Light rain after incorporation will not affect results.	Not required when used as directed.	Not stated.
Trifolamine®	4	7	Not stated.
Tristar® Advance	4	cereals 49	Not required when used as directed.
Valor®	Not stated	42	Not required when used as directed.
Velocity®	2	5 weeks	Not required when used as directed.
Verdict™ 520	1	Medic, clover 7; lucerne 21; vetch, canola lupin, chickpea, faba bean, field pea 28	Not required when used as directed.
Wildcat® 110 EC	4	21	wheat, triticale and cereal rye 70
2,4-D amine /2,4-D ester	6	7	Not required when used as directed.
2,4-DB	24	7	Not stated.

N/A = Not applicable, as it is a pre-emergent treatment. ◆ See *What's new in 2014* on page 3.

Water quality for herbicide application

Good quality water is important when mixing and spraying herbicides. It should be clean and of good irrigation quality. Poor quality water can reduce the effectiveness of some herbicides and damage spray equipment. Some poor results with herbicides could possibly be due to water quality problems.

Effects of water quality

Water quality depends on the source of the water (rain-fed tank, dam, river, bore or aquifer) and the season (e.g. heavy rain, drought). There are several characteristics of water quality which affect chemical performance.

Dirt: Dirty water has very small soil particles (clay and silt) suspended in it. These soil particles can absorb and bind the chemical's active ingredient and reduce its effectiveness. This applies especially to **glyphosate, paraquat** and **diquat.**

Dirt can also block nozzles, lines and filters and reduce the sprayer's overall performance and life. As a guide, water is considered dirty when it is difficult to see a 10¢ coin in the bottom of a household bucket of water.

Water hardness: Water is termed hard when it has a high percentage of calcium and magnesium. Hard water won't lather with soap and can cause some chemicals to precipitate. Susceptible chemicals often have agents added to overcome this problem.

Formulations of 2,4-DB are particularly sensitive to hard water (> 400 ppm $CaCO_3$ equivalent). Other herbicides such as glyphosate, 2,4-D amine and MCPA amine, Lontrel™ Advanced and Tigrex® can also be affected.

Hard water can also affect the balance of the surfactant system and affect properties such as wetting, emulsification and dispersion. Very hard water can also reduce the efficiency of agents used to clear dirty water.

Water pH: pH is a measure of acidity and alkalinity scaled on a range between 1 and 14. A pH of 7 is neutral, less than 7 acid and more than 7 alkaline. Most natural waters have a pH between 6.5 and 8.

In highly alkaline water (pH>8) many chemicals undergo a process called alkaline hydrolysis. This process causes the breakdown of the active ingredient into other compounds which can reduce the effectiveness of the pesticide over time. This is one reason why spray mixes should not be left in spray tanks overnight.

Very acid water can also affect the stability and physical properties of some chemical formulations.

Dissolved salts: The total amount of mineral salts dissolved in water is usually measured by the electrical conductivity (EC) of the water.

The EC of bores and dams depends largely on the salt levels in the rock and soil that surrounds them. During a drought the salinity of water increases.

Very salty water can cause blockages in equipment and is more resistant to pH changes.

Organic matter: Water containing a lot of organic matter, such as leaves or algae can block nozzles, lines and filters. Algae can also react with some chemicals, reducing their effectiveness.

Temperature: Very hot or cold water can affect the performance of some chemicals.

Improving water quality

Water needs to be tested to see whether it will affect chemical performance. There are commercial products available to reduce pH (e.g. Primabuff® BB5 and LI 700 and Hotup®), soften hard water and clear dirty water. To reduce the effects of very salty water, you may need to mix water from several sources.

Acknowledgement: Extracts from SPRAY SENSE Bulletin No.12 T. Burfitt, S. Hardy and T. Somers (1996).

The following table summarises the effect of water quality on some herbicides:–

Herbicide tolerances to water qualities:

Herbicide	Water Quality				
	Muddy	Saline	Hard	Alkaline (> pH 8)	Acidic (< pH 5)
2,4-DB			X	NR	
2,4-D or MCPA amine	✓	✓	X	NR	
2,4-D or MCPA ester	✓	Test	Test	✓	✓
Ally®	✓	✓	✓	Marginal	X
Brodal®		✓	✓	X	
Dicamba	✓	✓	NR	NR	
Diuron ◆	✓	Test	✓	✓	
Diuron ◆ + 2,4-D amine	✓	Test	X	NR	
Diuron ◆ + MCPA amine	✓	Test	X	NR	
Fusilade® Forte	✓	✓	✓	NR	X
Glean®	✓	✓	✓	Marginal	X
Glyphosate	X	✓	X		✓
Gramoxone®	X	✓	✓	✓	✓
Hoegrass®	✓	✓	✓	NR	✓
Logran®	✓	✓	✓	Marginal	X
Lontrel™ Advanced	✓	✓	X	X	
Simazine	✓	X	✓	NR	
Spray·Seed®	X	✓	✓	✓	✓
Elantra® Xtreme®	✓	✓	✓	✓	✓
Tigrex®	✓	X	X	NR	
Trifluralin		✓	✓	✓	✓
Verdict™	✓	✓	✓	NR	✓

Key:
✓ = OK.
X = Do not use.
NR = Not recommended but use quickly if there is no alternative.
Test = Mix herbicides and water in proportion and observe any instability.
Marginal = Not ideal, but acceptible.
◆ See *What's new in 2014* on page 3.

Using adjuvants, surfactants and oils with herbicides

Herbicides often need help to spread across the leaf and penetrate the leaf surface of weed targets to give best results.

Some herbicides have sufficient adjuvant and require no additional surfactants to perform well. However some do and this is usually detailed on the herbicide label. **Always read the herbicide label before opening the container and heed the information printed there.**

An **adjuvant** is any additive to a herbicide which is intended to improve the effectiveness of the herbicide. There are many products which have been developed to assist herbicides to contact the weed target, then remain and penetrate the weed leaf.

The APVMA classes adjuvants into two categories:

- adjuvants which enhance product efficacy; and
- adjuvants which improve the ease of application.

Adjuvants which enhance product efficacy

Wetters/Spreaders (enhance adhesion to and spreading of spray droplets on target surfaces by reducing the surface tension of the pesticide formulation and improving coverage) such as;

- Non-ionic surfactants – non-reactive, i.e. they do not have a negative charge or a positive charge; they remain on the leaf once dry and allow rewetting after rain, permitting additional pesticide uptake.
- Anionic surfactants – negative charge
- Cationic surfactants – positive charge
- Amphoteric surfactants
- Organo-silicate surfactants
- Acidified surfactants

Stickers (increase adhesion of pesticides to target surfaces) such as;

- Latex-based
- Terpene/pinolene
- Pyrrolidone-based

Penetrants (improve the transfer of active ingredients from the target surface to interior tissues) which may include:

- Mineral oil
- Vegetable oil
- Esterified vegetable oil
- Organo-silicate surfactants
- Acidified surfactants

Extenders (enhance the amount of time the active ingredient remains toxic by increasing resistance to environmental degradation) which may include;

- Ammonium sulphate
- Menthene-based

Humectants (increases the density/drying time of an aqueous spray deposit)

- Glycerol
- Propylene glycol
- Diethyl glycol

Adjuvants which improve ease of application

Acidifying/Buffering agents (adjusts the pH of alkaline or acidic water and minimizes decomposition of the pesticide through alkaline hydrolysis).

Anti-foaming/De-foaming agents (reduces or suppresses the formation of foam in the spray tank preventing foam overflow):

- Dimethopolysiloxane

Compatibility agents (permit the mixing of different agrochemicals by preventing antagonism between different ingredients in the spray solution) such as:

- Ammonium sulphate

Drift control agents (alter the viscoelastic properties of the spray solution yielding a coarser spray with greater mean droplet sizes):

- Polyacrylamides
- Polysaccharides

Dyes (commonly used for spot or boom spraying herbicides to detect missed spots or avoid spraying a plant or area twice).

Water conditioners (prevents reaction between hard water ions in spray solutions and suppresses formation of precipitates or salts)

- Ammonium sulphate

Factors affecting adjuvant use include:

1. **Crop safety** – addition of an adjuvant can reduce herbicide selectivity and thereby increase crop damage. This is not an issue for fallow and pre-emergent herbicides.
2. **Effectiveness or activity** – adjuvants are usually added to increase the effectiveness of herbicides. However, use of the wrong type or rate can reduce effectiveness, such as decreasing herbicide retention on leaves.
3. **Water hardness** – hard water can lead to poor mixing of the chemical with water. This particularly occurs with emulsifiable concentrates. High levels of calcium and magnesium ions bind with amine formulations causing them to be less soluble and therefore less effective.
4. **Water temperature** – low water temperature can lead to gelling in the tank. High concentration herbicides might not mix and surfactants may perform poorly.

The table on page 18 lists some of the available adjuvants.

A good reference for further information is a book called Adjuvants (Oils, Surfactants and Other Additives for Farm Chemicals), (Revised 2012 edition) available from GRDC, www.grdc.com.au/bookshop. Phone 1800 110 044.

Some adjuvants in common use

Trade name	Constituent	Company	Claim
Spray oil			
Banjo®	725 g/L methyl esters of canola oil	Nufarm	Wetting/spreading/penetrating agent for use with certain post-emergent herbicides.
Adigor™	440 g/L methyl esters of canola oil, fatty acids solvent, 222 g/L liquid hydrocarbons	Syngenta	Adjuvant for use with Axial® and other selective and non-selective herbicides as per label directions.
Uptake™ Spraying Oil	582 g/L paraffinic oil + 208 g/L non-ionic surfactants	Dow AgroSciences	Spreading/wetting agent for many selective herbicides e.g. Topik®, Verdict™ 520.
Hotwire® Spraying Oil	598 g/L paraffinic oil + 210 g/L non-ionic surfactants	Farmoz	Spreading/wetting agent for many selective herbicides.
Bonza®	471 g/L paraffin oil	Nufarm	Spreading/wetting agent for certain herbicides.
Caltex Broadcoat®	861 g/L petroleum oil	Caltex	Adjuvant/wetting agent. Used with certain non-selective herbicides.
Kwickin™/Impel™	704 g/L methyl and ethyl canolate and 196 g/L blend of surfactants, sorbitan esters and vegetable oil ethoxylate	GullfAg/ Nufarm	Improves penetration. Used with certain post-emergent herbicides.
Hasten™	704 g/L fatty acid esters of canola oil + surfactant >15%	Victorian Chemical Co.	Wetting/spreading/penetrating agent for certain post-emergent herbicides.
Activoil®	704 g/L fatty acid esters of canola oil.	SST Products	Improves penetration. Used with certain post-emergent herbicides.
Intac® Ag Oil	820 g/L canola oil	Nipro Products	Improves droplet deposition, uptake. Used with non and selective herbicides.
Supa Stik® Oil	840 g/L canola oil	Agrichem	Improves droplet deposition, uptake. Used with non and selective herbicides.
Protec® Plus	700 g/L canola oil extract	Grevillia Ag	Improves droplet deposition, uptake. Used with non and selective herbicides.
Codacide® Organic	860 g/L vegetable oil	Microcide	Suitable for use with certain non-selective herbicides.
Synertrol® Broadacre	780 g/L emulsified vegetable oil	Organic Crop Protectants	Wetter, spreader and penetrant compatible with most herbicides.
Ad-Here™	970 g/L mineral oil	Victorian Chemical Co.	Adjuvant for Select®, Verdict™, Sertin® 186 EC, Express®.
Supercharge®	471 g/L paraffin oil	Crop Care	Designed for use with Achieve® WG, Falcon® WG
Amplify®	432 g/L mineral oil	Farmoz	Designed for use with Farmoz Pentagon® herbicide.
D-C-Trate®	763 g/L petroleum oil	Caltex	Anti-evaporant/wetting agent used with certain herbicides.
DC Tron™	991 g/L petroleum oil	Caltex	See label.
Surfactant			
Agral® 600	600 g/L non-ionic surfactant	Crop Care	Wetting/spreading agent, for most selective and non selective herbicides.
Wetter TX®	1040 g/L non-ionic surfactant	Nufarm	Used with Roundup® when treating certain grasses.
BS1000®/Deltawet® 1000	1000 g/L alkoxylated alcohol	Crop Care/Tasman Chemicals	Wetting/spreading agent, for most non and selective herbicides.
Hot-up®	340 g/L non-ionic + 190 g/L mineral oil + 140 g/L ammonium sulfate	Victorian Chemical Co	Wetting, penetrating, reduce antagonism of non-selective herbicides.
Activator®	900 g/L non-ionic surfactant	Nufarm	Wetting agent. Used with most non and selective herbicides.
Wetter 1000	1003 g/L non-ionic ethoxylates	Chemag	Wetting/spreading agent, for most non and selective herbicides.
Wetspray® 600	600 g/L non-ionic surfactant	Farmoz	Wetting/spreading agent, for most non and selective herbicides.
Wetspray® 1000	1000 g/L non-ionic surfactant	Farmoz	Wetting spreading agent, for most non and selective herbicides.
Chemwet® 1000	1000 g/L non-ionic ethoxylates	Nufarm	Wetting/spreading agent, for most non and selective herbicides.
Agri-Wett® 77	377 g/L nonylphenol ethylene	Agrichem	Wetting/spreading agent, for most non and selective herbicides.
Bond® Adjuvant	450 g/L synthetic latex + 100 g/L non-ionic surfactant	Nufarm	Used when the addition of a sticker, spreader and deposit agent is required.
Compatability agent			
Liase®/Liquid Assist	417 g/L ammonium sulfate	Nufarm/Rutec	Minimise antagonism. For use with glyphosate herbicides.
Response®/Enhanzar®	425 g/L ammonium sulfate	Landmark/Western Stock Distributors	Minimise antagonism. For use with glyphosate herbicides.
Alltask Benefit®	425 g/L ammonium sulfate	Landmark	Minimise antagonism. For use with glyphosate herbicides.
Liquid Boost®	417 g/L ammonium sulfate	GullfAg	Minimise antagonism. For use with glyphosate herbicides.
Bonus®	250 g/L ammonium sulfate + 188.5 g/L alkylethoxyphosphate	Nufarm	Designed for use with Nufarm Credit® broadhectare only.
Acidifying/buffering agents			
LI 700®/Delta Lipro® 700	350 g/L soyal phospholipids + 350 g/L propionic acid	Nufarm/Tasman Chemicals	Wetter, spreader, acidifier, compatible with most herbicides except sulfonylureas.
Primabuff®	266.2 g/L nonoxinol-9 375.1 g/L phosphoric acid derivatives	Crop Care	Penetrant, buffering, acidifying, compatibility aid, used with certain non-selectives.
Agri-Buffa®	430 g/L phosphate esters, 100 g/L polyalkylene oxide	Agrichem	Wetter, spreader, acidifier, compatible with most herbicides.

Tips for tankmixing herbicides

Tankmixing herbicides is a common practice to improve weed control and broaden the weed spectrum. There may also be some advantages in helping avoid herbicide resistance problems.

Many tankmixes are included on registered herbicide labels.

Generally provided herbicides are registered for a particular use, they may be tankmixed provided they are compatible and label mixing instructions are followed.

Note that some herbicides although being physically compatible can be antagonistic to weed control.

This information is usually outlined on herbicide labels under compatability. Ratios for tank-mixing, crop safety, herbicide efficacy and special use of adjuvants, need to be considered also.

The order that herbicides are mixed is also important and the following mixing sequence is usually followed:

1. Water conditioning agents (if required – e.g. LI 700, Liase® or Primabuff®).
2. Water dispersable granules (WG)/dry flowable products (including those in water-soluble bags first).
3. Wettable powders (WP).
4. Flowables or suspension concentrates (e.g. atrazine-simazine liquids).
5. Emulsifiable concentrates (EC) (e.g. Trifluralin, Topik®, Kamba®, Bromoxynil).
6. Water-soluble concentrates (e.g. glyphosate, Amicide® Advance 700, Spray·Seed® 250, Gramoxone® 250).
7. Surfactants and oils (e.g. BS1000®, Hasten™, D-C-Trate®).
8. Soluble fertilisers.

Directory of herbicide manufacturers/distributors

Distributor/Manufacturer	Contact	Contact Person
Bayer CropScience Pty Ltd	391–393 Tooronga Road, Hawthorn East, Vic 3123. Ph: (03) 9248 6888 Fax: (03) 9248 6800. Web: www.bayercropscience.com.au	Technical Enquiries 1800 804 479
Crop Care Australasia Pty Ltd	PO Box 84, Morningside Qld 4170. Ph: 1800 111 454 Fax: (07) 3909 2010. Web: www.cropcare.com.au	Customer Service 1800 111 454
Dow AgroSciences	Locked Bag 502, Frenchs Forest NSW 2086. Ph: (02) 9776 3400 Fax: (02) 9776 3435. Web: www.dowagrosciences.com.au	Customer Service 1800 700 096
DuPont Australia	PO Box 960, 168 Walker Street, North Sydney NSW 2059. Web: www.dupont.com.au	Ag Products Hotline 1800 257 169
Farmoz Pty Ltd	Level 4 Building B, 207 Pacific Highway, St Leonards, Sydney NSW 2065. Ph: (02) 9431 7800 Fax: (02) 9431 7700. Web: www.farmoz.com.au	Peter Chalmers peter.chalmers@farmoz.com.au
Nufarm Australia Ltd	103–105 Pipe Road, Laverton North, Vic 3026. Ph: (03) 9282 1000 Fax: (03) 9282 1022. Web: www.nufarm.com.au	Technical Enquiries 1800 639 899
Sinochem	Level 8/606 St Kilda Road, Melbourne, Vic 3004 Ph: (03) 9520 8888 Web: www.sinochem.com.au	Customer Service 1800 334 096
Sumitomo Chemical Aust Pty Ltd	501 Victoria Ave, Chatswood NSW 2067. Ph: (02) 9904 6499 Fax: (02) 9904 7499. Web: www.sumitomo-chem.com.au	Chris van der Hoven chris.vanderhoven@sumitomo-chem.com.au
Syngenta Crop Protection Pty Ltd	Level 1, 2–4 Lyon Park Road, North Ryde NSW 2113. Ph: 1800 067 108 Fax: 1800 805 871. Web: www.syngenta.com.au	Syngenta Product Technical Advice Line 1800 067 108

Cleaning and decontaminating boomsprays

Cleaning and decontaminating spray equipment for the application of herbicides is essential. Many crops and pastures have been severely damaged or destroyed by the failure to ensure that spray equipment was thoroughly cleaned before use.

With the advent of crops such as canola and pulse crops in the rotation, and with more emphasis on legume-based pastures, decontamination of spray units must be carried out to ensure that there is no possibility of crop or pasture damage.

Product labels usually detail decontamination and cleaning procedures for each product.

Herbicide	Rate of agent/100 L water	Instructions for Cleaning and Decontamination
Weedmaster® DST®, Weedmaster® Argo®, Glyphosate, Raptor®, Flame®, Spinnaker®, Sniper®, Wipe Out® Plus, Sickle® 520, Precept®, Velocity®, Intervix®.	Clean Water (*Nufarm Tank and Equipment Cleaner), Absolute Boomer®	Rinse thoroughly several times with clean water before use.
Phenoxy type, salt or amine formulations (2,4-D amine, MCPA amine, 2,4-DB, dicamba).	2 L household ammonia (*Nufarm Tank and Equipment Cleaner)	Thoroughly agitate and flush a small amount of solution through the system and let stand in sprayer overnight. Flush and rinse with clean water several times before use.
Phenoxy type, ester formulations 2,4-D ester, MCPA ester, Paragon®, Midas®, Flight® EC, Tigrex®.	125 g powdered detergent (*Nufarm Tank and Equipment Cleaner)	Rinse the inside and outside of the tank and flush a small amount through the system for 15–20 minutes. Let stand for at least two hours or preferably overnight. Flush and rinse before use.
Atrazine, simazine.	125 g powdered detergent (*Nufarm Tank and Equipment Cleaner), Absolute Boomer®	Rinse with clean water before and after using the solution.
Sulfonylurea herbicides Glean®, Logran®, Ally®, Logran® B-power, Hussar® OD, Atlantis® OD.	300 mL fresh household chlorine bleach containing 4% chlorine or 300 mL BC-45 Spray Equipment Cleaning Agent (*Nufarm Tank and Equipment Cleaner) per 100 L water with agitation. Absolute Boomer® or CC49®	1. Drain and flush the tank, hoses and boom with clean water for 10 minutes. 2. Fill the tank with clean water and add the chlorine bleach. Flush the boom and allow to stand for 15 minutes, then drain. 3. Repeat Step 2. 4. Nozzles, screens and filters should be removed and cleaned separately.
Broadstrike™, Eclipse® 100 SC, Lontrel™ Advanced, Grazon™ Extra, Conclude™, Crusader™, Torpedo™.	500 mL liquid detergent DynamoMatic®, or 500 g of the powder equivalent such as Surf®, Omo®, 1 L Absolute Boomer®	Flush the system, then quarter-fill the tank with water and add the detergent. Start the pump and circulate for at least 15 minutes. Drain the whole system. Remove and clean the filters, screens and nozzles with clean water and allow to drain.
Herbicides for grass control in broadleaf crops and pastures such as Verdict™ (520 g/L).	500 mL liquid alkali liquid detergent such as Surf®, Omo®, DynamoMatic®, or 500 g of the powder equivalent. 1 L Absolute Boomer®	If broadleaf herbicides, particularly sulfonylureas (such as Glean®, Logran®), have been used in the spray equipment at any time prior to grass herbicides such as Verdict™, particular care should be taken to follow the directions for cleaning and decontamination on the label of the relevant broadleaf herbicide. Before spraying cereals, maize, sorghum or other sensitive crops, wash the tank and rinse after use. Completely drain the tank and wash filters, screens and nozzles. Drain and repeat the procedure twice. To decontaminate, wash and rinse the system as above, quarter-fill the tank, add the detergent and circulate through the system for at least 15 minutes. Drain the whole system. Remove filters, screens and nozzles and clean separately. Finally, flush the system with clean water and allow to drain.

WARNING: Grass control herbicides such as Verdict™, Fusilade® Forte, Correct®, Select®, Elantra® Xtreme® and Sertin® can be extremely damaging to winter and summer cereals. Likewise spraytank contamination of small quantities of sulfonylurea herbicides such as Glean® and Logran® can be extremely damaging to crops like canola, pulse crops and legume pastures.

***Nufarm Tank and Equipment Cleaner can also be used to decontaminate spraying equipment.**

NOTE: Rinse water should be discharged into a designated disposal area, or if this is unavailable, onto unused land away from surface water, water bodies, gardens, shelter belts and other environmentally sensitive areas.

Boomspray calibration

Boomsprays need to be calibrated regularly to work efficiently and economically.

Regular calibration ensures the right amount of chemical will be applied to the target without costly wastage.

The following template will enable you to calculate how much chemical and water to use.

In the template, enter the information asked for such as spray tank capacity, chemical rate and ground speed in the space provided in the right hand column. You will need this information to perform the calculations. The numbers in the black 'golfballs' tell you which figures you need to perform the calculations. For example, to work out your water application rate, you need to know your total spray output, your effective spray width and your actual ground speed. The 'golfball' numbers in the formula show you where to get these figures.

General Information

Item of equipment to be calibrated.	
Spray tank capacity (litres).	L ❺
Area to be sprayed (hectares).	ha ❼
Chemical used.	

Recording

What is the minimum water application rate – if any (from the chemical label)?	L/ha
Select the correct chemical application rate from the label.	L/ha ❹
Select an appropriate ground speed.	gear rpm
Record spray operation pressure.	bar or kPa
Record nozzle type and size in the spray unit. Check the rated 'water output' using the manufacturer's nozzle charts. Rated output	type size ..... mL/min
Record minimum boom height above target for these nozzles.	cm

Measuring

Record the output from every nozzle for 1 minute. 1..... 2..... 3..... 4..... 5..... 6..... 7..... 8..... 9..... 10..... 11..... 12..... 13..... 14..... 15..... 16..... 17..... 18..... 19..... 20..... 21..... 22..... 23..... 24..... Replace any nozzles that vary 10% or more from the manufacturer's correct nozzle output. (Nozzles with both higher and lower outputs must be replaced.)	Total spray output (add all nozzles) L/min ❶
Record actual effective spray width in metres by measuring the distance across the outside nozzles and adding the distance between two adjacent nozzles.	m ❷

Calculating

Actual Ground Speed*	$\frac{\text{Distance covered (m)} \times 3.6}{\text{Time taken (seconds)}}$	$\frac{(\quad) \times 3.6}{(\quad)}$	= ..... km/hr ❸

'3.6' in the calculation is a conversion factor to convert metres to kilometres (metres ÷ 1000) and seconds to hours (seconds ÷ 3600): D/1000 ÷ S/3600 = D/1000 × 3600/S = D/S × 3600/100 = D/S × 3.6.

* To calculate your actual ground speed:

- Measure a set distance, for example 100 metres.
- Make sure that the spraying conditions are like those in the area that you will be spraying.
- Record how long it takes using the appropriate gears and revs.

Now you can calculate the water application rate, how much chemical you will need to mix in each tank and how many tank loads you will need to do the whole job. Follow the steps below:

1. Copy the answers you worked out on the previous page into the boxes below. You will need these numbers to do the calculations on this page. (The numbers in black circles (e.g. ❷) tell you the step where the answer is on the previous page.

Total Spray Output	Effective Spray Width	Actual Ground Speed
..... litres/minute ❶	..... metres ❷	..... km/hr ❸

2. Work out the water application rate by using the numbers you have recorded above. Put these numbers in the correct place in the calculation below.

Water Application Rate	$\frac{❶ \times 600}{❷ \times ❸}$	$\frac{(\quad) \times 600}{(\quad) \times (\quad)}$	$= \frac{(\quad)}{(\quad)}$	❻ ..... litres/ha

'600' in the calculation is a conversion factor to convert litres per minute to litres per hour (minutes × 60), and kilometres to metres (km × 1000), then square metres (m × km × 1000 = m^2) to hectares (m^2 ÷ 10000):
60 ÷ 1000/10000 = 60 ÷ 1/10 = 60 × 10 = 600.

Does this water application rate meet the chemical label requirements? (See Part B above)	Yes	No
If not, how could you change this rate to meet this requirement?		

3. Now that you know the water application rate you can calculate how much chemical you need to mix in each tank.

Chemical Application Rate		Spray Tank Capacity
..... litres/ha ❹		..... litres ❺

How much chemical to mix in each tank?	$\frac{❹ \text{ (L/ha)} \times ❺ \text{ (L)}}{❻ \text{ (L/ha)}}$	$\frac{(\quad) \times (\quad)}{(\quad)}$ = ... litres

4. Finally, you can now work out how many tank loads you will need to do the job.

Spray mix needed for the job	❼ (ha) × ❻ (L/ha) ( ) × ( )	= ..... litres ❽
Number of tanks needed	$\frac{❽ \text{ (L)}}{❺ \text{ (L)}}$ $\frac{(\quad)}{(\quad)}$	= ..... tanks

(To crosscheck your calculations: *Number of tanks × Volume of chemical per tank = Area to be sprayed × Chemical rate)*

Source: SMARTtrain Calibration and Records Supplement 2010.

Managing your legal responsibilities in applying pesticides

Pesticides Act

The Pesticides Act 1999 is the primary legislative instrument controlling the use of pesticides in NSW and is administered by the Environment Protection Authority (EPA). **The underlying principle of the Pesticides Act is that pesticides must only be used for the purpose described on the product label and all the instructions on the label must be followed. Consequently, all label directions must be read by or explained to the user prior to each use of the pesticide.**

All pesticide users should take reasonable care to protect their own health and the health of others when using a pesticide. They should also make every reasonable attempt to prevent damage occurring from the use of a pesticide, such as off-target drift onto sensitive areas or harm to endangered and protected species.

A Regulation was gazetted in 2009 renewing the requirement for all commercial pesticide users, i.e. all farmers and spray contractors, to keep records of their pesticide application.

While no set form has to be used, records must include the following:

- full product name,
- description of the crop or situation,
- rate of application and quantity applied,
- description of the equipment used,
- address of the property, identification of the area treated and order of paddocks treated,
- date and time of the application (including start and finish),
- name, address, and contact details of the applicator and of the employer or owner if an employee or contractor is the applicator,
- estimated wind speed and direction (including any significant changes during application),
- other weather conditions specified on label as being relevant (e.g. temperature, rainfall, relative humidity).

A form that captures all the information required by the Regulation, together with notes on how to fill it in, is included in this guide. The form and notes can also be downloaded from the Department's website. A self-carboning record book is available from Murrumbidgee Rural Studies Centre, Yanco.

Records must be made within 24 hours of application, be made in legible English, and kept for 3 years.

The 2009 Regulation requires all commercial pesticide users to be trained in pesticide application.

The training of aerial applicators, pest control operators and fumigators is recognised as satisfying the requirements of the Regulation. Apart from these groups, all commercial users must have a prescribed qualification. Only domestic use, such as home gardens, is excluded, provided the pesticide is a specific domestic/home garden product. Covered by the Regulation is pest control by/on:

- public authorities, e.g. State Rail,
- golf courses, sporting fields and bowling greens,
- agricultural, horticultural, aquacultural and forestry operations,
- businesses, educational institutions, and hospitals.

The minimum prescribed training qualification is the AQF2 unit of competency, 'Apply chemicals under supervision', although owner-applicators are encouraged to train and be assessed in the two higher AQF3 competencies, 'Prepare and apply chemicals' and 'Transport, handle and store chemicals'.

Growers are recommended to undertake the SMARTtrain course, Chemical Application, or the standard ChemCert course, both of which cover the higher AQF3 competencies. For growers with literacy and/or numeracy problems, the lower level AQF2 competency will provide a minimum qualification that satisfies the Regulation.

Hazardous Chemicals legislation

Many registered pesticides are classified as hazardous chemicals even those that are not, pose some risk to the health of those who use them or are exposed to them.

The *Work Health and Safety Act 2011* (WHS), and the Hazardous Chemical section of the *Work Health and Safety Regulation 2011*, detail legal requirements of suppliers, workers and persons conducting businesses or undertakings in the workplace for hazardous chemicals management. The Act and accompanying Regulation are intended to protect workers from both the short and long term health effects of exposure to hazardous chemicals and to improve current health and safety practices by:

- provision of health and safety information to workers (including a list or register of all hazardous chemicals and an SDS (Safety Data Sheet) for each hazardous chemical),
- consultation with workers,
- training of workers,
- minimising the risks arising from hazardous chemicals exposure, and
- health surveillance (if warranted by the risk assessment in respect of organophosphates).

Both storage and use are covered by the WHS legislation.

Storage limits have changed. Premises storing large quantities require placarding of both the storage shed and the entrances to the premises. If very large quantities are stored – which would be rare on-farm, a manifest, site plan and written emergency plan are required. Consult your local WorkCover office for advice.

WorkCover NSW's *Code of practice for the safe use and storage of chemicals (including pesticides and herbicides) in agriculture* is an approved industry code of practice and provides practical guidance for farm chemical users to comply with the legislation mentioned here.

How to fill out your Pesticide Application Record Sheet

(This form includes more than the Records Regulation requires, so compulsory information is in *Italics*.)

Property/holding:

Attach a detailed property map (e.g. line drawing), showing adjoining sensitive areas, with paddocks and other features clearly identified.
Fill in the residential address.

Applicator details:

The applicator, or person applying the pesticide, must fill in their contact details. If the applicator is not the owner, e.g. a contractor or employee, then the owner's details also have to be filled in. In the case of a contractor, one copy of the record should be kept by the applicator and another given to the owner.

Sensitive area identification:

If there are sensitive areas, either on the property or on land adjoining, these should be identified in advance, and marked on the sensitive areas diagram, together with any precautions or special instructions. When using a contractor or giving the job to an employee, this section should be filled in and given to the person doing the application BEFORE the job starts. The property map with sensitive areas marked should be shown to them, and job fully discussed.

Paddock identification:

Identify the paddocks/blocks and order of treatment (if there is more than one) in the 'paddock' row of the form. This should be filled in prior to the start of application, along with the residential address. If using contractor or employee, this information should also be given to them BEFORE they start the job. Applicators using GPS systems could include a GPS reading in addition to the paddock number/name.

Crop/animal identification:

The left hand side of the Host/Pest section of the table is for crops, pastures and plants (non-crop, e.g. bushland and fallow), the right hand side for animals. *As a minimum, identify the host (crop/situation) and the weed.* It would be helpful to provide as much detail about the weed as possible, e.g. 4-leaf. Addition of details such as crop variety and growth stage are often important for QA schemes, but may also be necessary to positively identify the area treated as required by the regulation.

Product details:

The product name and rate/dose should be transcribed from the label. For tank mixes, include all products in the mixture.

If the use pattern is on permit, include the permit number and expiry date as well as the label details. The permit rate/dose may vary from that on the label. Don't forget to include the label product name.

The water rate may come from the label, or from your standard practice or as a result of your calibration. If additives or wetters are included in the mixture, it is helpful to note these.

The total L or kg can be calculated when the application is finished.

If the label has a WHP (withholding period), note this down. To calculate the date treated produce is suitable for sale, add the WHP to the date of application, e.g. if you applied a pesticide with a WHP of 7 days on the 7th December, you could harvest or graze the host 7 days later – 15th December.

Equipment details:

As a minimum, you have to fill in what equipment you used. Positive identification can be assisted by specifying the settings used for the application, e.g. nozzle type and angle, pressure. The nozzle type will usually include the angle. With pressure, the reading should be as close to the nozzle as possible. Other details are useful as a reminder for future use, or as a check on your set-up should you have a treatment failure, e.g. date of calibration and water quality. Water quality is important for herbicide efficacy. At the most basic level, water quality can be described in terms of its source, e.g. rainwater, dam water, bore water.

Weather:

As a minimum, you have to record wind speed and direction. This is better measured with instruments than estimated. Record any changes during application.

You must also record the time of day when you started, and the time when you finished.

Weather records have to be made for all equipment that distributes pesticide through the air.

Rainfall should be recorded for the 24 hours before and the 24 hours after application, unless a different figure is given in the restraints or critical comments sections of the label. Rainfall before or after application can affect efficacy.

Temperature and relative humidity should also be recorded, particularly if either or both are referred to in the restraints or critical comments sections of the label. Temperature and relative humidity can affect efficacy, increase the risk of off-target drift or may damage the host (e.g. phytotoxicity) or a combination of all three.

Spray record forms are downloadable from the NSW Department of Primary Industries website, www.dpi.nsw.gov.au/__data/assets/pdf_file/0011/188687/pesticide-application-form.pdf
At this site, there are instructions on how to fill in the form and examples of completed forms.

Spray record books containing the record forms on the website are available by ringing 1800 138 351. These spray record books contain 50 numbered, self-carboning forms and cost $12.00 each. Sequentially numbered forms are required for those producers in QA schemes where spray records are mandatory. The forms in the spray record book can be used for livestock and vertebrate pests, as well as crops and pastures.

Pesticide Application Record

Property holding (residential address):					Date:
Applicator's full name:			Owner (if not applicant):		
Address:			Address		
Phone: Mobile:	Fax:	Email:	Phone: Mobile:	Fax:	Email:
Sensitive areas (incl distances and buffers): N W E S			Comments (incl risk controls for sensitive areas):		
Paddock no/name:	Paddock area:		Order paddocks sprayed:		
Crop/situation:			Type of animals:		
Crop/pasture/variety:			Age/growth stage:		
Growth stage:			Mob/paddock/shed:		
Pest/weed/disease:			No animals treated:		
Pest density/incidence: Heavy ☐		Medium ☐		Light ☐	
Full product name:			Rate/dose:	Water rate (L/ha):	
Permit no:	Expiry date:		Adjuvants:	Total ha:	
Total L or kg:	WHP:		ESI:	Date suitable sale:	
Equipment type:	Release height:		Speed:	Nozzle type*:	Pressure:
Date last calibrated:	Water quality (pH and/or description):				
Showers ☐	Overcast ☐		Light cloud ☐	Clear sky ☐	
Rainfall (24 hours before and after)					
Before mm	During mm		After mm		
Time	Temperature	RH %	Wind speed	Direction	Variability
Start:					
Finish:					
Comments:					

* Include brand and capacity, e.g. TeeJet AI 11002.

Reducing herbicide spray drift

When applying pesticides the aim is to maximise the amount reaching the target and to minimise the amount reaching off-target areas. This results in:

1. Maximum pesticide effectiveness
2. Reduced damage and/or contamination of off-target crops and areas

In areas where a range of agricultural enterprises co-exist, conflicts can arise, particularly from the use of pesticides. **All** pesticides are capable of drift.

People have a moral and legal responsibility to prevent pesticides from drifting and contaminating or damaging neighbours' crops and sensitive areas.

Some labels now carry spray drift management instructions including buffer zones. Read and follow all label instructions.

How to minimise spray drift problems

Before spraying

- Always check for susceptible crops in the area, e.g. broad leaf crops such as grape vines, cotton, pulse crops, if using a broadleaf herbicide, and sensitive areas such as houses, schools, riparian areas
- Notify neighbours of your spraying intentions

Under the Records Regulation of the Pesticides Act it is essential that weather and relevant spray details are recorded. Forms are available from www.dpi.nsw.gov.au/agriculture/farm/chemicals/general/records

During spraying

- Always monitor meteorological conditions carefully and understand their effect on 'drift hazard'.
- Do not spray if conditions are not suitable, and stop spraying if conditions change and become unsuitable.
- Record weather conditions (especially temperature and relative humidity), wind speed and direction, herbicide and water rates, and operating details for each paddock.
- Supervise all spraying, even when a contractor is employed. Provide a map marking the areas to be sprayed, buffers to be observed, sensitive crops and areas.
- Spray when temperatures are less than 28°C.
- Minimise spray release height. (Lowest possible boom height).
- Use the largest droplets which will give adequate spray coverage. Where droplet size is mentioned on the label, follow the label instructions.
- Always use the least-volatile formulation of herbicide available.
- Maintain a down-wind buffer which may be in-crop e.g. keep a boom width from the downwind edge of the field. Where buffer zones are mentioned on the label, follow label instructions.
- If sensitive crops are in the area, use a herbicide which is the least damaging.

How many types of drift are there?

Sprayed herbicides can drift as *droplets*, as *vapours* or as *particles*.

Droplet drift is the easiest to control because under good spraying conditions, droplets are carried down by air turbulence and gravity, to collect on plant surfaces. Droplet drift is the most common cause of off-target damage caused by herbicide application. For example, spraying fallows with glyphosate under the wrong conditions often leads to severe damage to near-by establishing crops.

Particle drift occurs when water and other herbicide carriers evaporate quickly from the droplet leaving tiny particles of concentrated herbicide. This can occur with herbicide formulations other than esters. Instances of this form of drift have damaged susceptible crops up to 30 km from the source.

Vapour drift is confined to volatile herbicides such as 2,4-D ester. Vapours may arise directly from the spray or evaporation of herbicide from sprayed surfaces. Use of 2,4-D ester in summer can lead to vapour drift damage of highly susceptible crops such as tomatoes, sunflowers, soybeans, cotton and grapes. This may occur hours after the herbicide has been applied.

Vapours and minute particles float in the airstream and are poorly collected on catching surfaces. They may be carried for many kilometres in thermal updraughts before being deposited.

Sensitive crops may be up to 10,000 times more sensitive than the crop being sprayed. Even small quantities of drifting herbicide can cause severe damage to highly sensitive plants.

What factors affect the risk of herbicide spray drift?

Any herbicide can drift. The drift hazard, or off-target potential of a herbicide in a particular situation depends on the following factors:

- Volatility of the formulation applied. Volatility refers to the likelihood that the herbicide will evaporate and become a gas. Esters volatilise (evaporate) more readily than amine formulations.
- Closeness of crops susceptible to the particular herbicide being applied, and their growth stage. For example cotton is most sensitive to Group I herbicides in the seedling stage.
- Method of application and equipment used. Aerial application releases spray at ~3 m above the target and uses relatively low application volumes, while ground rigs have lower release heights and generally higher application volumes, and a range of nozzle types. Misters produce large numbers of very fine droplets that use wind to carry them to their target.
- Amount of active ingredient (herbicide) applied – the more herbicide applied per hectare the greater amount available to drift or volatilise.
- Efficiency of droplet capture – bare soil does not have anything to catch drifting droplets compared with crops, erect pasture species and standing stubbles.
- Weather conditions during and shortly after application.

Use a low volatile formulation

Many ester formulations are highly volatile when compared with the non-volatile amine, sodium salt and acid formulations. Some low volatile ester formulations may have a proportion

of high volatile esters present, so caution should be exercised when using these products.

The compromise between minimising drift and achieving ideal coverage

A significant part of minimising spray drift is the selection of equipment to reduce the number of small droplets produced. However, this in turn may affect coverage of the target, and therefore the possible effectiveness of the pesticide application.

This aspect of spraying needs to be carefully considered when planning to spray.

As the number of smaller droplets decreases, so does the coverage of the spray. Water rate may need to be increased to compensate for coverage.

Reduce spray release height

- Operate the boom at the minimum practical height. Drift hazard doubles as nozzle height doubles. If possible, angle nozzles forward 30° to allow lower boom height with double overlap. Lower heights however, can lead to more striping, as the boom sways and dips below the optimum height.
- 110° nozzles produce a higher percentage of fine droplets than 80° nozzles, however they allow a lower boom height while maintaining the required double overlap.
- Operate within the pressure range recommended by the nozzle manufacturer. Production of driftable fine droplets increases as the operating pressure is increased. Lower volumes such as 30 to 40 L/ ha produce a higher percentage of fine droplets than higher spray volumes at the same pressure and nozzle design.

Aircraft application has an inherently greater risk than ground rig application. This is due to a number of factors, including lower volume application, small droplet sizes, height of application, and turning and wing-tip vortices. An aircraft should not be used to apply herbicide in areas where highly susceptible crops are growing nearby.

Size of the area treated

When large areas are treated relatively large amounts of active herbicide is applied and the risk of off-target effects increases due to the length of time taken to apply the herbicide. Conditions such as temperature, humidity and wind direction may change during spraying.

Applying volatile formulations to large areas increases the chances of vapour drift damage to susceptible crops and pastures.

What is your 'capture surface'?

Targets vary in their ability to collect or capture spray droplets. Well grown, leafy crops are efficient collectors of droplets. Turbulent airflow normally carries spray droplets down into the crop within a very short distance.

Fallow paddocks or seedling crops are poor catching surfaces. Drift hazard is far greater when applying herbicide in these situations or adjacent to these poor capture surfaces.

The type of catching surface between the sprayed area and susceptible crops should always be considered in conjunction with the characteristics of the target area when assessing drift hazard.

Nozzle selection for post-emergent herbicides and fungicides

Overview

Nozzle selection for application of post-emergent herbicides and fungicides to cereals should primarily focus on reducing the risk of spray drift without compromising efficacy. Drift, or loss is a significant issue facing the industry and spray applicators not only have a moral but a legal obligation to adopt drift management best practise.

Late season application of fungicides and herbicides requires consideration for coverage and penetration issues that are usually not required for pre-emergent or summer/fallow applications.

Fungi typically target specific plant parts such as stems, leaves, and heads or pods. These locations must be adequately covered by droplets for the fungicide to work, and this requires special approaches regarding what nozzle to use. Likewise some weeds may need to be selectively targeted within the crop canopy, potentially a far trickier proposition than knockdown applications.

For many years the standard maxim was to spray these products with fine droplets because they were assumed to give the best coverage. But after many years of spray application research around the world, the current recommendation is to avoid fine droplets in preference to a coarse, directed spray applied at higher water volumes than what might be considered 'normal' application rates.

The problem with fine drops

In principle fine drops should mean greater coverage, that is if they actually land on the target and don't blow away or evaporate. However, small droplets travel slowly and have little inertia/momentum so are easily displaced by wind and turbulence.

Incidentally, the logic of increasing the spray pressure to force fine drops into the canopy is wrong. The acceleration of small droplets lasts only milliseconds and has no impact on the overall travel time of the droplet to the target. Spraying at high pressure not only increases the wear rate of nozzles, it also produces finer sprays with a corresponding increase in drift potential.

Coarse droplets are the go

Coarser sprays provide just as much coverage as long as water volume is sufficient (>80 L/ha). In terms of coverage, the droplet density (or number of drops/cm) is more important than droplet size, and adequate densities (efficacy) can be achieved with nozzles that produce coarse spray qualities.

Coarser droplets also maintain their original direction of travel for a longer period of time, and in the case on TwinJets (or double outlet nozzles), can cover the forward and backward sides of the target more effectively.

What nozzle?

At TeeJet, we recommend 110° TwinJets (or dual pattern nozzles) for both post-emergent herbicides and fungicides. Choices include the Turbo TwinJet (TTJ), the Air Induction Turbo TwinJet (AITTJ) or the Air Induction Dual Pattern AI3070, a new nozzle specifically designed for fungicide application in cereal crops. Double outlet nozzle bodies and caps are also available for growers who might want to mount two conventional nozzles on the one nozzle body.

Turbo TwinJet (TTJ60)

- Front flat spray 30° from vertical
- Rear flat spray 30° from vertical
- Medium – Coarse
- 1.5–6 bar
- Ideal pressure 2-4 bar
- 02 to 04 capacities
- Drift control – Good

Air Induction Turbo TwinJet (AITTJ60)

- Front flat spray 30° from vertical
- Rear flat spray 30° from vertical
- Coarse –Very Coarse
- 2–6 bar
- Ideal pressure 3–4 bar
- 02 to 04 capacities
- Drift control – Excellent

Air Induction Dual Flat Spray (AI3070)

- Front flat spray 30° from vertical
- Rear flat spray 70° from vertical
- Medium –Very Coarse
- 1.5–6 bar
- Ideal Pressure 2–4 bar
- 015 to 05 capacities
- Drift control – Excellent

Double outlet nozzle body or cap

- If using Turbo TeeJets (TT), 60°, 90° or 120° included angle
- Drift Control, drop size, pressure range – varies

The final choice will depend on the product being applied, travel speeds (or application volume), crop density and the applicators pre-spray drift risk assessment (weather conditions, location of susceptible crops etc).

Conclusions

- Use high application volumes unless the label specifically recommends against it. Higher volumes improve both coverage and penetration of the spray, and this is the single most important variable for post-emergent herbicides and fungicides.
- Avoid very fine sprays as they can lead to excessive spray drift and evaporation.
- Use TwinJets that produce coarser droplets that maintain their original direction of travel for a longer period of time, and therefore cover the leading and trailing sides of the target more effectively.
- Always try to select and operate a nozzle around its mid pressure range (e.g. AITTJ60 at 3–4 bar)

As always, any application requirements on the product label must be adhered to.

Source: Peter Alexander, TeeJet Australasia Pty Ltd.

Weather conditions to watch out for

Midday turbulence

- Updraughts during the heat of the day cause rapidly shifting wind directions. Spraying should usually stop by 11.00 am during the summer months.

High temperatures

- Avoid spraying when temperatures exceed 28°C.

Humidity

- Avoid spraying under low relative humidity conditions i.e. when Delta T (the difference between wet and dry thermometers) exceeds 10°C. Spraying when Delta T is between 8–10° is considered high risk.
- High humidity extends droplet life and can greatly increase the drift hazard of fine droplets under inversion conditions. This results from the increased life of droplets smaller than 100 microns.

Wind

- Avoid spraying under calm conditions.
- Ideal safe wind speed is 7–10 km an hour.
  Leaves and twigs are in constant motion – a light breeze.
- 11–14 kph (moderate breeze) is suitable for spraying if using low drift nozzles or higher volumes application (80–120 L/ha).
  Small branches move, dust is raised and loose paper moving – a moderate breeze.

Surface inversions

What are surface inversions?

Surface inversions are layers of the atmosphere at the earth's surface in which temperature increases with height. This is the inverse of the normal temperature decrease with height.

Hazards of surface inversions

Surface inversions strongly suppress the dispersion of airborne pesticides and the like. Surface inversions can cause airborne pesticides to:

- remain at high concentrations for long periods over and close to the target,
- travel close to the surface for many kilometres in light breezes,
- move downslope and concentrate into low lying regions, and
- be transported often in unpredictable directions.

Radiation inversions – the most hazardous

Surface inversions usually begin to occur near sunset after the ground cools rapidly by losing heat energy through infrared radiation upward into space. That radiation passes through clear air with little effect. As the ground cools, the air in contact with the ground begins to cool directly by conduction leading to the lowest layer of air being cooler than higher layers. This is referred to as radiation cooling.

Inversions caused by radiation cooling – called radiation inversions – are the most hazardous to pesticide applications because they are the most likely to severely restrict dispersion and promote transport at high concentrations of the airborne pesticides.

Radiation inversions occur most nights. Only when winds are strong enough to completely mix the lowest layers of the atmosphere and/or cloud cover severely restricts surface heating and cooling is there a chance that surface radiation inversions won't form overnight.

Radiation inversions also form over sloping terrain when air in contact with the ground is cooled by terrestrial radiation. The cooled layer remains quite shallow over the slope and is typically only 2 m to 10 m deep because gravity continually pulls it downward; causing drainage winds. Drainage-wind advection of cool air away from the slope and over or into lower lying regions may initiate a drainage inversion or intensify an existing radiation inversion. Drainage inversions, once formed, have similar attributes to radiation inversions. Airborne pesticides can be transported long distances downhill, over flat terrain toward the lowest lying regions and into valleys by drainage winds.

Radiation and drainage inversions have caused substantial damage in the northern river valleys to cotton crops and to vineyards in the Murray Valley.

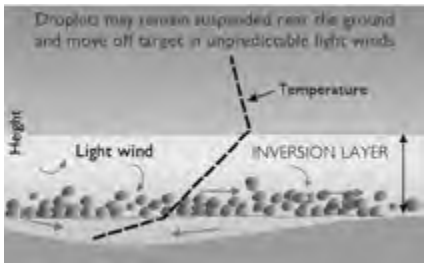
Radiation and drainage inversions typically begin in the evening at about sunset as the ground surface cools and the air in contact with the surface loses sufficient heat by conduction to become colder than the air immediately above. With continued overnight cooling, inversions usually intensify and deepen up to the time of the overnight minimum temperature.

How to anticipate and recognise radiation inversions

The potential for inversions to occur and to adversely hold high concentrations of airborne pesticides near the surface should always be anticipated between sunset and up to an hour or two after sunrise; unless one or more of the following conditions occur:

- There is continuous overcast, low and heavy cloud.
- There is continuous rain.
- Wind speed remains above 11 km/hr for the whole period between sunset and sunrise. Be mindful that established inversions can sometimes still occur when winds are in excess of 11 km/hr.

Source: APVMA 'Surface Inversions for Australian Agricultural Regions', www.apvma.gov.au



Source: Bureau of Meteology.

Where to find helpful meteorological information

Real time data needs to be collected in the paddock at the time of spraying. This can be done with:

- Handheld units which measure temperature, Delta T and wind speed.
- On-farm weather stations. Some can now be accessed by mobile phone.

Hourly data

Hourly data from the Bureau of Meteorology (BOM) weather stations including temperature, Delta T, wind speed and direction is available for the previous 72 hours from: www.bom.gov.au/weather/nsw/nsw-observations-map.shtml – click on the relevant town.

This data can help in planning spray activities and is useful for developing an understanding of the current daily patterns of meteorological conditions.

Meteograms™

Meteograms™ provide 7 day forecasts of: • temperature • relative humidity • Delta T • rainfall • wind speed • wind direction.

Meteograms™ are very helpful in planning spray programs for periods of lowest drift risk and highest pesticide efficacy.

Meteograms are available either free or by subscription. Some examples can be found at email address sent from weatherzone, www.spraywisedecisions.com.au or www.syngenta.com.au (you need to log in for free.

Night spraying

Spraying during the night and early morning is common, especially during the warmer summer months where controlling fallow weeds is an important agronomic practice. The popularity of spraying at night has also lifted with the introduction of GPS guidance. The main reason for night spraying is because in many cases Delta T conditions less than 8–10 are more common at night or in the early part of the morning, and the risk of physical drift by high wind is lower.

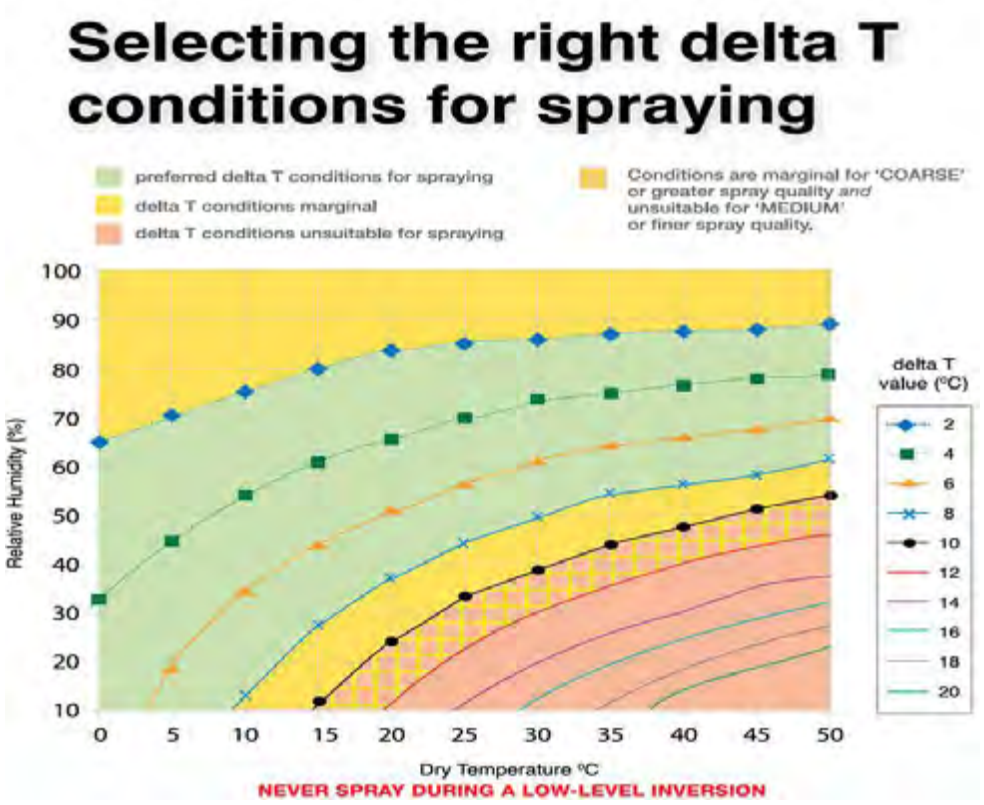
However, the risk of inversions is nearly always greater at night or in the early morning. Spraying during inversion conditions has resulted in massive off-target damage in recent seasons, particularly to sensitive crops such as cotton and grapes.

Important considerations when spraying at night.

- As a result of the APVMA's spray drift initiative, labels will increasingly include the Restraint, 'DO NOT apply during surface temperature inversions conditions at the application site.' Any Restraint is an absolute prohibition. Since surface inversion conditions are prevalent at night, night spraying should be avoided unless the applicator can demonstrate an inversion was not present.
- Plan ahead for spraying by checking local forecast conditions and meteograms.
- Continuously check for inversions before and during spraying. If they are present DO NOT spray. Observe dust habits behind ground rigs and/or use smoke generators to help identify inversion conditions.
- Only spray with nozzles that produce coarse or very coarse droplets. This may mean spraying slower rather than faster. Coarse droplets will still provide effective control when spraying summer weeds.
- Use adjuvants that minimise fine droplets.
- Ensure boom height is not operated higher than necessary.
- Be aware of local off target risks, such as sensitive crops etc.

Night spraying therefore carries some inherently high risks that spray applicators should be continuously monitoring and managing.

Source: M Scott, Agricultural Chemicals Officer, NSW Department of Primary Industries, Orange

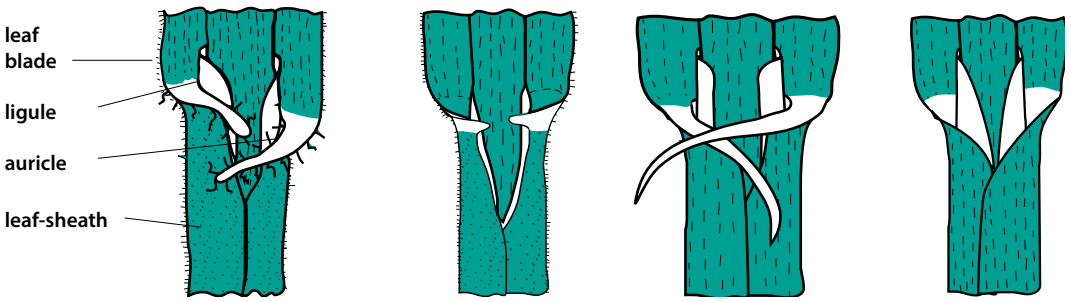


Further information about weather conditions and spraying can be found on the following websites:

www.grdc.com.au/GRDC-FS-SprayPracticalTips
www.grdc.com.au/Resources/Bookshop/2014/01/Weather-essentials-for-pesticide-application

Identifying cereal seedlings

It is extremely important to accurately identify cereal plants, before applying a herbicide for weed control. Cereal seedlings are identified by looking at four important characteristics. This involves taking a close look at the junction of the leaf blade and the leaf sheath (a hand lens may be useful).



	*Wheat and triticale**	*Rye*	*Barley*	*Oats and wild oats***
Ligule	medium	short	medium	medium
Auricle	medium blunt hairy	short hairless	long pointed hairless	absent
Leaf blade twist	clockwise	clockwise	clockwise	anticlockwise
Leaf hairiness	hairy	inconsistent	± hairless	± hairless

Important characteristics are underlined.

* Wheat and triticale are difficult to distinguish by vegetative characters. It is possible to distinguish them during early growth by uprooting the seedling and observing the grain shell. Wheat grain shells are a light colour, and oval. Triticale grain shells are darker and longer.

** Oats cannot be distinguished from wild oats during vegetative growth.

Preferred options

Preferred options in this booklet aim to help farmers and advisers to select the more reliable and effective herbicides available from the vast range of registered products.

Two types of preferred options are indicated with the registered herbicide rate shown within.

is a preferred option where **NO** legumes are in association with the cereal crop.

is a preferred option where legumes are present with the cereal crop, either sown or volunteer.

In no way are preferred options binding on advisers or farmers; they are a guide only. Specific weeds and circumstances need to be considered in making recommendations.

Preferred options should be considered in conjunction with appropriate herbicide resistance strategies.

A preferred option is for a weed species controlled by a herbicide in a specific crop. More than one herbicide may have a preferred option for a specific weed at a given stage of crop growth.

A preferred option may be for application only at a specific stage of growth of the crop even though the herbicide is registered for application at other stages and uses. They may apply only to a specific geographic area of NSW owing to other constraints – e.g. the effect of picloram on clover-based pastures.

Requirements for preferred option status are:

- Registered in commercial use for at least two seasons.
- Proven to be sound, reliable and easy to use under farm conditions.
- Shown efficacy better than other herbicides in at least three districts.
- If possible, supported by departmentally conducted trial or demonstration results.
- Cost effectiveness. Not necessarily the cheapest available.
- Interstate information will be considered.

Table 4. Herbicides for fallow commencement and/or maintenance – Grass weed control

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Imazapic 240 g/L **Flame® Pre-emergent**		Paraquat 250 g/L **Gramoxone® 250**	Paraquat + Diquat 135 + 115 g/L **Spray.Seed® 250**	Amitrole 250 g/L + Paraquat 125 g/L **Alliance®**	Glyphosate 570 g/L **Roundup Ultra® Max**	Glyphosate 540 g/L **Weedmaster® Argo®**	Glyphosate 470 g/L **Weedmaster® DST®**
Grass weeds	**(litres)**		**(litres)**	**(litres)**	**(litres)**	**(litres)**	**(litres)**	**(litres)**
annual phalaris	–	Fallow residual pre-emergent herbicide. Apply to paddock at least 4 months before planting wheat, barley, chickpea. 200 mm rainfall required for plant-back. See Table 2. Best applied to dry soil surface prior to weeds germinating. Northern NSW only.	1.2–2.4	1.2–2.4	–	0.625–0.95	0.33–0.67	0.38–1.5
annual ryegrass	–		1.2–2.4	1.0–3.2	3.0–4.0	0.95-1.25	1.0–1.3 e	1.15–1.5
barley grass	–		1.2–2.4	1.0–3.2	3.0–4.0	0.625–0.95	0.33–1.0	0.38–1.5
barnyard grass	0.15–0.2		1.2–2.4	1.2–2.4	3.0–4.0	0.625–1.3	0.67–1.3	0.76–1.5
blowaway grass	0.15–0.2		–	–	–	–	–	–
brome grass	–		1.2–2.4	1.0–3.2	3.0–4.0	0.95-1.25	1.0–1.3	0.96–1.5
button grass	0.15–0.2		–	–	–	0.625–1.3	0.67–1.3	0.76–1.5
cereals – volunteer	–		1.2–2.4	1.0–3.2	3.0–4.0	0.625–0.95	0.33–1.0	0.38–1.5
couch	–		–	–	–	1.2–1.9 b	1.0–2.0 b	1.15–2.3 b
Johnson grass	–		–	–	–	1.2–1.9	1.3–2.0	1.15–2.3
liverseed grass	0.15–0.2		1.2–2.4	1.2–2.4	–	0.625–1.3	0.67–1.3	0.76–1.5
native millet	–		–	–	–	0.625–1.3	0.67–1.3	0.76–1.5
nut grass	–		–	–	–	1.9 + 1.9 c	2.0 + 2.0 c	2.3 + 2.3 c
phalaris – perennial	–		–	–	–	1.2–1.9	–	1.44–1.9
pigeon grass	–		–	–	–	–	–	–
sorghum – volunteer	–		–	–	–	0.425–1.3	0.67–1.3	0.76–1.5
spiny burrgrass	–		–	–	–	–	–	–
stinkgrass	0.15–0.2		–	1.2–2.4	–	0.425–1.3	0.67–1.3	0.76–1.5
summer grass	–		–	–	–	0.425–1.3	0.33–1.0	0.38–1.5
sweet summer grass	–		–	–	–	–	0.5–1.3	0.57–1.5
vulpia	–		1.2–2.4	1.0–3.2	–	0.95-1.25 a	1.0–1.3 e	1.15–1.5
wild oats	–		0.6–2.0	1.0–3.2	3.0–4.0	0.625–0.95	0.33–1.0	0.38–1.15
windmill grass	–		–	–	–	–	–	–
winter grass	–		1.2–2.4	–	–	0.95-1.25	–	0.96–1.5
Yorkshire fog	–		–	–	–	1.2–1.9	–	–
Rec. water vol L/ha boom	**50 min**		**50–200**	**50–200**	**50–200**	**80 max**	**25–100**	**25–100**
Wheat plant back	**4 months**		**1 hr**	**1 hr**	**0 hr c**	**1 hr**	**6 hr**	**6 hr**
Herbicide group	**B**		**L**	**L**	**L + Q**	**M**	**M**	**M**

a = When treating dense populations, use higher rate, add Wetter TX® and water volumes > 70 L/ha.
b = Best in conjunction with multiple applications and/or cultivation.
c = See label for program.
e = Minimum water rate of 70 L/ha and appropriate nozzles. See label.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014

EXPERIENCE THE POWER OF A SMARTER GLYPHOSATE

NEW

Nufarm weed master® ARGO®

dual salt technology® herbicide

VERY SMART AND VERY STRONG

It's the combination of intelligence and great strength that sets new weedmaster® ARGO® apart. It's strong enough to provide fast knockdown, and smart enough to provide added benefits like a 20 minute commercial rainfast offer* and solve the compatibility issues that affect some other glyphosate products. So mixing it with key partner products like Amicide® Advance 700 makes powerful one-pass weed control easy.

Find out more at **weedmasterargo.com.au**

* weedmaster ARGO delivers commercially acceptable weed control, provided it is applied according to label directions, even just 20 minutes prior to a shower. If weed control fails, Nufarm will replace up to 100% of your initial use amount of weedmaster ARGO for re-treatment. Contact your local reseller or Nufarm on www.nufarm.com/AU/SalesService for claims. Benefits provided to the farmers by this Rainfast Offer are in addition to other rights and remedies available to the consumer under the law.

No one knows glyphosate better than Nufarm.

Nufarm

NUF0102

Table 5. Herbicides for fallow commencement and/or maintenance – Broadleaf weed control – Part 1

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Tribenuron-methyl 750 g/kg **Express®**	Oxyfluorfen 240 g/L **Goal®**	Carfentrazone ethyl 400 g/L **Hammer® 400EC** f	Pyraflufen-ethyl 2.1 g/L 2,4-D LV Ester 421 g/L **Pyresta®**	Triclopyr + Picloram + Aminopyralid 300 + 100 + 8 g/L **Grazon™ Extra**	Dicamba 500 g/L **Kamba® 500** g	Dicamba 700 g/kg **Cadence®**	Aminopyralid 10 g/L + Fluroxypyr 140 g/L **Hotshot™**	Paraquat + Diquat 135 + 115 g/L **Spray.Seed® 250**	Amitrole 250 g/L +Paraquat 125 g/L **Alliance®**	Glyphosate 570 g/L **Roundup Ultra® Max**	Glyphosate 470 g/L **Weedmaster® DST®**
Broadleaf weeds	(grams)	(millilitres)	(millilitres)	(litres)	(litres)	(litres)	(grams)	(litres)	(litres)	(litres)	(litres)	(litres)
amaranthus	25	–	–	–	–	0.32–0.56 b	230–400	–	–	3.0–4.0	–	–
amsinckia	–	–	–	0.25–0.5 i	–	–	–	–	–	–	–	–
blackberry nightshade	–	–	–	–	0.2–0.4 (S) b	0.32–0.56	230–400	–	–	–	–	–
black bindweed	25 b	–	–	–	–	0.28	200	0.5 g i	–	–	0.425–1.3	–
bladder ketmia	–	–	–	–	–	–	–	–	1.6–2.4	3.0–4.0	0.625–1.3	0.76–1.15 n
Boggabri weed	–	–	–	–	–	–	–	–	1.6–2.4	–	0.425–1.3	0.38–1.45
burrs – Bathurst	–	–	–	–	–	0.32–0.56	230–400	–	1.6–2.4	–	1.2–1.9	0.76–2.3
burrs – noogoora	–	–	–	–	–	0.32–0.56 b	230–400	–	–	–	0.625–1.3	0.76–1.15 n
caltrop/yellow vine	25	–	–	–	–	0.32–0.56 b	230–400	–	1.6–2.4	–	0.425–1.3	0.38–1.15
canola – volunteer	–	–	–	–	–	–	–	–	1.8–2.4 m	3.0–4.0 m	–	–
capeweed	–		15–45	0.25–0.5 i	–	0.16–0.24 b	–	–	1.2–3.2	3.0–4.0	0.95–1.25	0.96–1.5
charlock	–	–	–	–	–	–	–	–	1.2–3.2	–	–	–
chickpea – volunteer	–	–	–	–	–	–	–	–	–	–	–	–
chickweed	–	–	15–45	0.25–0.5 i	–	–	–	–	–	–	–	–
clover	–	–	–	–	–	0.2	140	–	1.2–3.2 p	–	1.2–1.9 c	–
corn gromwell	–	–	–	–	–	–	–	–	1.2–3.2	–	–	–
cudweed	–	–	–	–	–	–	–	–	–	–	–	0.76–1.15
datura (thornapple)	20 b	–	–	–	–	–	230–400	–	1.6–2.4	–s	0.625–1.3	0.76–1.15 n
deadnettle	25 b	75	–	0.25–0.5 i	–	–	–	–	1.2–3.2	–	0.425–1.3	0.575–1.5
docks	–		–	0.5 i e	–	0.28–0.56	200–400	–	–	–	1.2–1.9	–
erodium (storksbill)	–	75	15–45	0.25–0.5 i	–	–	–	–	1.2–3.2 z	3.0–4.0	1.2–1.9	–
fat hen	–	–	–	–	–	0.28–0.56	200–400	–	1.6–2.4	–	–	–
field pea – volunteer	–	–	–	–	–	–	–	–	1.2–1.8 p	3.0–4.0	–	–
fleabane	–	–	–	–	–	–	–	–	–	3.0–4.0	1.15 q r	–
fumitory	–	–	–	–	–	–	–	–	1.2–3.2	–	–	0.76–1.15
goosefoot	–	–	–	–	–	–	–	–	–	3.0–4.0 j	0.625–1.3	0.76–1.15
ground cherry–annual	–	–	–	–	–	–	–	–	–	–	0.625–1.3	0.76–1.15 n
heliotrope – white	–	–	–	–	–	–	–	–	–	–	–	–
Hexham scent	–	–	–	–	–	0.28	200	–	1.6–2.4	–	–	–
hoary cress	–	–	–	–	–	0.28 a	200 a	–	–	–	1.2–1.9	1.15
horehound	–	–	–	–	–	0.32–0.56	230–400	–	1.2–3.2	–	–	–
lucerne (established)	–	–	–	–	0.3–0.5 b	–	–	–	–	–	–	–
lupin – volunteer	–	–	–	–	–	–	–	–	1.2–1.8 p	–	–	–
marshmallow	–	75 u	15–45	0.5–0.9 i	–	–	–	–	1,2–1.8	3.0–4.0	–	–
medic	30	–	–	0.25–0.5 i	–	–	–	–	1.2–3.2 p	3.0–4.0 h	–	–
melons	–	–	–	–	0.2–0.4 b	–	–	–	1.6–2.4	–	0.625–1.3 k l	0.74–1.5 k l
Mexican poppy	–	–	–	–	–	–	–	–	–	–	0.625–1.3	0.76–1.15
mustards	–	–	–	0.5 i h	–	–	–	–	1.2–3.2	3.0–4.0	0.95–1.25	0.38–1.5
New Zealand spinach	20	–	–	–	–	0.28	200	–	1.6–2.4	–	0.625–1.3	0.76–1.15

Always add non-ionic surfactant at 100 mL/100 L spray volume. For best results tankmix with recommended label rates of glyphosate.

Always apply with recommended label rates of glyphosate. Addition of Goal® will improve knockdown and increase speed of control.

Always apply with recommended label rates of knockdown herbicides.

Always add with recommended rate of glyphosate at no less than coarse to very coarse droplets.

Tankmix Roundup® CT + adjuvant for control. Caution: check minimum recropping periods in Table 1.

Observe plant-back period with broadleaf crops.

Observe plant-back period with broadleaf crops. See Table 1.

Observe plant-back periods – see Table 1.

Add wetting agent when water volume is above 100 L/ha.

Parthenium weed	–	–	–	–	–	0.32–0.56	230–400	–	–	–	–	–
Paterson's curse	–	75	15–45	0.25–0.5 i	–	–	–	–	1.8–3.2	3.0–4.0	0.95–1.25	1.15–1.5
peachvine (cowvine)	–	–	–	–	0.2–0.4 b	–	–	–	–	3.0–4.0	–	–
peppercress	–	–	–	–	–	–	–	–	–	–	–	–
pigweed	20 b	–	–	–	–	–	–	0.5 g i	–	–	0.625–1.3	0.38–1.5 n
plantain	–	–	–	–	–	–	–	–	–	–	1.2–1.9	–
potato weed	–	–	–	–	–	–	–	–	–	–	–	–
radish – wild	–	–	15–45	0.25–0.5 i	–	–	–	–	1.2–3.2	3.0–4.0	0.95–1.25	1.15–1.5
rough poppy	–	–	–	–	–	–	–	–	1.2–3.2	–	–	–
saffron thistle	–	–	–	–	–	0.28 a	200 a	–	1.2–3.2	–	0.95–1.25	0.76–1.5
shepherd's purse	–	–	–	–	–	–	–	–	1.2–3.2	–	–	–
skeleton weed	–	–	–	–	–	–	–	–	–	–	–	–
slender thistle	–	–	–	–	–	–	–	–	–	–	–	–
sorrel	–	–	–	–	–	0.28 a	200 a	–	–	–	1.2–1.9	–
soursob	–	–	–	–	–	–	–	–	–	3.0–4.0	0.95	1.15
sowthistle	25	–	–	0.5 i	0.2–0.4 b	–	–	–	–	3.0–4.0	0.425–1.3	0.575–1.5
spear thistle	–	–	–	–	–	0.32–0.56	230–400	–	–	3.0–4.0	0.95–1.25	0.75–1.15
spiny emex	–	–	15–45	–	–	0.28–0.56	200–400	–	1.2–3.2	3.0–4.0	–	–
spurge	–	–	–	–	–	–	–	–	–	–	–	0.76–1.15
stagger weed	–	–	–	–	–	–	–	–	–	–	–	–
star thistle	–	–	–	–	–	0.32–0.56	230–400	–	–	–	–	–
stinging nettle	–	–	–	–	–	–	–	–	1.2–3.2	–	t	t
stinking goosefoot	–	–	–	–	–	–	–	–	–	–	0.625–1.3	0.76–1.15
sub. clover	–	–	15–45	0.5 i	–	0.2	140	–	1.2–3.2 p	–	1.2–1.9 c z	–
sunflower	–	–	–	–	–	0.28–0.56	200–400	–	–	–	–	0.575–1.5
turnip weed	20	–	–	0.25–0.5 i	–	–	–	–	1.2–3.2	–	0.625–1.3	0.76–1.15 n
variegated thistle	–	–	–	–	–	0.28	200	–	–	3.0–4.0	0.95–1.25	0.575–1.5
vetch	–	–	–	–	–	0.28	200	–	1.2–3.2	–	–	–
wild lettuce	20 b or 30	–	–	–	–	–	–	–	–	3.0–4.0	0.625–1.3	0.76–1.15 n
wild turnip	–	–	–	0.25–0.5 i	–	–	–	–	1.2–3.2	3.0–4.0	0.95–1.25	0.76–1.5 n
wireweed	–	–	–	–	–	0.28	200	–	1.2–3.2	3.0–4.0	0.625–1.3	0.76–1.15 n
Rec Water Vol L/ha Boom	**>50**	**30–200**	**50–150**	**60–150**	**50 min**	**50 min**	**50 min**	**80 min**	**50–200**	**50–200**	**80 max**	**25–100**
Wheat plant-back	**3 days**	**24 hr**	**0 hr**	**1–3 days**	**2–4 Mths**	**1–14 days**	**1–14 days**	**4 months g**	**1 hr**	**0 hr**	**1 hr**	**6 hr**
Herbicide group	**B**	**G**	**G**	**G + I**	**I**	**I**	**I**	**I**	**L**	**L + Q**	**M**	**M**

a = Add 0.8 L/ha 2,4-D amine for control.
b = Add glyphosate as per label for control.
c = Tankmix with dicamba for improved control.
d = See label for rates as they vary from Summit RAZE®.
e = Curled dock only.
f = Hammer® also available in 240 g/L, see label for rates.
g = Northern NSW only.
h = Indian hedge mustard only.
i = Add glyphosate – see label.
j = Chenopodium pumilio only.
k = Add Garlon™ 600 at 80–160 mL/ha for prickly/paddy melons or 120–160 mL/ha for Afghan/camel melons.
l = Use glyphosate alone for camel melon only.
m = Includes Roundup-Ready® canola.
n = Prior to stem elongation. After this add Amicide® Advance 700 for control. See label.
p = Add 5 g/ha Ally® or 0.5 L/ha dicamba for control.
q = A minimum of 1.18 L/ha Weedmaster® Argo® + 650 mL–1.1 L/ha Amicide® Advance 700.
r = A minimum of 1.18 L/ha Weedmaster® Argo® + 650 mL–1.1 L/ha Amicide® Advance 700 + followed by 1.6–2.0 L/ha Nuquat®.
t = Add Goal®/Striker®/Spark® at 75 mL/ha for control.
u = Small flowered Mallow.
NS = Not stated.
(S) = Suppression only.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 5. Herbicides for fallow commencement and/or maintenance – Broadleaf weed control – Part 2

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Metsulfuron-methyl 600 g/kg **Ally®**		Imazapic 240 g/L **Flame® Pre-emergent** NNSW only		Bromoxynil 200 g/L **Bromicide® 200**	2,4-D amine 700 g/L **Amicide® Advance 700**	2,4-D amine 800 g/kg **Baton® Low**	2,4-D amine 300 g/L **Various trade names** a	2,4-D LV ester 680 g/L **Estercide® Xtra 680**	2,4-D amine 300 g/L + Picloram 75 g/L + 7.5 g/L aminopyralid **FallowBoss™ Tordon™**	Fluroxypyr 333 g/L **Starane™ Advanced** b		Triclopyr 755 g/L **Garlon™ Fallowmaster™**	
						Note: Use these herbicides with caution when sensitive crops such as cotton, soybeans, grapes etc. are grown nearby.								
Broadleaf weeds	(grams)		(litres)		(litres)	(litres)	(kilograms)	(litres)	(litres)	(litres)	(litres)		(millilitres)	
amaranthus	–	For fallow control, see label for tankmix options with glyphosate products. Add wetting agent as required. Not before undersowing pasture legumes.	0.15–0.2	**Fallow residual pre-emergent herbicide.** Apply to paddock at least 4 months before planting wheat, barley and chickpea. See Table 2. Best applied to dry soil surface **before** weeds germinate. Northern NSW only. Requires 200 mm rainfall before planting.	–	0.745–1.15 d	0.4–1.3	1.8–2.7	0.8	–	–	Add Uptake™ spraying oil at 0.5 L/100 L of spray. When mixing with Roundup® CT to control grasses refer to Roundup® CT label.	–	Add Uptake™ spraying oil at 0.5 L/100 L water. Do not use oils when tankmixing with Roundup® CT. See label for melon species, size and chemical rate.
amsinckia	5 or 7		–		–	–	–	–	–	–	–		–	
blackberry nightshade	–		–		–	0.515–0.745 d	0.4–1.3	1.2–1.8	–	–	–		–	
black bindweed	–		–		1.5 i	–	–	–	–	–	0.45 h		–	
bladder ketmia	–		–		–	0.745–1.15 d	–	1.8–2.7	–	–	0.3 h		–	
Boggabri weed	–		0.15–0.2		–	–	–	–	–	–	–		–	
burrs – Bathurst	–				–	0.515–0.745 d	0.4–1.3	1.2–1.8	0.8–3.3	–	0.45		–	
burrs – noogoora	–		–		–	0.745–1.15 d	0.4–1.3	1.8–2.7	–	–	0.45		–	
caltrop/yellow vine	–		0.15–0.2		–	0.28–0.815 d	0.4–1.3	0.66–1.2	0.62–0.8	–	0.3 h		–	
canola – volunteer	–		–		–	0.88 or 1.2 d	0.4–1.3 t	1.8–2.7 t	0.9–1.3 t	–	–		–	
capeweed	–		–		–	–	–	–	0.53–0.8	–	–		–	
charlock	5		–		–	0.35–0.575 d	0.4–1.3	0.9–1.2	0.41–0.8	–	–		–	
chickpea – volunteer	5		–		–	–	–	–	–	–	–		–	
chickweed	5		–		–	–	–	–	–	–	–		–	
clover	5		–		–	0.545–0.745 d	0.4–1.3	1.2–1.8	0.62–0.8	–	–		–	
corn gromwell	–		–		–	–	–	–	–	–	–		–	
cudweed	–		–		–	–	–	–	–	–	–		–	
datura (thornapple)	–		–		–	0.515–0.745 d	0.4–1.3	1.2–1.8	0.41–1.7	–	0.45		–	
deadnettle	5		–		–	–	–	–	0.8	–	–		–	
docks	5 or 7		–		–	0.39–0.515 d	–	0.9–1.2	1.7–2.5	–	–		–	
erodium (storksbill)	–		–		–	0.515–0.745 d	–	1.2–1.8	0.8	–	–		–	
fat hen	–		–		–	0.745–1.15 d	0.4–1.3	0.8–2.7	0.41–0.8	–	–		–	
field pea – volunteer	7		–		–	0.39–0.515 d	–	0.9–1.2	–	–	–		–	
fleabane	–		–		–	0.65–1.1 d f j	–	–	–	0.7	–		–	
fumitory	5		–		–	0.28–0.815 d	–	0.66–1.2	0.8–3.3	–	–		–	
ground cherry – annual	–				–	0.745–1.15 d	–	1.8–2.7	–	–	0.45		–	
heliotrope – white	–		–		–	–	–	–	–	–	–		–	
Hexham scent	–		–		–	–	–	–	1.5–1.7	–	–		–	
hoary cress	–		–		–	–	0.4–1.3	–	0.8–2.1	–	–		–	
horehound	–		–		–	0.515–0.745 d	–	1.2–1.7	1.7–3.3	–	–		–	
lucerne (established)	–		–		–	–	–	5.0 v	–	–	–		–	
lupin – volunteer	5		–		–	0.39–0.515 d	0.4–1.3	0.9–1.2	0.41–1.7	–	–		–	
marshmallow	–		–		–	0.515–0.745 d	–	–	–	–	0.6		–	
medic	5		–		–	0.39–0.515 d	–	0.9–1.2	–	–	–		–	
melons	–		–		–	0.745–1.15 d	–	1.8–2.7	0.41–0.18	–	–		65–130 e	
Mexican poppy	–		–		–	0.745–1.15 d	–	1.8–2.7	0.8–1.5	–	–		–	
mintweed	–		0.15–0.2		–	–	0.4–1.3	–	0.8–1.5	–	–		–	
mustards	5		–		–	0.28–0.815 d	0.4–1.3	0.66–1.2	0.41–2.5	–	–		–	

Tankmix glyphosate CT or Credit® + surfactant at label rates.

New Zealand spinach	–	–	–	0.28–0.815 d	0.4–1.3	0.66–1.2	0.8	0.7	–	–
parthenium weed	–	–	–	–	–	–	–	–	–	–
Paterson's curse	5 or 7	–	–	0.39–0.515 d	0.4–1.3	0.9–1.2	0.8–1.7	0.7	–	–
peachvine (cowvine)	–	0.15–0.2	1.4–2.1	–	–	1.8–2.7	–	–	0.3 h	–
peppercress	–		–	–	–	–	–	–	–	–
pigweed	–	0.15–0.2	–	–	–	–	–	–	0.25–1.125 h	–
potato weed	–	–	–	0.745–1.15 d	0.4–1.3	1.8–2.7	–	–	–	–
radish – wild	–	–	–	0.28–0.815 d	0.4–1.3	0.66–1.2	–	0.35–0.7	–	–
rough poppy	5	–	–	–	0.4–1.3	–	2.1–2.9	0.35–0.7	–	–
saffron thistle	–	–	–	0.39–0.515 d	0.4–1.3	0.9–1.2	0.41–2.5	0.35–0.7	–	–
scotch thistle	–	–	–	–	–	–	–	–	–	–
shepherd's purse	5	–	–	0.515–0.745 d	0.4–1.3	1.2–1.8	0.8	0.7	–	–
skeleton weed	7 (S)	–	–	0.515–0.745 (S) d	0.4–1.3	1.2–1.8 (S)	0.8–1.7	0.7	–	–
slender thistle	–	–	–	–	0.4–1.3	–	0.8–3.3	0.7	–	–
sorrel	5	–	–	0.515–0.745 d	0.4–1.3	–	–	–	–	–
soursob	5	–	–	–	–	–	–	–	–	–
sowthistle	5	–	–	0.28–0.815 d	–	0.66–1.2	–	–	0.6 y	–
spear thistle	–	–	–	0.39–0.575 d	–	0.9–1.2	1.15–2.1	0.7	–	–
spiny emex	5 or 7	–	–	–	–	–	–	–	0.9	–
spurge	–	–	–	–	–	–	–	–	–	–
stagger weed	5	–	–	–	–	–	–	–	–	–
star thistle	–	–	–	–	–	–	0.8–1.7	–	–	–
stinging nettle	–	–	–	–	–	–	–	–	–	–
stinking goosefoot	–	–	–	–	–	–	0.8	0.7	–	–
sub. clover	5	–	–	–	0.4–1.3	–	0.62–0.8	0.5–0.7	–	–
sunflower	7	–	–	0.39–0.515 d	0.4–1.3	0.9–1.2	0.41–0.8	0.35–0.7	0.6	–
turnip weed	5	–	–	0.28–0.815 d	0.4–1.3	0.66–1.2	0.41–0.8	0.35–0.7	–	–
variegated thistle	–	–	–	0.39–0.515 d	0.4–1.3	0.9–1.2	0.41–3.3	0.35–0.7	–	–
vetch	–	–	–	0.515–0.745 d	–	1.2–1.8	–	0.7	–	–
wild lettuce	–	–	–	0.39–0.515 d	–	0.9–1.2	–	–	0.3 y	–
wild turnip	5	–	–	0.28–0.815 d	0.4–1.3	0.66–1.2	–	0.35–0.7	–	–
wireweed	5 or 7	–	–	0.515–0.745 d	–	1.2–1.8	0.8	0.7	0.9 y	–
Rec Water Vol L/ha Boom	**30 min**	**50 min**	**50–200**	**50–250**	**30–120**	**30–120**	**30–100**	**50–100**	**50 min**	**50 min**
Wheat plant-back	**10 days**	**4 mths**	**NS**	**1–7 days**	**1–7 days**	**1–7 days**	**1–7 days**	**1–7 days**	**7 days**	**7 days**
Herbicide group	**B**	**B**	**C**	**I**	**I**	**I**	**I**	**I**	**I**	**I**

a = 2,4-D Amine also available in 475 g/L, see appropriate labels for rates.
b = Fluroxypyr also available in 400 g/L. See label for rates.
d = Must also add a minimum of 1.18 L/ha Weedmaster® Argo®.
e = Rate for prickly paddy melon 65–130 mL/ha and Afghan or camel melon 95–130 mL/ha of Garlon™ Fallowmaster™ 755.
f = Must also add a minimum of 1.18 L/ha Weedmaster® Argo®, followed by 1.6–2.0 L/ha Nuquat® within 7–10 days of the first application.
h = Add glyphosate for control.
i = 1–1.5 L/ha plus glyphosate.
j = See label for appropriate rate given weed size and season consideration. Minimum water rate 70 L/ha.
r = For prickly/paddy melon add 80 mL Garlon™ 600/ha – do not add crop oil when mixing with glyphosate.
t = See label for rates for controlling Roundup Ready® canola volunteers.
v = 1.0 L/ha up to 4 leaf stage, 1.4 L/ha up to 6 leaf stage.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Restrictions now exist that limit the use of Estercide® 800 at certain times of the year.

* Currently there is a restriction on the use of high volatile esters. These formulations can only be used between 1 May and 31 August. Other formulations of 2,4-D (Low volatile esters and amine formulations) can be used at any time of the year within restraints listed on the respective labels.

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1

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Table 6. Herbicides for presowing seedbed weed control

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Salvage seedbed preparation																	
	Tribenuron-methyl 750 g/kg Express®	Metosulam 100 g/L Eclipse® 100 SC	Carfentrazone-ethyl 240 g/L Hammer® s	Saflufenacil 700 g/kg Sharpen® WG	Oxyfluorfen 240 g/L Goal®	Flumioxazin 500 g/kg Valor® 500 WG	Pyraflufen-ethyl 2.1 g/L + 2,4-D LV Ester 421 g/L Pyresta®	Pyraflufen-ethyl 20g/L Ecopar®	Fluroxpyr 333 g/L Starane™ Advanced b	Clopyralid 600 g/L Lontrel™ Advanced #	Dicamba 500 g/L Kamba® 500 g	Dicamba 700 g/kg Cadence®	Paraquat + Diquat 135 g + 115 g/L Spray.Seed® 250	Paraquat 250 g/L Gramoxone® 250	Amitrole 250 g/L + Paraquat 125 g/L Alliance®	Glyphosate 570 g/L Roundup Ultra® Max g	Glyphosate 470 g/L Weedmaster® DST® g	Glyphosate 510 g/L Raze®
Crop type	W,B,O	AC	AC	W,B,O,CH, FP,FB,L,LE	AC	AC	AC	WC	W, B, CH	WC, C	AC	AC	AC	AC	WC, C, F, L	AC	AC	AC
aircraft (A) or ground (B)	AB	AB	B	B	AB	B	B	B	AB	AB	AB	AB	B	B	B	AB	AB	AB
Weeds controlled	(grams)	(millilitres)	(millilitres)	(grams)	(millilitres)	(grams)	(litres)	(litres)	(litres)	(millilitres)	(litres)	(grams)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)
amsinckia	–	–	–	9–26	75	–	0.25–0.5 i	–	–	–	–	–	0.8–2.4	–	–	0.625–0.95*	0.38–1.15*	0.7–1.0
annual phalaris	–	–	–	–	75	–	–	–	–	–	–	–	0.8–2.4	1.2–1.6	–	0.625–0.95	0.76–1.5	0.7–1.0
annual ryegrass	–	–	–	9–26	75	–	0.5 i	–	–	–	–	–	0.6–3.2	1.2–1.6	1.5–2.8	0.95–1.25	0.76–1.5	0.7–1.3
barley grass	–	–	–	9–26	75	–	0.5 i	–	–	–	–	–	0.6–3.2	1.2–1.6	1.5–2.8	0.625–0.95	0.38–1.15	0.35–1.0
bedstraw	–	–	–	–	–	–	–	–	0.6	–	–	–	0.8–3.2	–	–	–	–	–
black bindweed	25 i	–	–	–	75	–	–	–	0.45 t	–	0.28	115–170 c	0.8–2.4	–	–	1.2–1.9	–	–
brome grass	–	–	–	9–26	75	–	0.25–0.5 i	–	–	–	–	–	0.6–3.2	1.2–1.6	1.5–2.8	0.95–1.25	0.38–1.5	0.35–1.4
caltrop	25	–	–	–	75	30 i	–		0.3 t	–	0.16–0.24 c	115–170 c	0.8–2.4	–	–	0.425–1.3	–	–
canola – volunteer	–	–	–	9–26	–	30 i	–		–	–	–	–	1.8–2.4 l	1.8–2.4 l	1.5–2.8 l	–	–	–
capeweed	–	–	25–75	9–26	75	30 i	0.25–0.5 i		–	75 y z	0.16–0.24 c	115–170 c	0.8–3.2	–	1.5–2.8	0.95–1.25	0.38–1.5	0.75–1.4
chickpea–volunteer	–	–	–	–	–	–	0.9 i	–	–	75 y	–	–	–	–	–	–	–	–
cereals – volunteer	–	–	–	–	75	–	0.25–0.5 i o	–	–	–	–	–	0.6–3.2	1.2–1.6	1.5–2.8	0.625–0.95	0.38–1.15	0.33–1.0
cleavers	–	–	–	–	–	–	–	–	0.6	–	–	–	–	–	–	–	–	–
corn gromwell	–	–	–	–	–	–	–	–	–	–	–	–	0.8–3.2	1.2–1.6	–	–	–	–
deadnettle	25 or 25 i	–	–	–	75	–	0.25–0.5 i	0.1–0.2 †	–	–	–	–	0.8–3.2	1.2–1.6	–	0.425–1.3	–	–
dock	–	–	–	–	75	–	0.5 e i	–	–	–	0.16–0.24 c	115–170 c	–	–	–	1.2–1.9	0.76–1.9	0.7–1.8
erodium	–	–	25–75	9–26	75	30 i	0.25–0.5 i j	–	–	–	–	–	0.8–3.2	1.2–1.6 x	2.0–2.8	1.2–1.9	1.44–1.9	0.7–1.8 w
faba bean – volunteer	–	–	–	–	–	–	–	–	–	75 y z	–	–	–	–	–	–	–	–
fleabane	–	–	–	17–34	–	–	–	–	–	–	–	–	–	–	2.0–2.8	–	–	–
fieldpea – volunteer	–	–	–	–	–	–	–	–	–	–	0.16–0.24 c	115–170 c	–	–	2.0–2.8	0.32–0.95*	–	–
fumitory	–	–	–	–	75	–	–	–	–	–	–	–	0.8–3.2	1.2–1.6	–	0.32–0.95*	0.76–1.5*	0.7–1.0
goosefoot	–	–	–	–	75	–	–	–	–	–	0.32–0.56	115–170 c	0.8–2.4	–	2.0–2.8	0.625–0.95	–	0.7–1.0
lesser swine cress	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
lupin – volunteer	–	–	–	9–26	75	–	–	–	–	–	–	–	0.8–1.8 m	–	–	0.32–0.95*	0.76–1.5*	0.7–1.0
marshmallow	–	–	25–75	9–26	75	30 i	–	0.1–0.2 †	0.6	–	–	–	–	–	2.0–2.8	–	–	–
medics	30	50	–	9–26	–	30 i	0.25–0.5 i	–	–	–	0.16-0.24 c	115–170 c	1.2–1.8 v	–	2.0–2.8	–	–	–
Mexican poppy	–	–	–	–	75	–	–	–	–	–	–	–	0.8–2.4	1.2–1.6	–	0.625–0.95	–	0.7–1.0
Muskweed	–	–	–	9–26	–	–	–	–	–	–	–	–	–	–	–	–	–	–
mustards	–	–	–	9–26	75	–	0.5 f i	–	–	–	0.16–0.24 c	115–170 c	0.8–3.2	1.2–1.6	1.5–2.8 f	0.95–1.25	1.15–1.5	1.0–1.3
New Zealand spinach	20	–	–	–	75	–	–	–	–	–	0.28	200	0.8–2.4	–	–	0.625–1.3	–	0.7–1.0
Paterson's curse	–	–	25–75	9–26	75	30 i	0.25–0.5 i	–	–	–	0.16–0.24 c	115–170 c	1.2–3.2	–	2.0–2.8	0.95–1.25	0.76–1.5	0.7–1.3
Notes	Always add non ionic-surfactant at 100 mL/100 L spray volume. For best results tankmix with recommended label rates of glyphosate.		Always apply with recommended label rates of knockdown herbicides.	Always apply with recommended label rates of knockdown herbicides. Add Bonza® adjuvant at 1% (Sharpen® WG herbicide may be used alone with a suitable adjuvant for control of volunteer cotton seedlings including Roundup Ready® Flex cotton. Canola has a 16 week plantback.)	Always apply with recommended label rates of glyphosate, paraquat or paraquat/diquat mixtures. Addition of Goal® will improve knockdown and increase speed of control.	Always add label rate of tankmix partner plus Hasten™ or Quicken™ at 0.5 L/100L.	Always add with recommended rate of glyphosate at no less than coarse to very coarse droplets.	Apply as a tankmix with Raze® or other glyphosate product. Apply when weeds are actively growing and at the 2–6-leaf growth stage. Addition of Hot-up™ Spray Adjuvant at 0.5% v/v may be beneficial when applying Ecopar® with a glyphosate herbicide.	Add Uptake™ spraying oil at 0.5 L/100 L of spray. Plant-back for wheat, barley and chickpea is 7 days for rates up to 1.5 L/ha.	Observe plant-back with both cereal and broadleaf crops. Lontrel™ can bind tightly to stubble. See Table 1.	Observe plant-back with broadleaf crops. See Table 1.	Observe plant-back with broadleaf crops. See Table 1.	Use lower rates for full soil disturbance and rates greater than 1 L/ha for minimum soil disturbance at seeding. See label. Add wetting agent where water volume is above 100 L/ha.	Use lower rates for full soil disturbance and higher rates for minimum soil disturbance at seeding. See label. Add wetting agent where water volume is above 100 L/ha.		Lower rates on small weeds and full soil disturbance. No surfactant required.		Lower rates with young weeds and full soil disturbance. Wetting agent not normally required – see label.

peppercress	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.8–2.4	–	–	–	–	–	
phalaris–perennial	–	–	–	–	75	–	–	–	–	–	–	–	–	–	–	–	–	1.2–1.9	1.15–1.5	1.0–1.8	
rough poppy	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.8–3.2	1.2–1.6	–	–	–	0.7–1.0	
radish – wild	–	35 a	25–75	9–26	75	30 i	–	0.1–0.2 †	–	–	–	–	0.8–3.2	–	1.5–2.8	0.95–1.25	1.15–1.5	–	
saffron thistle	–	–	–	–	75	–	–	–	–	–	–	–	0.8–3.2	1.2–1.6	–	0.95–1.25	0.76–1.5	0.7–1.3	
scotch thistle	–	–	–	–	75	–	–	–	–	–	0.28	–	–		–	0.95–1.25	1.15–1.5	0.7–1.3	
skeleton weed	–	–	–	–	75	–	–	–	–	–	–	–	–	–	–	0.95–1.9*	1.15*	1.0	
shepherd's purse	–	–	–	–	–	30 i	–	–	–	–	–	–	–	0.8–3.2	–	–	–	–	
sorrel	–	–	–	–	75	–	–	–	–	–	0.16–0.24 d	115–170 d	–	–	–	1.2–1.9	1.15–1.5	1.0–1.8	
soursob	–	–	–	–	75	–	–	–	–	–	–	–	–	–	2.0–2.8	0.95	1.15*	1.0	
sowthistle	25	–	–	9–26	75	30 i	0.5 i	–	0.6 p	–	0.16–0.24 c	115–170 c	0.8–2.4	1.2–1.6	2.0–2.8	0.425–1.3	–	0.7–1.3	
spear thistle	–	–	–	–	75	–	–	–	–	–	–	–	–	–	2.0–2.8	0.95–1.25	0.76–1.5	0.7–1.3	
spiny emex	–	–	25–75	9–26	75	30 i	–	–	0.9 r	–	0.28	200–400	0.8–3.2	1.2–1.6	2.0–2.8	–	0.38–1.5	0.35–0.9	
stinging nettle	–	–	–	–	–	–	–	–	–	–	–	–	0.8–3.2	–	–	–	–	–	
sub. clover	–	35 u	25–75	9–26	75	30 (S) i	0.5 i	–	–	75 y z	0.2 t	140 t	0.8–3.2 m	–	2.0–2.8	1.2–1.9	1.15–1.5	1.0–1.8	
toad rush	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
turnip weed	20	35 u	–	9–26	75	–	0.25–0.5 i	–	–	–	0.16–0.24 c	115–170 c	0.8–2.4	1.2–1.6	1.5–2.8	0.625–1.3	–	0.7–1.3	
variegated thistle	–	–	–	–	75	–	–	–	–	–	0.16–0.24 c	115–170 c	0.8–2.4	1.2–1.6	2.0–2.8	0.95–1.25	0.76–1.5	0.7–1.4	
vetch	–	–	–	–	–	–	–	–	–	75 y	0.28	200	1.8–3.2	–	–	–	–	–	
vulpia	–	–	–	–	75	–	0.5 i	–	–	–	–	–	0.6–3.2	1.2–1.6	–	0.95–1.25	0.76–1.5	0.7–1.3	
wild lettuce	30 or 20 i	–	–	–	75	–	–	0.1–0.2 †	0.6 p	–	0.16–0.24 c	115–170 c	0.8–2.4	1.2–1.6	2.0–2.8	0.625–1.3	–	–	
wild oats	–	–	–	9–26	75	–	–	–	–	–	–	–	0.6–2.4	0.6	1.5–2.8	0.625–0.95	0.38–1.15	0.35–1.0	
wild turnip	–	35 u	–	–	75	–	0.25–0.5 i	–	–	–	–	–	0.8–3.2	1.2–1.6	–	0.95–1.25	0.76–1.5	0.7–1.3	
winter grass	–	–	–	–	75	–	–	–	–	–	–	–	–	1.2–1.6	–	0.95–1.25	0.76–1.5	0.7–1.4	
wireweed	–	–	–	–	75	30 i	–	0.1–0.2 †	0.8 p	–	0.16–0.24 c	115–170 c	0.8–3.2	1.2–1.6	2.0–2.8	0.625–1.3	–	0.7–1.0	
Water vol L/ha boom	**50 min**	**50–100**	**50–150**	**80–250**	**30–200**	**50 min**	**60–150**	**70–150**	**50 min**	**50 min**	**50 min**	**50 min**	**50–200**	**50–200**	**50–200**	**80 max**	**25–100**	**25–100**	
Wheat plant-back	**3 days**	u	**u**	**1 hr**	**1 day**	**1 hr**	**1–3 days** h	**1 hr**	**7 days**	**7 days**	**1–14 days**	**1–14 days**	**1 hr**	**1 hr**	**0 hr** q	**1 hr**	**24 hr**	**1 hr**	
Herbicide group	**B**	**B**	**G**	**G**	**G**	**G**	**G + I**	**G**	**I**	**I**	**I**	**I**	**L**	**L**	**L + Q**	**M**	**M**	**M**	

a = Add 400–800 mL glyphosate 450 for control.
b = Fluroxypyr is also available in 200 g/L and 400 g/L. See label for rates.
c = Add 0.4– 0.6 L/ha glyphosate 450 for control.
d = Add 0.65– 0.8 L/ha glyphosate 450 for control.
e = Curled dock only.
f = Indian hedge mustard only.
g = Compatable with Amicide® Advance 700 (700 g/L 2,4-D amine).
h = See Table 1 for other crops. Note rainfall required.
i = Add glyphosate for control, see label.
j = Long storksbill only.
k = Add dicamba for improved control.
l = See label for controlling RR canola.
m = For control add 5 g/ha Ally® or 0.5 L/ha dicamba.
n = Add 1.0 L/ha glyphosate 450 for control.
o = Wheat and barley only. See label.
p = Add 0.6 L/ha glyphosate 450 for control.
q = See label for other crops.
r = Add 5 g/ha Ally® for control.
s = Hammer® also available in 400 g/L. See label for rates.
t = Tankmix with glyphosate for best results.
u = See appropriate glyphosate label.
v = See label for tankmix options in minimum till situations.
w = Add Hammer® for improved control.
x = Add Reglone® at 0.75–1.5 L/ha.
y = Add paraquat/diquat or glyphosate for control.
z = Can also be used PSPE at 120–240 g/ha (S). See label.
* = Only registered in conjunction with a full soil disturbance cultivation.
# = Also available as Lontrel™ 750 SG (750 g/kg).
† = White clover, French serradella and snail medic may be damaged.
(S) = Suppression only.

Crop usage
AC = All Crops
W = Wheat
CH = Chickpea
C = Canola
FB = Faba beans
L = Lupins
LE = Lentils
T = Triticale
O = Oats
B = Barley
WC = Winter Cereals
FP = Field Pea

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 7. Herbicides for pre-emergent and post-sowing pre-emergent weed control

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Chlorsulfuron 750 g/kg Glean®	Triasulfuron 750 g/kg Logran® 750	Butafenacil + Triasulfuron 200 + 520 g/kg Logran® B–power	Sulfosulfuron 750 g/kg Monza® Wheat and triticale only	Trifluralin 480 g/L Triflur® X	Pendimethalin 440 g/L Stomp® 440 j	Oryzalin + Trifluralin 125 + 125 g/L Duet® 250 EC	Prosulfocarb 800 g/L + S-Metolachlor 120 g/L Boxer® Gold	Pyroxasulfone 850 g/kg Sakura® 850 WG Wheat and triticale only, not durum	Triallate 500 g/L Avadex® Xtra	S-Metolachlor 960 g/L Dual Gold®	Metolachlor 960 g/L Clincher® Plus	Clopyralid 600 g/L Lontrel™ Advanced h
Incorporation	PSI	PSI	PSI	PSI	PSI	PSI	PSI	IBS	IBS	PSI	IBS	IBS	PSPE
	IBS	IBS	IBS	IBS	IBS	IBS	IBS			IBS	PSPE	PSPE	
Crop type	TW	W only	W only	TW only	AC not O	B, W, FP, CH	B, W, C	W, B	W, T	AC not O	WC	WC	WC, C
aircraft (A) or boom (B)	AB	AB	B	AB	B	AB	B	B	B	B	B	B	AB
Weeds controlled	(grams)	(grams)	(grams)	(grams)	(litres)	(litres)	(litres)	(litres)	(grams)	(litres)	(litres)	(litres)	(litres)
amsinckia	15	30	50	–	1.5–3.0 (S) (IBS) z	–	–	1.5–2.5 c (S)	–	–	–	–	–
annual phalaris	20 b	35	50 u	25 b	0.8 or 1.5–3.0 (IBS) z	–	1.6 or 2.3	1.5–2.5 c	118	–	–	–	–
annual ryegrass	15 or 20	35	50 u	25 b	0.8 or 1.5–3.0 (IBS) z	1.35–2.25	1.6 or 2.3	1.5–2.5 c or 2.5	118	b	0.375–0.5 (S) v	0.565–0.75 (S) v	–
barley grass	20 b	–	–	25 (S)	1.5–3.0 (S) (IBS) z	–	–	1.5–2.5 (S) c or 2.5 (S)	118	–	–	–	–
bedstraw	–	–	–	–	–	–	–	–	–	–	–	–	–
black bindweed	–	30	50	–	–	–	–	–	–	–	–	–	–
brome grass	20(S)	–	–	25 (S)	1.5–3.0 (S) (IBS) z	–	–	1.5–2.5 c (S)	118 (S)	–	–	–	–
caltrop	–	–	–	–	1.5–3.0 (S) (IBS) z	–	–	–	–	–	–	–	–
capeweed	20	35	50 u	–	–	–	–	–	–	–	–	–	0.15–0.3 (S)
cereals – volunteer	–	–	–	–	–	–	–	–	–	–	–	–	–
cleavers	–	–	–	–	–	–	–	–	–	–	–	–	–
crassula	–	–	–	–	–	–	–	1.5–2.5 c or 2.5	–	–	–	–	–
corn gromwell	20	30	50	–	1.5–3.0 (IBS) z	–	–	–	–	–	–	–	–
deadnettle	15 or 20	30	50	–	1.5–3.0 (S) (IBS) z	–	1.6 or 2.3	1.5–2.5 c (S)	–	–	–	–	–
dock	20	–	–	–	–	–	–	–	–	–	–	–	–
erodium	–	–	–	–	–	–	–	–	–	–	–	–	–
faba bean – volunteer	–	–	50 u	–	–	–	–	–	–	–	–	–	0.15–0.3 (S)
fieldpea – volunteer	–	–	50 u	–	–	–	–	–	–	–	–	–	–
fumitory	15 or 20	30	50	25 b	1.5–3.0 (IBS) z	–	1.6 or 2.3 (S)	1.5–2.5 c	–	–	–	–	–
lesser swine cress	–	30	50	–	–	–	–	–	–	–	–	–	–
lupin – volunteer	–	–	–	–	–	–	–	–	–	–	–	–	–
Mexican poppy	–	35(S)	50 (S)	–	–	–	–	–	–	–	–	–	–
mintweed	20	–	–	–	–	–	–	–	–	–	–	–	–
mustards	15	30	50	–	–	–	–	–	–	–	–	–	–
New Zealand spinach	–	–	50	–	–	–	–	–	–	–	–	–	–
Paterson's curse	15	30	50	–	–	–	–	–	–	–	–	–	–
peppercress	–	–	–	–	–	–	–	–	–	–	–	–	–
phalaris – perennial	–	–	–	–	–	–	–	–	–	–	–	–	–
rough poppy	15 or 20	30	50	–	1.5–3.0 (IBS) z	–	–	1.5–2.5 c (S)	–	–	–	–	–
radish – wild	–	35 (S)	50 u(S)	–	–	–	–	–	–	–	–	–	–
saffron thistle	20 (S)	–	–	–	–	–	–	–	–	–	–	–	–

Apply to level seedbed. Incorporate by sowing. Not before undersowing pasture legumes. Only use before sowing wheat or triticale.

Apply to level seedbed. Incorporate by sowing. Wheat only. Not before undersowing legumes.

Apply to level seedbed. Incorporate by sowing. Wheat only. Not before undersowing legumes.

Apply to bare soil prior to or at sowing, and incorporate by sowing. Not where legumes undersown. Rain required within 7–10 days for best results.

Not on oats. In conventional systems, apply 1–4 weeks before sowing and incorporate within 4 hours. In no-till systems and IBS incorporate within 24 hours. For best results incorporate as close to application as practically possible. Sow 5 cm deep. Triflur® X can be used with wheat, barley and triticale in no-till systems at 1.5–3.0 L /ha incorporated by sowing with narrow points and press wheels (see label)

Read label as appropriate rates differ with location, crop type, soil type and incorporation method.

Use 1.6 L rate for conventional cultivation and either incorporate before sowing or incorporate with full disturbance by sowing. Use 2.3 L rate for direct drill and incorporate by sowing with full disturbance. See label. Sow cereal seed to minimum 5 cm depth.

Apply and incorporate by sowing as soon as possible and no longer than 3 days after application.

Apply and incorporate immediately prior to or up to 3 weeks before sowing.

Apply to moist seedbed. Use lower rates on light soils. Sufficient rain is required within 10 days after spraying is spraying PSPE. See label.

Apply to moist seedbed. Use lower rates on light soils. Sufficient rain is required within 10 days after spraying is spraying PSPE. See label.

Observe plant-back with both cereal and broadleaf crops. Lontrel™ can bind tightly to stubble. See Table 1.

scotch thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–
skeleton weed	–	–	50(S)	–	–	–	–	–	–	–	–	–	–	–
shepherd's purse	15 or 20	30	50	–	–	–	–	–	–	–	–	–	–	–
sorrel	–	–	–	–	–	–	–	–	–	–	–	–	–	–
soursob	15	–	50	–	–	–	–	–	–	–	–	–	–	–
sowthistle	–	30	50 u	–	–	–	–	–	–	–	–	–	–	–
spear thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–
spiny emex	20	35	50 u	–	1.5–3.0 (S) (IBS)	–	–	–	–	–	–	–	–	–
stinging nettle	–	–	–	–	–	–	–	–	–	–	–	–	–	–
sub. clover	–	–	50 u	–	–	–	–	–	–	–	–	–	–	0.15–0.3 (S)
toad rush	–	–	–	–	–	–	–	1.5–2.5	118	–	0.15–0.25	0.225–0.375	–	
turnip weed	–	30	50	–	–	–	–	–	–	–	–	–	–	–
variegated thistle	–	30 (S)	50 (S)	–	–	–	–	–	–	–	–	–	–	–
vetch	–	–	–	–	–	–	–	–	–	–	–	–	–	–
vulpia	–	–	–	–	1.5–3.0 (S) (IBS)	1.5–2.25 (S)	1.6 (S)	1.5–2.5 c or 2.5	118	–	–	–	–	–
wild lettuce	–	30	50	–	–	–	–	–	–	–	–	–	–	–
wild oats	–	–	u	a	1.5–3.0 (S) (IBS) a	(S)	1.6 or 2.3 (S)	1.5–2.5 c d	118 (S)	1.6 f e	–	–	–	–
wild turnip	15	30	50	25	–	–	–	–	–	–	–	–	–	–
winter grass	–	–	–	–	1.5–3.0 (IBS)	–	–	–	–	–	–	–	–	–
wireweed	15 or 20	35	50	b	0.8 or 1.5–3.0 (IBS)	1.35–2.25	1.6 or 2.3	1.5–2.5 c	–	b	–	–	–	–
Water vol L/ha boom	**30 min**	**50–100**	**50–100**	**40–100**	**70–450**	**50–200**	**50–100**	**50 min**	**50–100**	**30–100**	**60 min**	**–**	**50 min**	
Wheat plant-back	**0 day**	**0 day**	**0 day 1 day durum**	**0 day**	**0 day (IBS) or 1–4 wks**	**0 day**	**0 day**	**0 day**	**0 day**	**0 day**	**0 day**	**0 day**	**NA**	
Herbicide group	Group B products. All will severely damage undersown or volunteer legumes				**D**	**D**	**D**	**J, K**	**K**	**J**	**K**	**K**	**I**	

a = Add Avadex® Xtra for control.
b = Add trifluralin for control.
c = Add 0.8–1.5 L/ha Triflur® 480 for control.
d = Surface germinating only.
e = Add Glean®, Lusta®, or Logran® for improved control in wheat and triticale.
f = Preferred option for Northern NSW.
j = Pendimethalin also available in 330 g/L. See label for rates.
h = Also available as Lontrel™ 750 SG (750 g/kg).
u = Logran® B-power gives knock-down control of small (up to 2-leaf) emerged weeds. Add Hasten™ or non-ionic wetter for knockdown.
v = Barley and oats only.
z = Alternatively apply 1.5–2.0 L/ha Triflur® X + 1.6–2.0 L/ha Avadex® Xtra for control. When adding Avadex® Xtra incorporate within 6 hours.
(S) = Suppression only.

Crop usage
AC = All Crops
W = Wheat
CH = Chickpea
C = Canola
T = Triticale
O = Oats
B = Barley
WC = Winter cereals
FP = Field pea

Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergent.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 8. Herbicides for weed control for wheat and barley – Early post-emergence – Part 1

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Flumetsulam 800 g/kg **Broadstrike™**		Metsulfuron-methyl 600 g/kg **Ally®** g		Chlorsulfuron 750 g/kg **Glean®**		Sulfosulfuron 750 g/kg **Monza®** Wheat and triticale only		Triasulfuron 750 g/kg **Logran® 750 WG**		Metribuzin 700 g/kg **Sencor® 700**	Bromoxynil 200 g/L **Bromicide®**		Terbutryn flowable 500 g/L **Igran®**		Diuron WG ◆ + MCPA 900 g/kg + 500 g/L **Diurex® WG** c + MCPA Amine 500		Bromoxynil + MCPA 200 + 200 g/L **Buctril® MA**		MCPA + Dicamba 340 + 80 g/L **Kamba® M**		MCPA 750 g/L **Thistle-Killem® 750**		MCPA 570 g/L **LVE Agritone®**		Picloram + MCPA 26 + 420 g/L **Tordon™ 242**		MCPA + Diflufenican 250 + 25 g/L **Tigrex®**		Pyrasulfotole 37.5 g/L + Bromoxynil 210 g/L **Velocity®**		Pyrasulfotole 50 g/L + MCPA 250 g/L **Precept® 300 EC** o	
Apply at crop growth stage	**3 L–Joint (wheat) Mid Till–Joint (barley)**		**3 L–Jo**		**2 L–Ea Till**		**Emerg–Ea Till**		**1-leaf–Ea Till** Not before 3 L stage when tankmixing		**3 L–8 Wks**	**3 L–Full Till**		**3 L–Ea Till**		**3–5 L Till**		**3 L–Full Till**		**Ea Till –Full Till**		**5 L–Prior to booting**		**3 L–Bo**		**Ea Till –Full Till**		**3–5-leaf–L Till**		**2 L–Full Till**		**3 L–1st node (wheat) 5 L–1st node (barley)**	
Zadoks code	**13–31, 16–31**		**13–35**		**12–23**		**11–22**		**11–21**		**13–8 Wks**	**13–30**		**13–21**		**13–23**		**13–30**		**21–30**		**15–23**		**13–37**		**22–30**		**13–30**		**12–30**		**13, 15–31**	
Weeds controlled	**(grams)**		**(grams)**		**(grams)**		**(grams)**		**(grams)**		**(grams)**	**(litres)**		**(litres)**		**(grams + litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**	
amsinckia	25	Safe on undersown lucerne, medics and sub-clovers after the 2–3 trifoliate leaf stage. Add Uptake™ spraying oil or wetting agent for wheat and undersowns or wetting agent only for barley.	5 or 7	Add surfactant.	15	Not on barley before 2-leaf stage. Add wetting agent. Not Preferred Recommendation for barley.	25	Wheat and triticale only. Add D-C-Tate® 2 L/100 L spray volume. Not for use with undersown legumes. Note: Plant-backs on label. Don't use on flood or furrow irrigations or soils with pH > 8.5.	–	Spray before crop reaches early tillering. For best results apply when soil conditions are moist and weeds are small.	–	1.4–2.0	Not on undersown medics, Persian or Berseem clover. Avoid spraying when temperatures above 20° C.	0.55–0.85	Avoid spraying when temperatures exceed 18°C. Do not use on undersown medics or lucerne.	280 + 0.5	Use only on moist soil. This is a tank mix.	1.4–2.0	1.4 L/ha can be used at 3-leaf stage.	–	Damage can occur if crop not actively growing. Do not apply after the fully-tillered stage.	–	See label for crop stage, weed size and chemical rate. Barley: Use only from 5-leaf stage to flag-leaf just visible (Z15–37). Maximum rate in barley 1.4 L/ha.	–	Do not plant susceptible crops within 12 months of applying the product.	–	Can be used on undersown sub-clover and some other clovers. See label. Not on lucerne or annual medics. Application should be made from the third to the eighth trifoliate leaf stage.	0.6–1.0	Add Hasten™ 1% v/v, Supercharge® 0.75% v/v or Uptake™ 0.5% v/v. Note recropping intervals on label.	0.75–1.0	Spray grade liquid ammonium sulfate or Hasten™ (1% v/v) must be used with Precept®. Do not use non-ionic surfactants. Note recropping intervals on label.
annual phalaris	–		–		–		–		–		–	–		–		–		–		–		–		–		–		–		–		–	
annual ryegrass	–		–		15 or 25 a		–		–		–	–		–		–		–		–		–		–		–		–		–		–	
barley grass	–		–		–		25 (S)		–		–	–		–		–		–		–		–		–		–		–		–		–	
bedstraw	–		–		–		–		–		–	1.4–2.0		–		–		–		–		–		–		–		0.67–1.0		0.75–1.0			
black bindweed	–		–		20		–		10 p		–	1.4–2.0		p		–		1.4–2.1		1.7		0.97–1.35 v		–		1.0		–		0.5–1.0		–	
brome grass	–		–		–		20–25 (S)		–		–	–		–		–		–		–		–		–		–		–		–		–	
buchan weed	25 (S) m		–		–		–		–		–	–		–		–		–		–		–		–		–		–		–		–	
canola – volunteer	25 w		–		–		20 w		–		–	–		–		–		1.4–2.0 n		–		0.33 l v		0.44–1.84 v		–		0.5 n		0.5–1.0 n		0.5–1.0	
capeweed	25 m		–		–		–		–		–	1.4–2.0		0.55–0.85		280 + 0.5		1.4–2.0		1.0–1.7		1.45 v		0.44–1.84 v		–		0.5–1.0		0.5–1.0		0.5 f	
charlock	25		5		15		–		–		–	–		0.55–0.85 b		280 + 0.5		1.4–2.0		1.0–1.7		0.66 v		0.44–1.84 v		–		0.5–1.0		–		–	
cereals – volunteer	–		–		–		–		–		–	–		–		–		–		–		–		–		–		–		–		–	
chickpea – volunteer	–		5		–		–		–		–	–		–		–		–		–		–		–		–		–		0.5–1.0 (S)		0.5 f	
cleavers	–		–		–		–		–		–	–		–		–		–		–		–		–		–		–		–		–	
clover	–		5		–		–		–		–	–		–		–		–		1.7		–		–		–		–		–		0.5 f k	
corn gromwell	–		–		20		–		–		–	1.4–2.0		0.55–0.85		280 + 0.5		1.4–2.0		–		–		–		–		1.0		0.5–1.0		0.5–1.0	
common barbgrass	–		–		–		–		–		–	–		–		–		–		–		–		–		–		–		–		–	
deadnettle	25 (S) m		5		15 or 20		–		10–13 p		–	–		0.55–0.85 p		280 + 0.5		–		–		1.45 v		–		–		1.0		0.5–1.0		0.5–1.0	
dock	–		5 or 7		–		–		–		–	–		–		–		–		1.0–1.7		–		–		–		1.0 (S)		–		–	
erodium	–		–		–		–		–		–	–		–		–		–		–		–		–		–		1.0 (S) h		–		–	
faba bean – volunteer	–		–		–		–		10 p		–	–		p		–		–		–		–		–		–		–		0.5		0.5 f	
field pea – volunteer	–		7		–		20		10 p		–	–		p		–		–		–		–		–		–		–		0.5 (S)–1.0		0.5–1.0 or 0.5 f	
fumitory	–		5		20		–		–		–	2.0		0.55–0.85		–		1.4–2.0		–		0.93 v		0.44–1.84 v		–		0.75		0.5–1.0		0.5–1.0	
lesser swinecress	–		–		–		–		–		–	1.4–2.0		–		–		–		–		–		–		–		–		–		–	
lupin – volunteer	25		5		–		–		–		–	–		–		–		–		–		0.46–0.96 v		–		–		1.0 (S)		0.5–1.0		0.5–1.0	
medics	–		5		–		–		10 p		–	–		p		–		–		–		–		–		–		–		0.5 (S)–1.0		0.5 f or 1.0	
Mexican poppy	–		–		–		–		10–13 p		–	2.0		p		–		1.4–2.0		–		–		–		–		–		–		–	

mintweed	–	–	20	–	–	–	–	–	–	1.4–2.0	1.7	1.35 v	–	–	–	Application prior to the 3 trifoliate leaf stage may result in damage to clover.	–	For best results apply in warmer temperature and high light intensity and > 1hr of daylight left after application.	–	For best results apply in warmer temperature and high light intensity and > 1hr of daylight left after application.
mustards	25	5	15	25	6.5–10 p	–	2.0	0.55–0.85 bp	280 + 0.5	1.4–2.0	1.0–1.7	0.66 v	0.44–1.84 v	1.0	0.5–1.0		0.5		0.5 j	
New Zealand spinach	25 (S)	–	–	–	–	–	–	–	–	–	1.7	–	–	1.0 (S)	–		–		–	
Paterson's curse	25 (S) m	5 or 7	15	–	–	–	2.0	0.55–0.85	–	1.4–2.0	–	0.66–0.96 v	0.44–1.84 v	–	1.0 (S)		0.5–1.0		0.5–1.0	
peppercress	25	–	–	–	–	–	1.4–2.0	–	–	–	–	–	–	–	1.0 (S)		–		–	
radish – wild	25 (S) m	–	15 or 20	20	10–13 p	–	2.0	p	280 + 0.5	1.4–2.0	1.0–1.7	0.66 v	0.175–0.35 + 0.35–0.5 Nugrex® y	1.0	0.5–1.0 q		0.5–1.0		0.5–1.0 i	
rough poppy	–	5	20	–	–	–	–	–	–	1.4–2.0	–	–	–	–	1.0 (S)		–		–	
saffron thistle	–	–	–	–	–	–	1.4–2.0	–	–	1.4–2.0	1.7	0.66–1.35 v	0.44–1.84 v	1.0	1.0		0.67–1.0		–	
shepherd's purse	25	5	20	–	10 p	–	1.4–2.0	p	–	1.4–2.0	–	–	–	–	0.5–1.0		0.5–1.0		–	
skeleton weed	–	7 (S)	–	–	–	–	–	–	–	–	–	0.96–1.35 v	0.44–1.84 v	1.0	1.0 (S)		–		–	
slender thistle	–	–	–	–	–	–	–	–	–	1.4–2.0	–	0.66–1.35 v	0.44–1.84 v	–	–		–		–	
sorrel	–	5	–	–	–	–	–	–	–	–	1.0–1.7	–	–	–	–		–		–	
soursob	–	5	20	–	–	–	–	–	1.1	–	–	–	–	–	–		–		–	
sowthistle	–	5	–	–	–	–	–	–	–	1.4–2.1 r	–	–	–	1.0	1.0 (S)		0.5–1.0		0.5–1.0	
spear/black thistle	–	–	–	–	–	–	–	–	–	–	–	0.96–1.35 v	0.44–1.84 v	–	–		–		–	
spiny emex	25 (S) m	5 or 7	–	–	–	–	2.0	0.55–0.85 b	280 + 0.5	1.4–2.0	1.0–1.7	–	–	1.0	1.0 (S)		0.5–1.0		0.75–1.0 (S)	
St Barnaby thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–		–	
sunflower – volunteer	–	7	–	–	13 p	–	–	p	–	–	–	0.69–1.0 v	–	–	–		–		–	
toad rush	–	e	e	–	–	110 t u	–	0.55–0.85	–	–	–	–	0.44–1.84 v	–	1.0		–		–	
turnip weed	15–25	5	15	–	6.5 p	–	2.0	0.55–0.85 bp	280 + 0.5	1.4–2.0	1.0–1.7	0.66 v	0.44–1.84 v	1.0	0.5–1.0		0.5–1.0		0.5–1.0	
variegated thistle	–	–	–	–	–	–	1.4–2.0	–	–	1.4–2.0	1.7	0.66–1.35 v	0.44–1.84 v	1.0	1.0 (S)		–		–	
vetch	–	–	–	–	13 p	–	–	0.6 p	–	–	1.0	–	–	–	1.0 (S)		0.5–1.0 (S)		0.5 f	
vulpia	–	–	–	25	–	–	–	–	–	–	–	–	–	–	–		–		–	
wild lettuce	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.5–1.0		0.5–1.0		0.5–1.0	
wild oats	–	–	–	25 (S)	–	–	–	–	–	–	–	–	–	–	–		–		–	
wild turnip	25	5	15	20	6.5–10 p	–	2.0	0.55–0.85 bp	280 + 0.5	1.4–2.0	1.0–1.7	0.66 v	0.44–1.84 v	1.0	0.5–1.0		0.5		0.5–1.0	
wireweed	–	5 or 7	20	–	–	–	2.0	–	–	1.4–2.0	1.0–1.7	–	–	1.0(S)	0.75 (S)		0.5 (S)–1.0		0.5–1.0	
Recom water L/ha	**50–150**	**50 min**	**30 min**	**40–100**	**30–100**	**–**	**50–200**	**50–100**	**20–100**	**50–200**	**50 min**	**30–120**	**30–120**	**50 min**	**50 min**		**70–150**		**50–100**	
Herbicide group	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**C**	**C + I**	**C + I**	**I**	**I**	**I**	**I**	**I + F**		**H + C**		**H + I**	

a = No more than 3 leaves of annual ryegrass. Use more than 50 L/ha water.
b = Tank mix with 0.3 L/ha MCPA 500 g/L or 0.3 L/ha 2,4-D (as amine) 500 g/L for control.
c = Alternatively Diuron Flowable 500 g/L.
d = Metribuzin also available as 480 g/L.
e = Can be tankmixed with Sencor® 480 for toad rush control (See label).
f = Add Lontrel™ Advanced for control. See label for rates.
g = Can be mixed with MCPA amine or terbutryn.
h = Long storksbill only (Erodium botrys).
i = **DO NOT** use the 0.5 L/ha rate where excellent coverage is not possible.
j = Indian hedge mustard only.
k = Sub clover only.
m = See label for tankmix of Broadstrike™ and other herbicides for control.
n = See label for rates for controlling RR Canola.
o = Also available as Precept® 150. See label for rates.
p = Tankmix of Igran® and Logran® can be used for control. See label.
q = Tankmix 350–500 mL/ha Tigrex® plus 175–350 mL/ha MCPA LVE (570 g/L) for control.
r = Northern NSW only.
t = Application of Sencor® to barley on soils with pH > 7.0 will result in severe crop damage.
u = Toad rush should be sprayed at the 2–4 leaf stage. Spray after rain when soil moisture is plentiful and soil is moist to the surface. Take advantage of dew on soil surface.
v = See critical comments on label in 'Directions for Use', showing varying rate according to weed size.
w = Not Clearfield canola volunteers.
y = See label for crop and weed stage and appropriate rate.
(S) = Suppression only.
◆ = See *What's new in 2014* on page 3.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 8. Herbicides for weed control for wheat and barley – Early post-emergence – Part 2

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Metosulam 100 g/L **Eclipse® 100 SC**		Thifensulfuron + Metsulfuron-methyl 682 + 68 g/kg **Harmony® M**		Bromoxynil + Diflufenican 250 + 25 g/L **Jaguar®**		Terbutryn + MCPA 275 + 160 g/L **Agtryne® MA**	MCPA + Bromoxynil + Dicamba 140 + 280 + 40 g/L **Broadside®**	Fluroxypyr 333 g/L **Starane™ Advanced**		Clopyralid 600 g/L **Lontrel™ Advanced** b	2,4-DB 500 g/L **Buttress®**		Fluroxypyr 140 g/L + Aminopyralid 10 g/L **Hotshot™**		Dicamba 700 g/kg **Cadence®**		Dicamba 500 g/L **Kamba® 500**		MCPA 375 g/L + Florasulam 7 g/L **Conclude™**		Clopyralid 300 g/L + Florasulam 50g/L **Torpedo™**	Picolinafen 50 g/L+ MCPA 500 g/L **Paragon®**		Picolinafen 35 g/L + Bromoxynil 210 g/L + MCPA 350 g/L **Flight® EC**	Pyraflufen-ethyl 20 g/L **Ecopar®**
Apply at crop growth stage	**2 L–1st node**		**3 L–Boot**		**2 L–Full Till**		**3–5-leaf**	**3 L–Full Till**	**3 L–Flag**		**2 L–1st node**	**5L–Full Till**		**3 L–1st node**		**3 L–Mid Till**		**5 L–Ea Till**		**3 L–Flag**		**2 L–1st node**	**3 L–5 L**		**3 L–Mid Till**	**2 L–Mid Till**
Zadoks code	**12–31**		**13–39**		**12–29**		**13–15**	**13–30**	**13–39**		**12–31**	**15–31**		**13–31**		**13–25**		**15–22**		**13–39**		**12–31**	**13–15**		**13–28**	**12–25**
Weeds controlled	**(millilitres)**		**(grams)**		**(litres)**		**(litres)**	**(litres)**	**(litres)**		**(litres)**	**(litres)**		**(litres)**		**(grams)**		**(litres)**		**(litres)**		**(litres)**	**(litres)**		**(millilitres)**	**(litres)**
amsinckia	50	Apply with 0.5 L Uptake™ spraying oil or 1 L D-C-Trate®/100 L water. Can be tankmixed with 0.35–0.5 L/ha to broaden weed spectrum.	–	NW slopes and plains only.	0.75	Can be used on undersown sub-clover and lucerne. Not annual medics. Application should be made from the first to the eighth trifoliate leaf stage.	1.0	0.75–1.4	–	Can be tankmixed with Ally®, MCPA LVE or MCPA amine to broaden weed spectrum.	–	–	Boom only. Good quality water essential.	–	Add BS1000® (when mixed with metsulfuron-methyl).	115 m or p	Add wetter. Do not apply after mid-tillering stage as crop damage may result.	–	Damage can occur if crop not actively growing or crop after mid- tillering stage. Small weeds.	–	Always add Uptake™ spraying oil at 500 mL/100 L water, unless tankmixing with Ally®. When tankmixing with Ally® add a non-ionic wetter at 200 mL/200 L.	–	–	Do not use 0.5 L/ha rate on crops younger than 5 leaf. Do not apply rates higher than 0.25 L/ha to crops in the 3 leaf stage.	–	–
annual phalaris	–		–		–		–	–	–		–	–		–		–		–		–		–	–		–	–
annual ryegrass	–		–		–		–	–	–		–	–		–		–		–		–		–	–		–	–
barley grass	–		–		–		–	–	–		–	–		–		–		–		–		–	–		–	–
bedstraw	50 (S) u		–		1.0 (S)		–	–	0.3		–	–		–		–		–		0.7		0.1 h	–		–	0.4 i
black bindweed	–		40		0.5–1.0		–	1.0–1.4	0.3–0.45		–	–		0.5–0.75 e		200 m or p		0.28		–		–	–		–	–
brome grass	–		–		–		–	–	–		–	–		–		–		–		–		–	–		–	–
buchan weed	–		–		–		–	–	–		–	–		–		–		–		–		–	–		–	–
canola – volunteer	50 o		–		0.5–0.75*		–	1.4	–		–	–		–		–		–		–		–	0.25 *		360	0.4 i *
capeweed	35–50 u		–		0.5–1.0		1.0	0.75–1.4	–		0.15 h	2.1–3.2		–		115 p (S)		0.16 v		0.7 (S)		0.1 h	0.25–0.5		360–720	0.4 i
charlock	–		–		0.5–0.75		1.0	–	–		–	2.1–3.2		–		115 m or r		0.16 v		–		–	0.25–0.5		360–720	–
cereals – volunteer	–		–		–		–	–	–		–	–		–		–		–		–		–	–		–	–
chickpea – volunteer	35–50 u		–		–		–	–	–		0.1 h	–		0.75 e		115–200		–		0.7		0.075–0.1	–		–	0.4 l
cleavers	–		–		–		–	–	0.6		–	–		–		–		–		–		–	–		–	–
clover	50 (S) nu		–		–		–	–	–		0.075–0.1 h	–		–		115–200		0.28		–		–	–		–	0.4 ln
corn gromwell	–		–		0.5–0.75		1.0	1.0–1.4	–		–	–		–		–		–		–		–	0.5		720	–
common barbgrass	–		–		–		–	–	–		–	–		–		–		–		–		–	–		–	–
deadnettle	–		30		0.5–0.75		1.5	–	0.9		–	–		0.5–0.75 ce		115 m		0.2–0.28 m		–		–	0.5 (S)		720 (S)	0.4 l
dock	–		–		1.0 (S)		–	0.75–1.4	–		–	2.1–3.2 x		–		200 r		0.16 or 0.28 v		–		–	–		–	–
erodium	–		–		0.5 (S)		–	–	–		–	–		–		–		–		–		–	–		–	0.4 i
faba bean – volunteer	35–50 u		–		–		–	–	–		0.125 h	–		0.5–0.75 f		200 r		–		0.7		0.075–0.1	–		–	0.4 l
field pea – volunteer	50 (S) u		–		0.75 (S)		–	–	–		0.075 h	–		0.5–0.75 f		115–200		–		0.7		0.075–0.1	–		–	–
fumitory	–		40		0.75–1.0 (S)		1.0	1.0–1.4	–		–	2.1–3.2		–		–		–		–		–	0.5 (S)		540–720 (S) h	0.4 l
lesser swinecress	–		–		1.1		–	–	–		–	–		–		–		–		–		–	–		–	–
lupin – volunteer	35–50 u		–		0.5–1 (S)		–	–	0.9		0.125 h	–		0.5 g		115		–		0.7		0.075–0.1	0.5 (S)		720 (S) i	0.4 i
medics	50 (S) u		–		–		–	–	–		0.075–0.1 h	–		–		–		–		–		0.075–0.1 j	–		–	0.4 l
Mexican poppy	–		–		–		–	–	–		–	2.1–3.2		–		–		–		–		–	–		–	–
mintweed	–		–		1.0 (S)		–	–	–		–	–		–		200 t		0.28 t		–		–	–		–	–
mustards	50		45		0.5–1.0		1.0	0.75–1.4	0.3–0.9 h		–	2.1–3.2		–		115 m or p		0.16 v		0.7		0.075–0.1 h	0.25–0.5		360–720	0.4 i
New Zealand spinach	–		40		–		–	–	–		–	–		–		200		0.28		–		–	–		–	–

Paterson's curse	–	–	0.5–0.75	1.0	–	–	–	2.1–3.2	–	–	–	–	0.1 h	–	–	0.4 l
peppercress	–	30–40	1.1	–	–	–	–	–	–	–	–	–	–	–	–	–
radish – wild	50	–	0.5–1.0 y	–	0.75–1.4	0.3–0.9 h	–	–	–	115 p or r	0.16 v	0.7	0.075–0.1 h	0.25–0.5	360–720	0.3–0.4 i
rough poppy	–	–	0.5–0.75	1.0	–	–	–	–	–	115 m	–	–	–	–	–	–
saffron thistle	35–50 u	–	1.0	–	–	–	0.025 k h	2.1–3.2	–	200 t	0.28 t	–	–	0.5	720	–
shepherd's purse	–	–	1.0	–	–	0.3–0.9 h	–	2.1–3.2	–	115 m	–	–	–	0.25–0.5	360–720	–
skeleton weed	–	–	1.0(S)	–	–	–	0.25 a	–	–	–	–	–	–	–	–	–
slender thistle	35–50 u	–	–	–	–	–	0.025 k	2.1–3.2	–	–	–	–	–	–	–	–
sorrel	–	–	1.0(S)	–	–	–	–	–	–	115 m	0.28 t	–	–	–	–	0.4 l
soursob	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.4 l
sowthistle	35–50 u	30–40	1.0 (S)	–	–	0.6	0.05 q	2.1–3.2	0.5–0.75 cde	115 m	–	–	–	0.5 (S)	720 (S)	0.4 l
spear/black thistle	35–50 u	–	–	–	–	–	0.025 k	2.1–3.2	–	200	–	–	–	–	–	–
spiny emex	–	40–45	0.5–0.75	1.5	0.75–1.4	0.9	–	2.1–3.2	0.5–0.75 de	200 m or p or r	0.16 v	0.7	0.1 h	0.5 (S)	720 (S)	0.4 l
St Barnaby thistle	35–50 u	–	–	–	–	–	0.15 h	–	–	–	–	–	–	–	–	–
sunflower – volunteer	–	40	–	–	–	–	–	–	–	–	0.28	–	–	–	–	–
toad rush	–	–	1.0 (S)	1.5	–	–	–	–	–	–	–	–	0.1 h	0.5	720	–
turnip weed	35–50	30	0.5–0.75	1.0	–	0.3–0.9 h	–	2.1–3.2	–	m or p or r	0.16 v	0.7	0.1 h	0.25–0.5	360–720	0.4 l
variegated thistle	35–50 u	–	1.0	–	–	–	0.025 k	2.1–3.2	0.5–0.75 de	200	0.28	–	–	–	–	–
vetch	35–50 u	–	1.0	–	–	–	0.05 h	–	0.5–0.75 f	115–200	0.16–0.28 w	0.7	0.1 h	–	–	–
vulpia	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
wild lettuce	35–50 u	40	1.0 (S)	–	–	0.6	0.075 h	2.1–3.2	0.75 e	115 m	–	–	–	0.25–0.5	360–720	0.4 i
wild oats	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
wild turnip	50	–	0.5–0.75	1.0	–	0.3–0.9 h	–	2.1–3.2	–	m or p or r	0.16 v	0.7	–	0.25–0.5	360–720	0.4 i
wireweed	–	40	1.0	1.5	0.75–1.0	0.9	–	2.1–3.2	0.5–0.75 ce	200 m or r	0.16 or 0.28 v	–	–	–	–	0.4 l
Recom water L/ha	**50–100**	**50 min**	**50 min**	**50–100**	**50 min**	**50 min**	**50 min**	**110 min**	**80 min**	**50 min**	**50 min**	**50–100**	**50–100**	**50 min**	**50–150**	**70–150**
Herbicide group	**B**	**B**	**C + F**	**C + I**	**C + I**	**I**	**I**	**I**	**I**	**I**	**I**	**I + B**	**I + B**	**F + I**	**C + F + I**	**G**

a = Add 1.0 L/ha MCPA 500 g/L for control.
b = Also available as Lontrel™ 750 SG (750 g/kg).
c = Add 5 g of metsulfuron-methyl (600 g/kg) and non-ionic wetter at 100 mL/100 L of water. See label.
d = Add 500–700 mL MCPA LVE. See label.
e = Northern NSW only.
f = 500 mL (southern NSW), 750 mL (northern NSW).
g = Southern NSW only.
h = See label for tankmix options.
i = Add 500 mL/ha MCPA 500 for control (NOT MCPA LVE).
j = Snail medic only.
k = Mix with 1 L/ha MCPA amine or 0.7 L/ha LVE MCPA for control.
l = Add 500 mL/ha MCPA 500 + 5 g/ha Esteem® WDG.
m = Tankmix 115 g /ha Cadence® with 5 g/ha Ally® for control with surfactant such as BS1000® at 100 mL/100 L spray.
n = Subclover only.
o = Not Clearfield canola volunteers.
p = Tankmix 115 g/ha Cadence® with 50 mL/ha Eclipse® 100 SC for control apply with Uptake™ spraying oil at 0.5 L/100 L water or D-C-Trate® oil at 1 L/100 L water.
q = Add 800 mL Tordon™ 242 or 5 g Ally® + 700 mL MCPA LVE.
r = Tankmix 115 g/ha Cadence® with 0.7 L/ha MCPA (500 g/L) for control.
t = Tankmix Cadence® with 1.2 L/ha MCPA (500 g/L) for control.
u = Add partner herbicide for control, see label.
v = Tankmix with 0.7 L/ha MCPA amine 500 g/L for control.
w = Add 700 mL/ha MCPA LVE when using lower rate.
x = Seedlings only.
y = Tankmix 500 mL/ha Jaguar® with 200–400 mL/ha MCPA LVE (500 g/L) for control.
z = *Angustifolius* (narrow-leaf) lupin.
* = See label for controlling RR Canola volunteers.
(S) = Suppression only.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 8. Herbicides for weed control for wheat and barley – Early post-emergence – Part 3

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Tralkoxydim 400 g/kg **Achieve® WG** (Pentagon) e		Diclofop-methyl 500 g/L **Hoegrass® 500**		Fenoxaprop-p-ethyl 110 g/L **Wildcat® 110 EC** Wheat only		Clodinafop-propargyl 240 g/L + 60 g/L Cloquintocet-mexyl **Topik®** Wheat only		Diclofop-methyl + Fenoxaprop p-ethyl 250 g/L + 13 g/L **Tristar® Advance**		Diclofop-methyl 200 g/L + Sethoxydim 20 g/L **Decision®**		Pinoxaden + Cloquintocet-mexyl 100 g/L + 25 g/L **Axial®**		Fenoxaprop-p-ethyl 13.6 g/L + Diclofop-methyl 200 g/L + Sethoxydim 20 g/L **Cheetah® Gold**		Fenoxyprop-p-ethyl 69 g/L + Cloquintocet-mexyl 34.5 g/L **Foxtrot®**		Flamprop-m-methyl 90 g/L **Mataven® 90** (Judgement®) c Wheat only		Imazamox 33 g/L + Imazapyr 15 g/L **Intervix®** Clearfield wheat and Clearfield barley only		Sulfosulfron 750 g/kg **Monza®** Wheat only		Pyroxsulam 30 g/L + Cloquintocet-mexyl 90 g/L **Crusader™** Wheat only (not durum)		Iodosulfuron-methyl-sodium 100 g/L **Hussar® OD** Wheat and barley only		Mesosulfuron-methyl 30 g/L **Atlantis® OD** Wheat only		MCPA + Imazapic + Imazapyr 288.5 g/L + 22 g/L + 7.3 g/L **Midas®** Clearfield wheat only	
Apply at crop growth stage	2 L–Ea Till		2 L–Ea Till		2 L–Mid Till		2 L–Late Jnt		2 L–Ea Till		2 L–1 Till		2 L–Boot		2 L–2 Till		2 L–Mid Till		3 L–Full Till		3 L–1st node		Em –Ea Till		3 L–1st node		3 L–5 Till		Not before 3 L		4L–Flag L	
Zadoks code	12–22		12–21 (w)		12–24		12–37		12–22		12, 14–21		12–49		12–22		12–24		13–30		13–31		11–22		13–31		13–25		> Z13		14–37	
Weeds controlled	(grams)		(litres)		(litres)		(millilitres)		(litres)		(litres)		(litres)		(litres)		(litres)		(litres)		(millilitres)		(grams)		(millilitres)		(millilitres)		(litres)		(litres)	
amsinckia	–	Add 0.75 or 1 L Supercharge® or Amplify® /100 L.	–	Add wetting agent e.g. 250 mL BS1000®/100 L water. Maximum rate for barley 1.1 L/ha at 4–5-leaf stage only. Diclofop-methyl is also available in a 375 g/L formulation (Rhino®, Hostage®).	–	Add wetting agent, e.g.BS1000® at 250 mL/100 L spray.	–	Add 1 L D-C-Trate® oil/100 L spray or 0.5 L Uptake™ or Hasten™ oil/100 L spray.	–	Suppression of annual phalaris may be improved by adding 250 mL BS1000®/100 L water.	–	Add the crop oil Hasten™ at 1% v/v (i.e. 1.0 L/100 L of spray mixture) when Decision® is being applied alone.	–	Always add 500 mL Adigor® spray adjuvant/100 L of water. Use the lower rate when weeds are actively growing without stress, small in size and of low density. **DO NOT** apply later than the first awns visible stage (GS49) of the crop.	–	Cheetah® Gold must be mixed with either Uptake™ at 0.5% v/v or Hasten™ at 1% v/v.	–	Do not apply to durum varieties. Spray wild oats from 3-leaf to the end of tillering stage. Do not apply to wheat after beginning of jointing. Apply Uptake™ only when spraytopping.	–	Not for use in 1 gene wheat such as Clearfield JNZ or Clearfield STL. Always add Supercharge® at 0.5 L/100L.	25	Add D-C-Trate® at 2 L/100 L of spray. Spray small weeds (see label). Not on undersown legumes. Good soil moisture required for effective results	–	Always use BS1000® at 250 mL/100 L. Note recropping intervals. See label.	–	Wheat: apply 4–7 weeks after sowing when wheat at 3-leaf–5 tiller stage. Barley: apply 4 leaf–5 tiller stage. See Critical Comments on label for use in barley, as barley can be sensitive to Hussar® OD under certain conditions.Weeds young and actively growing. Use only on varieties listed on label.	–	Atlantis® OD must always be applied with a non-ionic wetting agent (e.g. BS1000® at 0.25% v/v). Atlantis® OD must not be mixed with zinc based foliar fertilisers as a loss of efficiency can occur. Suppression of brome grass may be improved with the use of Hasten™ at 1% v/v.	0.9	Note: use on Clearfield System wheat varieties only; apply to crops in the 4L to start of flagleaf stage. Apply early post-emergent to actively growing grass weeds (3-leaf to 2 tiller stage) and broadleaf weeds (2–6 leaf stage).
annual phalaris	380–500 (S)		–		0.4–0.5 d		85–160		1.5 (S)		–		0.2–0.25		1.0 (S)		0.635–0.8		–		–		25		–		100 x		0.33		0.9	
annual ryegrass	380–500		0.75		f		160–210		1.5		1.0		0.25–0.3 (S)		1.0		–		–		600–750		–		500 (S)		75–100		0.33 (S)		0.9 w	
barley grass	–		–		–		–		–		–		–		–		–		–		375–750		25 (S)		–		–		0.33 (S)		0.9	
bedstraw	–		–		–		–		–		–		–		–		–		–		600–750 (S)		–		500		100 (S)		–		0.9	
black bindweed	–		–		–		–		–		–		–		–		–		–		–		–		–		75 (S)		–		0.9 (S)	
brome grass	–		–		–		–		–		–		–		–		–		–		375–750		20–25 (S)		500		–		0.33 (S)		0.9	
buchan weed	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
canola – volunteer	–		–		–		–		–		–		–		–		–		–		–		20 n		500 n		–		–		0.9 n	
capeweed	–		–		–		–		–		–		–		–		–		–		–		–		500 + k		–		–		0.9	
cereals – volunteer	–		–		–		–		–		–		–		–		–		–		375–750		–		–		–		–		0.9	
charlock	–		–		–		–		–		–		–		–		–		–		–		–		–		75		–		–	
chickpea – volunteer	–		–		–		–		–		–		–		–		–		–		–		–		500		–		–		–	
cleavers	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
clover	–		–		–		–		–		–		–		–		–		–		600–750 i		–		–		75		–		0.9	
corn gromwell	–		–		–		–		–		–		–		–		–		–		–		–		–		75 (S)		–		0.9	
common barbgrass	–		j		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
deadnettle	–		–		–		–		–		–		–		–		–		–		–		–		–		75		–		0.9	
dock	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
erodium	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		0.9 (S)	
faba bean – volunteer	–		–		–		–		–		–		–		–		–		–		–		–		500		–		–		0.9 (S)	
field pea – volunteer	–		–		–		–		–		–		–		–		–		–		–		20		500		75 (S)		–		–	
fumitory	–		–		–		–		–		–		–		–		–		–		–		–		–		75		–		0.9	
lesser swinecress	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
lupin – volunteer	–		–		–		–		–		–		–		–		–		–		–		–		500		75		–		–	
medics	–		–		–		–		–		–		–		–		–		–		–		–		500		75		–		0.9 (S)	
Mexican poppy	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
mintweed	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		0.9 (S)	
mustards	–		–		–		–		–		–		–		–		–		–		375–750		25 (S)		500 + k		75		–		0.9	
New Zealand spinach	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	

Paterson's curse	–	–	–	–	–	–	–	–	–	–	–	–	–	100	Do not use where group 'B' resistance is likely to be a problem or where a group B herbicide has been applied to the current crop. Not compatible with zinc foliar fertilisers.	–	0.9
pepper cress	–	–	–	–	–	–	–	–	–	–	–	375–750	–	–		–	–
radish – wild	–	–	–	–	–	–	–	–	–	–	–	–	20	500 + k		100	–	0.9
rough poppy	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–
saffron thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	0.9(S)
shepherd's purse	–	–	–	–	–	–	–	–	–	–	–	–	–	–		75	–	0.9
skeleton weed	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–
slender thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–
sorrel	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–
soursob	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–
sowthistle	–	–	–	–	–	–	–	–	–	–	–	–	–	500 + k		100 (S)	–	0.9 (S)
spear/black thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	0.9
spiny emex	–	–	–	–	–	–	–	–	–	–	–	600–750 (S)	–	–		100	–	0.9
St Barnaby thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–
sunflower – volunteer	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–
toad rush	–	–	–	–	–	–	–	–	–	–	–	–	–	–		75 (S)	–	0.9
turnip weed	–	–	–	–	–	–	–	–	–	–	–	–	–	500		75	–	0.9
variegated thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	0.9
vetch	–	–	–	–	–	–	–	–	–	–	–	–	–	500 (S)		75 (S) a	–	0.9 (S)
vulpia	–	–	–	–	–	–	–	–	–	–	–	600–750 (S)	25	–		–	–	0.9 (S)
wild lettuce	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	0.9 (S)
wild oats	300–500	1.1–1.5	0.3–0.4 d	65–125 h	1.5	–	0.15–0.2	1.0	0.475–0.635	1.25–2.5 b c	375–750	25 (S)	500	100		0.33	0.9
wild turnip	–	–	–	–	–	–	–	–	–	–	375–750	20	–	–		–	0.9
wireweed	–	–	–	–	–	–	–	–	–	–	–	–	–	75		–	0.9
Rec water L/ha boom	**50–150**	**50–150**	**50–100**	**50–110**	**50–100**	**50–150**	**50 min**	**50–150**	**50–100**	**30–100**	**70 min**	**40–100**	**50–100**	**50–80**		**50–80**	**50 min**
Herbicide group	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**Z**	**B**	**B**	**B**	**B**		**B**	**B + I**

a = Wild vetch only (*Vicia sativa*).
b = Use higher rate prior to jointing. For spraytopping use 1.25–1.875 L/ha. See label for crop variety safety.
c = Judgement® contains 75 g/L flamprop-m-methyl. See label for rates.
d = Mixtures with some broadleaf herbicides may result in reduced grass weed control. See label. Use alone for phalaris control.
e = Pentagon® contains 600 g/L tralkoxydim.
f = Hoegrass® can be tank-mixed with Wildcat® or Puma® Progress for ryegrass control.
h = Rate in southern NSW is 65–85 mL/ha and in northern NSW 65–125 mL/ha.
i = Subclover only.
j = Hoegrass® 375 registered for control.
k = See label for tankmix options.
n = Not Clearfield canola. See label for controlling RR Canola volunteers.
w = Where ALS (group B) resistant ryegrass is known to be present, application of a group D herbicide such as trifluralin or Stomp® 330 EC should be made prior to sowing.
x = *Phalaris paradoxa* only.
(S) = Suppression only.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 9. Herbicides for weed control for wheat and barley – Late post-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Flamprop-M-methyl 90 g/L **Mataven® 90 (Judgement®)** c **Wheat only**		Pinoxaden 100 g/L + cloquintocet-mexyl 25 g/L **Axial®**		Triasulfuron 750 g/kg **Logran®**		Flumetsulam 800 g/kg **Broadstrike™**		Low Volatile 2,4-D Ester 680 g/L **Estercide® Xtra 680**	2,4-D amine 700 g/L **Amicide® Advance 700**		2,4-D amine 800 g/kg **Baton® Low**		2,4-DB 500 g/L **Buttress®**		MCPA 750 g/L **Thistle-Killem® 750**		MCPA 570 g/L **LVE Agritone®**		Picloram + MCPA 26 + 420 g/L **Tordon™ 242**		Picloram + 2,4-D 75 + 300 g/L **Tordon™ 75-D**		Clopyralid 600 g/L **Lontrel™ Advanced** a e
Apply at crop growth stage	**Prior flag leaf**		**Up to awn peep**		**Prior flower**		**Fi–Ea dough**		**Full Till–Bo**	**Full Till–Bo**		**Full Till–Bo**		**5 L–F Till**		**Full Till–Bo**		**3 L–Bo**		**Ea Till–Full Till**		**M Till–Joint**		**2 L–1st node**	
Zadoks code	**Prior Z40**		**12–49**		**31–60**		**61–83**		**31–37**	**30–37**		**30–37**		**15–37**		**30–37**		**13–37**		**22–30**		**23–31**		**12–31**	
Weeds controlled	**(litres)**		**(litres)**		**(grams)**		**(grams)**		**(litres)**	**(litres)**		**(kilograms)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**	
amsinckia	–	**Selective spray topping** rates for wild oats. Add Uptake™ spraying oil at 0.5 L/100 L spray. Spray wild oats between stem elongation and booting stage and wheat no later than flag leaf sage (Z40). Do NOT apply to Durum varieties. See label.	–	For spray topping wild oats. Zadok 30–47. Always add 500 mL of Adigor®/100 L. Do not apply Axial® more than once per crop. Sth NSW 150–200 mL Axial® Nth NSW 200 mL.	–	**Late salvage spray.** Add crop oil at 1 L/100 L spray or surfactant at recommended rates. Spray radish during early flowering. **DO NOT** spray crop during flowering.	–	Salvage spray to prevent seed set in wild radish and turnip weed. Spray least–mature weeds from early flowering to early pod set of most mature weeds, and crop from flowering to early dough stage. Add Uptake™ oil or wetter (barley). Can be used on undersown lucerne, clovers and annual medics.	–	–	Maximum rate on wheat 1.5 L/ha, barley 1.25 L/ha.	–	Maximum rate on wheat 1.3 L/ha, barley 1.1 L/ha.	–	Boom only. Good quality water essential.	Tankmix 1	Undersown legumes tolerant to lower rates – see label. Not on medics or lucerne.	–	See label for crop stage, weed size and chemical rate. Barley: Use only from 5-leaf stage to flag-leaf just visible (Z15–37). Maximum rate in barley 1.4 L/ha.	–	Do not plant susceptible crops within 12 months of applying the product.	–	Do not plant susceptible crops within 12 months of applying the product.	–	
annual ryegrass	–		–		–		–		–	–		–		–		–		–		–		–		–	
annual phalaris	–		–		–		–		–	–		–		–		–		–		–		–		–	
black bindweed	–		–		–		–		–	–		–		–		0.46–1.45		–		1.0 d		0.3		–	
capeweed	–		–		–		–		0.53–0.8	–		–		2.1–3.2		Tankmix 1		0.44–1.84 j		–		–		0.15	
canola – volunteer	–		–		–		–		0.41–0.8 i	0.9–1.25		–		–		See label		0.44–1.84 j		–		–		–	
charlock	–		–		–		–		0.41	0.5–0.98		0.25–1.3		2.1–3.2		Tankmix 1		0.44–1.84 j		–		–		–	
clover	–		–		–		–		0.62–0.8	1.1		0.25–1.3		–		–		–		–		–		–	
corn gromwell	–		–		–		–		0.8	–		–		–		Tankmix 1		–		–		–		–	
deadnettle	–		–		–		–		0.8	–		–		–		Tankmix 1		–		–		–		–	
erodium	–		–		–		–		0.8	–		–		–		Tankmix 1		–		–		–		–	
fleabane	–		–		–		–		–	1.4 k		–		–		–		–		–		–		–	
fumitory	–		–		–		–		0.8	–		–		2.1–3.2		0.46–1.45		0.44–1.84 j		–		–		–	
Mexican poppy	–		–		–		–		0.8	–		–		2.1–		–		–		–		–		–	
mintweed	–		–		–		–		0.8	0.98		–		–		0.46–1.45		–		–		0.3 b		–	
mustards	–		–		–		–		0.41–0.8	0.5–0.98		0.25–1.3		2.1–3.2		0.46–1.45		0.44–1.84 j		1.0		0.3 b		–	
New Zealand spinach	–		–		–		–		0.8	0.98–1.5		0.25–1.3		–		–		–		1.0 (S)		0.3		–	
Paterson's curse	–		–		–		–		0.8	0.98–1.5		0.25–1.3		2.1–3.2		0.46–1.45		0.44–1.84 j		–		–		–	
radish – wild	–		–		10–15 h		25		0.41–0.8	1.25–1.5		0.25–1.3		–		Tankmix 1		0.44–1.84 j		1.0		0.3 b		–	
rough poppy	–		–		–		–		0.41–0.8	0.98		0.25–1.3		–		0.46–1.45		–		–		–		–	
saffron thistle	–		–		–		–		0.41–0.8	0.5–1.5		0.25–1.3		2.1–3.2		0.46–1.45		0.44–1.84 j		1.0		0.3		–	
scotch thistle	–		–		–		–		–	–		–		–		–		0.44–1.84 j		–		–		–	
shepherd's purse	–		–		–		–		0.8	0.98–1.5		0.25–1.3		2.1–3.2		–		–		–		–		–	
skeleton weed	–		–		–		–		0.8	0.98–1.5		0.25–1.3		–		–		0.44–1.84 j		1.0		–		–	
slender thistle	–		–		–		–		0.8	0.715–1.5		0.25–1.3		2.1–3.2		–		0.44–1.84 j		–		–		–	
sorrel	–		–		–		–		–	1.5		0.25–1.3		–		–		–		–		–		–	
sowthistle	–		–		–		–		–	1.5		–		2.1–3.2		–		–		1.0		0.3		–	
spear thistle	–		–		–		–		–	–		–		2.1–3.2		0.46–1.45		0.44–1.84 j		–		–		–	
spiny emex	–		–		–		–		–	–		–		2.1–3.2		Tankmix 1		–		1.0		0.3		–	
St Barnaby thistle	–		–		–		–		–	–		–		–		–		–		–		–		0.15	
sunflower	–		–		–		–		0.41–0.8	0.5–1.25		0.25–1.3		–		–		0.44–1.84 j		–		0.3 b		–	
turnip weed	–		–		–		25		0.41–0.8	0.5–0.98		0.25–1.3		2.1–3.2		Tankmix 1		0.44–1.84 j		1.0		0.3 b		–	
variegated thistle	–		–		–		–		0.41–0.8	0.5–1.5		0.25–1.3		2.1–3.2		0.46–1.45		0.44–1.84 j		1.0		0.3 b		–	
vetch	–		–		–		–		–	–		–		–		–		–		–		–		0.05	
wild oats	1.25–1.875 c		0.2		–		–		–	–		–		–		–		–		–		–		–	
wild turnip	–		–		–		–		0.41–0.8	0.5–0.98		0.25–1.3		2.1–3.2		Tankmix 1		0.44–1.84 j		1.0		–		–	
wireweed	–		–		–		–		0.8	–		–		2.1–3.2		–		–		1.0(S)		0.3 b (S)		–	
Recom water L/ha boom	**30–100 min**		**50 min**		**30–100**		**100 min**		**30–100**	**50–250**		**30–120**		**110 min**		**30–120**		**30–120**		**50 min**		**50–100 min**		**50 min**	
Herbicide group	**Z**		A		**B**		**B**		**I**	**I**		**I**		**I**		**I**		**I**		**I**		**I**		**I**	

2,4-DB is not safe on woolly pod vetch, berseem and red clovers.

a = See label for tankmix options. b = Tank mix with 0.47 L/ha 2,4-D amine for control. c = Judgement® contains 75 g/L flamprop-M-methyl. See label for rates. d = Preferred option for northern NSW only. e = Also available as Lontrel™ 750 SG (750 g/kg).

f = Subclover. (S) = Suppression only. h = 10 g/ha rate, only on some triasulfuron labels. i = See label for controlling RR canola volunteers. j = See critical comments on label in 'Directions for Use', showing varying rate according to weed size. k = Fleabane up to 6-leaf rosette stage. Apply in 70–100 L water.

Tankmix 1 = 330 mL/ha + 500 mL/ha Crop Care Diuron Flowable.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014

Table 10. Herbicides for weed control for oats – Early post-emergence – Part 1

Rate per hectare	Metosulam 100 g/L **Eclipse® 100 SC**		Chlorsulfuron 750 g/kg **Glean®**		Clopyralid 300 g/L + Florasulam 50 g/L **Torpedo™**		Bromoxynil 200 g/L **Bromoxynil**		Bromoxynil + MCPA 200 + 200 g/L **Buctril® MA**		Bromoxynil + MCPA + Dicamba 140 + 280 + 40 g/L **Broadside®**		Pyraflufen-ethyl 20 g/L **Ecopar®**		Pyrasulfotole 50 g/L + MCPA 250 g/L **Precept® 300 EC** s		Dicamba 500 g/L **Kamba® 500**		MCPA + Dicamba 340 + 80 g/L **Kamba® M**		Fluroxypyr 333 g/L **Starane™ Advanced** t		Aminopyralid 10 g/L + Fluroxypyr 140 g/L **Hotshot™**		MCPA 375 g/L + Florasulam 7 g/L **Conclude™**		MCPA + Diflufenican 250 g + 25 g/L **Tigrex®**	
Apply at crop growth stage	**2 L–1st Node**		**2 L–Ea Till**		**3 L–1st Node**		**3 L–Ful Till**		**3 L–Ful Till**		**3 L–Ful Till**		**2 L–Mid Till**		**3 L–1st node**		**5L–Ea Till**		**Ea–Ful Till**		**3-leaf–Flag leaf**		**3 L–1st node**		**3 L–Flag**		**3/5 L–L Till**	
Zadoks code	**12–31**		**12–23**		**13–31**		**13–30**		**13–30**		**13–30**		**12–25**		**13–31**		**15–22**		**21–30**		**13–39**		**13–31**		**13–39**		**13–30**	
Weeds controlled	**(millilitres)**		**(grams)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(millilitres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**	
amsinckia	50	Apply with 0.5 L Uptake™ spraying oil or 1 L D-C-Trate® oil/100 L water. Can be tankmixed with 0.35–0.5 L LVE MCPA/ha for improved control. See label.	15	Not before 2-leaf stage of oats. Moist soils or rain within 7 days enhances results. Add wetter.	–	Always add 500 mL/100 L Uptake™ spraying oil. See label when mixing Torpedo™ with grass weed herbicides.	1.4–2.0	Not on undersown medics. Avoid spraying when temperatures are above 20°C. Aerial application can be unsatisfactory.	1.4–2.0	1.4 L/ha can be used at 3-leaf stage.	0.75–1.4		–		0.75–1.0	Spray grade liquid ammonium sulfate, Hasten™ (1% v/v), Supercharge® (0.75% v/v) or Uptake™ (0.5% v/v) must be used with Precept®. Do not use non-ionic surfactants. Note recropping intervals on label. For best results apply in warmer temperatures and high light intensity and > 1 hr of daylight left after application.	–	Damage can occur if crop not actively growing or at right stage. Small weeds.	–	Can be tankmixed with Eclipse®, MCPA LVE or MCPA amine to broaden weed spectrum. Do not use metsulfuron-methyl mixes in Oats.	–	Always add Uptake™ spraying oil at 500 mL/100 L water, unless tankmixing with Ally®. When tankmixing with Ally® add a non-ionic wetter at 200 mL/200 L.	–	Can be used on undersown sub-clover and some other clovers. See label. Not on lucerne or annual medics. Application should be made from the third to the eighth trifoliate leaf stage.	–	
annual ryegrass	–		20 or 25 a		–		–		–		–		–		–		–		–		–		–		–		–	
bedstraw	50 (S) r		–		0.1 h		1.4–2.0		–		–		400		0.75–1.0		–		–		0.3		–		0.7		–	
black bindweed	–		20		0.1 h		1.4–2.0		1.4–2.0		1.0		–		–		0.28		1.7		0.3–0.45		0.5–0.75 f		–		–	
canola – volunteer	50 h		–		–		–		–		1.4		400		0.5–1.0 u		–		–		–		–		–		0.5 u	
capeweed	35–50 r		–		0.1 h		1.4–2.0		1.4–2.0		0.75–1.4		400		0.5 n		0.16 b		1.0–1.7		–		–		0.7 (S)		0.5–1.0	
charlock	–		15		–		–		1.4–2.0		–		–		–		0.16 b		1.0–1.7		–		–		–		0.5–1.0	
cleavers	–		–		–		–		–		–		–		–		–		–		0.6		–		–		–	
clover	50 (S) m		–		–		–		–		–		–		0.5 n q		0.28		1.7		–		–		–		–	
corn gromwell	–		20		–		1.4–2.0		1.4–2.0		1.0		–		0.5–1.0		–		–		–		–		–		1.0	
deadnettle	–		15 or 20		–		–		–		–		–		0.5–1.0		–		–		0.9		0.5–0.75 f g		–		1.0	
dock – seedlings	–		–		–		–		–		0.75–1.4		–		–		0.16 b		1.0–1.7		–		–		–		1.0 (S)	
faba bean – volunteer	35–50 r		–		0.075–0.1		–		–		–		–		0.5 n		–		–		–		0.5–0.75 d		0.7		–	
field pea – volunteer	50 (S)		–		0.075–0.1		–		1.4–2.0		–		–		0.5–1.0 n		–		–		–		0.5–0.75 d		0.7		–	
fumitory	–		20		–		2.0		1.4–2.0		1.0		–		0.5–1.0		–		–		–		–		–		0.75	
lupin – volunteer	35–50 r		–		0.075–0.1		–		–		–		400		0.5–1.0		–		–		0.9		0.5–0.75 k		0.7		1.0 (S)	
Mexican poppy	–		–		–		2.0		1.4–2.0		–		–		–		–		–		–		–		–		–	
mintweed	–		20		–		–		1.4–2.0		–		–		–		0.28 g		1.7		–		–		–		–	
mustards	50		15		0.075–0.1		2.0		1.4–2.0		0.75–1.4		400		0.5 o		0.16 b		1.0–1.7		0.3–0.9 p		–		0.7 o		0.5–1.0	
New Zealand spinach	–		–		–		–		–		–		–		–		0.28		1.7		–		–		–		–	
Paterson's curse	–		15		–		2.0		1.4–2.0		–		–		0.5–1.0		–		–		–		–		–		1.0 (S)	
radish – wild	50		15 or 20		0.075–0.1		2.0		1.4–2.0		0.75–1.4		300–400		0.5–1.0		0.16 b		1.0–1.7		0.3–0.9 p		–		0.7		0.5–1.0 i	
rough poppy	–		20		–		–		1.4–2.0		–		–		–		–		–		–		–		–		1.0 (S)	
saffron thistle	35–50 r		–		–		1.4–2.0		1.4–2.0		–		–		–		–		1.7		–		–		–		1.0	
shepherd's purse	–		20		–		1.4–2.0		1.4–2.0		–		–		–		–		–		0.3–0.9 p		–		–		0.5–1.0	
skeleton weed	–		–		–		–		–		–		–		–		–		–		–		–		–		1.0 (S)	
slender thistle	35–50 r		–		–		–		1.4–2.0		–		–		–		–		–		–		–		–		–	
sorrel	–		–		–		–		–		–		–		–		–		1.0		–		–		–		–	
soursob	–		20		–		–		–		–		–		–		–		–		–		–		–		–	
sowthistle	35–50 r		–		–		–		1.4–2.1 j		–		–		0.5–1.0		–		–		0.6		0.5–0.75 f p		–		1.0 (S)	
spear/black thistle	–		–		–		–		–		–		–		–		–		–		–		–		–		–	
spiny emex	–		–		–		2.0		–		0.75–1.4		–		0.75–1.0 (S)		0.16 b		1.0–1.7		0.9		0.5–0.75 f p		0.7		1.0 (S)	
toad rush	–		–		–		–		1.4–2.1		–		–		–		–		–		–		–		–		1.0	
turnip weed	35–50		15		0.1 h		2.0		1.4–2.0		–		–		0.5–1.0		0.16 b		1.0–1.7		0.3–0.9 p		–		0.7		0.5–1.0	
variegated thistle	35–50 r		–		–		1.4–2.0		1.4–2.0		–		–		–		0.28		1.7		–		0.5–0.75 f p		–		1.0 (S)	
vetch	35–50 r		–		–		–		–		–		–		0.5 n		0.16 b		1.0–1.7		–		0.5–0.75 d		0.7		1.0 (S)	
wild lettuce	35–50 r		–		0.1 h		–		–		–		400		0.5–1.0		–		–		0.3–0.6		0.75 f		–		0.5–1.0	
wild oats	–		–		–		–		–		–		–		–		–		–		–		–		–		–	
wild turnip	50		15		–		2.0		1.4–2.0		–		400		0.5–1.0		0.16 b		1.0–1.7		0.3–0.9 p		–		0.7		0.5–1.0	
wireweed	–		20		–		2.0		–		0.75–1.4		–		0.55–1.0		0.16 b		1.0–1.7		–		–		–		0.75 (S)	
Rec water L/ha boom	**50–100**		**30 min**		**50–100**		**50–200**		**50–200**		**50 min**		**50 min**		**50–100**		**50 min**		**50 min**		**50 min**		**80 min**		**50–100**		**50 min**	
Herbicide group	**B**		**B**		**B + I**		**C**		**C + I**		**C + I**		**G**		**H + I**		**I**		**I**		**I**		**I**		**I + B**		**I + F**	

a = No more than 3 leaves of annual ryegrass. Use more than 50 L/ha water.
b = Tankmix with 0.7 L/ha MCPA amine (500 g/L) for control.
d = 500 mL (southern NSW), 750 mL (northern NSW).
e = Add 500–700 mL MCPA LVE. See label.
f = Northern NSW only.
g = Tankmix with 1.2 L/ha MCPA 500.
h = Not Clearfield canola volunteers.
i = Tankmix 350–500 mL/ha Tigrex® plus 200–400 mL/ha MCPA LVE (500 g/L) for control.
j = Northern NSW only.
k = Southern NSW only.
m = Subclover only.
n = Add Lontrel™ Advanced for control. See label for rates.
o = Indian hedge mustard only.
p = See label for tankmix options.
q = Subclover only.
r = Add partner herbicide for control. See label.
s = Also available as Precept® 150. See label for rates.
t = Fluroxypyr also available in 200 g/L and 400 g/L. See label for rates.
u = See label for controlling RR Canola volunteers.
(S) = Suppression only.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014

Table 10. Herbicides for weed control for oats – Early post-emergence – Part 2

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Flumetsulam 800 g/kg **Broadstrike™**		Diuron flowable ◆ 500 g/L **Diuron 500** g	Terbutryn flowable 500 g/L **Igran®** e		Terbutryn + MCPA 275g + 160 g/L **Agtryne® MA**		Picolinafen + MCPA 50 g + 500 g/L **Paragon®**		Picolinafen + MCPA + Bromoxynil 35 g/L+ 350g/L + 210 g/L **Flight® EC**		Picloram + MCPA 26 + 420 g/L **Tordon™ 242**		MCPA 750 g/L **Thistle-Killem® 750**	MCPA 570 g/L **LVE Agritone®**		Dicamba 700 g/kg **Cadence®**		Clopyralid 600 g/L **Lontrel™ Advanced** h	2,4-DB 500 g/L **Buttress®**	
Apply at crop growth stage	**Mid Till–E Jo**		**3–5 L Till**	**3 L–E Till**		**3 L–5L**		**3 L to 5 L**		**3 L to Late tiller**		**E Till–Full Till**		**5L–E Ti**	**3 L–E Flag**		**3 L–M Till**		**2 L–1st node**	**5L–F Till**	
Zadoks code	**23–31**		**13–23**	**13–21**		**13–15**		**13–15**		**13–28**		**22–30**		**15–37**	**13–37**		**13–25**		**12–31**	**15–37**	
Weeds controlled	**(grams)**		**(litres)**	**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**	**(litres)**		**(grams)**		**(litres)**	**(litres)**	
amsinckia	25	Safe on undersown lucerne, medics and sub-clovers after the 2–3 trifoliate leaf stage. Use only wetting agent such as BS1000® with oats.	0.9	0.55–0.85	Avoid spraying when temperatures exceed 18°C. Do not use on undersown medics, lucerne or white clover. See variety safety caution on label.	1.0	See oat variety sensitivities on label and Table 28.	–	Do not use 0.5 L/ha rate on crops younger than 5 leaf. Do not apply rates higher than 0.25 L/ha to crops in the 3 leaf stage.	–	Slight transient yellowing may occur in oats.	–	Do not plant susceptible crops within 12 months of applying the product.	–	–	Max rate between 3 L–5-leaf stage 0.44 L/ha	m	Add wetting agent. Do not apply after mid-tillering as crop damage may result.	–	–	Boomspray only. Good quality water essential.
annual ryegrass	–		–	–		–		–		–		–		–	–		–		–	–	
black bindweed	–		–	p		–		–		–		1.0		0.46–1.45 a	–		200		–	–	
canola – volunteer	25 f		–	–		–		0.25 n		0.36		–		–	–		–		–	–	
capeweed	25 r		0.9	0.55–0.85		1.0		0.25–0.5		0.36–0.72		–		0.46–1.45 a	0.44–1.4 a		115 t		0.15 b	2.1–3.2	
charlock	25		0.9	0.55–0.85 b		1.0		0.25–0.5		0.36–0.72		–		0.46–1.45 a	0.44–1.4 a		115 t		–	2.1–3.2	
clover	–		–	–		–		–		–		–		–	–		115–200		0.075–0.1 x	–	
corn gromwell	–		–	0.55–0.85		1.0		0.5		0.72		–		–	–		–		–	–	
deadnettle	25 (S) r		–	0.55–0.85		1.5		0.5 (S)		0.72 (S)		–		–	–		–		–	–	
dock	–		–	–		–		–		–		–		–	–		200 t		–	–	
field pea – volunteer	–		–	p		–		–		–		–		–	–		115–200		0.075 d	–	
fumitory	25 r		–	0.55–0.85		1.0		0.5 (S)		0.54 a–0.72 (S)		–		0.46–1.45 a	0.44–1.4 a		–		–	2.1–3.2	
lupin – volunteer	25		–	–		–		0.5 (S)		0.72 (S) u		–		–	–		115		0.125 d	–	
Mexican poppy	–		–	p		–		–		–		–		–	–		–		–	–	
mintweed	–		–	–		–		–		–		–		0.46–1.45 a	–		–		–	–	
mustards	25		0.9	0.55–0.85 bp		1.0		0.25–0.5		0.36–0.72		1.0		0.46–1.45 a	0.44–1.4 a		115 m t		–	2.1–3.2	
New Zealand spinach	25 (S)		–	–		–		–		–		1.0 (S)		–	–		200		–	–	
Paterson's curse	25 (S) r		–	0.55–0.85		1.0		–		–		–		0.46–1.45 a	0.44–1.4 a		–		–	2.1–3.2	
radish – wild	25 (S) r		–	p		–		0.25–0.5		0.36–0.72		1.0		0.46–1.45 a	0.44–1.4 a		m or t		–	–	
rough poppy	–		0.9	–		1.0		–		–		–		–	–		–		–	–	
saffron thistle	–		0.9	–		–		0.5		0.72		1.0		0.46–1.45 a	0.44–1.4 a		–		0.025 k	2.1–3.2	
shepherd's purse	25		–	p		–		0.25–0.5		0.36–0.72		–		–	–		–		–	2.1–3.2	
skeleton weed	–		–	–		–		–		–		1.0		0.46–1.45 a	0.44–1.4 a		–		0.25 c	–	
slender thistle	–		–	–		–		–		–		–		–	0.44–1.4 a		–		0.025 k	2.1–3.2	
sorrel	–		–	–		–		–		–		–		–	–		–		–	–	
soursob	–		–	–		–		–		–		–		–	–		–		–	–	
sowthistle	–		–	–		–		0.5 (S)		0.72 (S)		1.0		–	–		–		0.05 d	2.1–3.2	
spear thistle	–		–	–		–		–		–		–		0.46–1.45 a	0.44–1.4 a		200		0.025 k	2.1–3.2	
spiny emex	25 (S) r		0.9	0.55–0.85 b		1.5		0.5 (S)		0.72 (S)		1.0		–	–		200 m or t		–	2.1–3.2	
toad rush	–		–	0.55–0.85		1.5		0.5		0.72		–		–	–		–		–	–	
turnip weed	15–25		0.9	0.55–0.85 b p		1.0		0.25–0.5		0.36–0.72		1.0		0.46–1.45 a	0.44–1.4 a		m or t		–	2.1–3.2	
variegated thistle	–		–	–		–		–		–		1.0		0.46–1.45 a	0.44–1.4 a		200		0.025 k	2.1–3.2	
wild lettuce	–		–	–		–		0.25–0.5		0.36–0.72		–		–	–		–		0.075 d	2.1–3.2	
wild oats	–		–	–		–		–		–		–		–	–		–		–	–	
wild turnip	25		0.9	0.55–0.85 b p		1.0		0.25–0.5		0.36–0.72		1.0		0.46–1.45 a	0.44–1.4 a		m or t		–	2.1–3.2	
wireweed	–		–	–		1.5		–		–		1.0 (S)		–	–		200		–	2.1–3.2	
Rec water L/ha boom	**50–150**		**50–100**	**50–100**		**50–100**		**50 min**		**50–150**		**50 min**		**30–120**	**30–120**		**50 min**		**50 min**	**110–220**	
Herbicide group	**B**		**C**	**C**		**C + I**		**F + I**		**C+ I + F**		**I**		**I**	**I**		**I**		**I**	**I**	

a = Refer to weed table on label. Weed size will dictate rate.
b = Tank mix with 0.3 L/ha MCPA 500 g/L or 0.3 L 2,4-D amine 500 g/L for control.
c = Add 1.0 L/ha MCPA 500 g/L for control.
d = See label for tankmix options.
e = Do not apply to Avon, Saia, Cassia or Barmah varieties of oats. Consult agronomist before using on other varieties.
f = Not Clearfield canola volunteers.
g = Alternatively Diurex® 900 WG 900 g/kg.
h = Also available as Lontrel™ 750 SG (750 g/kg).
k = Tankmix with 1 L/ha MCPA Amine or 0.7 L LVE MCPA/ha for control.
m = Tankmix 115 g/ha Cadence® with 50 mL/ha Eclipse® 100 SC for control. Add Uptake™ spraying oil at 0.5 L/100 L water or 1 L D-C-Trate® oil/100 L water.
n = See label for comntrolling RR canola volunteers.
p = Tankmix of Igran® and Logran® can be used for control. See label.
r = See label for tankmix of Broadstrike™ and other herbicides for control. See label.
t = Tankmix 115 g Cadence®/ha with 0.7 L MCPA (500 g/L) per ha for control.
u = Angustifolius (narrow leaf) lupins only.
x = Subclover only.
(S) = Suppression only.
◆ = See *What's new in 2014* on page 3.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014

Table 11. Herbicides for weed control for oats – Late post-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Triasulfuron 750 g/kg **Logran®**		Flumetsulam 800 g/kg **Broadstrike™**		2,4-D amine 700 g/L **Amicide® Advance 700**		2,4-D amine 800 g/kg **Baton® Low**	2,4-DB 500 g/L **Buttress®**		MCPA 750 g/L **Thistle-Killem® 750**		MCPA LVE 570 g/L **LVE Agritone®**		Picloram + MCPA 26 + 420 g/L **Tordon™ 242**		Picloram + 2,4-D + aminopyralid (75 + 300 g/L + 7.5 g/L) **FallowBoss™ Tordon™**	
Apply at crop growth stage	Late P.E.		Fl–Ea dough		Fully Till–Boot		Fully Till–Boot	5 L–F Till		Fully Till–Bo		5L–Ea Flag		Ea Till–Full Till		Mid Till–Jo	
Zadoks code	31–60		61–83		30–37		30–37	15–37		30–37		15–38		22–30		23–31	
Weeds controlled	(grams)		(grams)		(litres)		(kilograms)	(litres)		(litres)		(litres)		(litres)		(litres)	
amsinckia	–	**Late Salvage Spray.** Add crop oil at 1 L/100 L spray. Spray radish at early flowering. **DO NOT** spray crop during anthesis or flowering. May cause leaf yellowing.	–	**Salvage spray** to prevent seed set in wild radish and turnip weed. Spray least mature weeds from early flowering to early pod set of most mature weeds, and crop from flowering to early dough stage. Add wetter only in oats. Can be used on undersown lucerne, clovers and annual medics.	–	Maximum rate on oats 0.715 L/ha.	–	–	Boomspray only. Good quality water is essential.	–	Undersown sub-clovers may be slightly retarded. Do not apply to undersown medics or lucerne.	–	Undersown legumes tolerant to lower rates – see label. Not on medics or lucerne.	–	Do not plant susceptible crops within 12 months of applying the product.	–	Do not plant susceptible crops within 12 months of applying the product.
annual ryegrass	–		–		–		–	–		–		–		–		–	
black bindweed	–		–		–		–	–		–		–		1.0 d		0.3	
capeweed	–		–		–		–	2.1–3.2		0.46–1.45		0.44–1.4		–		–	
charlock	–		–		0.5–0.715		0.25–0.6	2.1–3.2		0.46–1.45		0.44–1.4		–		–	
clover	–		–		0.715		0.25–0.6	–		–		–		–		–	
corn gromwell	–		–		–		–	–		–		–		–		–	
deadnettle	–		–		–		–	–		–		–		–		–	
fumitory	–		–		–		–	2.1–3.2		–		0.44–1.4		–		–	
Mexican poppy	–		–		–		–	–		–		–		–		–	
mintweed	–		–		0.715		0.25–0.6	2.1–3.2		0.46–1.45		–		–		0.3 b	
mustards	–		–		0.5–0.715		0.25–0.6	2.1–3.2		0.46–1.45		0.44–1.4		1.0		0.3 b	
New Zealand spinach	–		–		0.715		0.25–0.6	–		–		–		1.0 (S)		0.3	
Paterson's curse	–		–		0.715		0.25–0.6	2.1–3.2		0.46–1.45		0.44–1.4		–		–	
radish – wild	10–15 c		25		0.715		0.25–0.6	–		0.46–1.45		0.44–1.4 f		1.0		0.3 b	
rough poppy	–		–		0.715		0.25–0.6	–		–		–		–		–	
saffron thistle	–		–		0.5–0.715		0.25–0.6	2.1–3.2		0.46–1.45		0.44–1.4		1.0		0.3	
scotch thistle	–		–		–		–	–		–		0.44–1.4		–		–	
shepherd's purse	–		–		0.715		0.25–0.6	2.1–3.2		0.46–1.45		–		–		–	
skeleton weed	–		–		0.715		0.25–0.6	–		0.46–1.45		0.44–1.4		1.0		–	
slender thistle	–		–		0.715		0.25–0.6	2.1–3.2		–		0.44–1.4		–		–	
sorrel	–		–		0.715		0.25–0.6	–		–		–		–		–	
sowthistle	–		–		0.715		–	2.1–3.2		–		–		1.0		0.3	
spear thistle	–		–		–		–	2.1–3.2		0.46–1.45		0.44–1.4		–		–	
spiny emex	–		–		–		–	2.1–3.2		–		–		1.0		0.3	
turnip weed	–		25s		0.5–0.715		0.25–0.6	2.1–3.2		0.46–1.45		0.44–1.4		1.0		0.3 b	
variegated thistle	–		–		0.5–0.715		0.25–0.6	2.1–3.2		0.46–1.45		0.44–1.4		1.0		0.3 b	
wild oats	–		–		–		–	–		–		–		–		–	
wild turnip	–		–		0.5–0.715		0.25–0.6	2.1–3.2		0.46–1.45		0.44–1.4		1.0		–	
wireweed	–		–		–		–	2.1–3.2		–		–		1.0 (S)		0.3 b (S)	
Recom water L/ha boom	30–100		100 min		30–120		30–120	110–220		30–120		30–120		50 min		50 min	
Herbicide group	B		B		I		I	I		I		I		I		I	

b = Tank mix with 375 mL/ha 2,4-D Amine 625 for control.
c = 10 g/ha rate, only on some triasulfuron labels.
d = Preferred option for northern NSW only.
e = See label for tankmix options.
f = See label for tankmix options with Nugrex® for improved control in wild radish.
(S) = Suppression only.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

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Herbicide resistance management

• Rotate herbicide groups • Avoid spraying dense weed infestations

Defining herbicide resistance

Herbicide resistance is the inherent ability of a weed to survive a herbicide rate that would normally control it. This is not the same phenomena as poor herbicide performance.

Why it is a problem?

If herbicide resistance develops, herbicides from different chemical 'groups' or different control methods will have to be used to control the weed. These options may be more expensive or less effective. Once developed, herbicide resistance will persist for many years.

Understanding herbicides

Herbicides act by interfering with specific processes in plants. This is known as the herbicides 'mode of action' (MOA).

Watch your paddocks

- Keep accurate records.
- Monitor weed populations and record results of herbicides used.
- If herbicide resistance is suspected, prevent weed seed set.
- If a herbicide does not work, find out why.
- Check that weed survival is not due to spraying error.
- Conduct your own paddock tests to confirm herbicide failure and what herbicides are still effective.
- Have a herbicide resistance test carried out on seed from suspected plants testing for resistance to other herbicide (MOA) groups.
- Do not introduce or spread resistant weeds in contaminated grain or hay.
- Resistance can develop from fence lines and irrigation channels. Closely monitor and test for resistance in these areas.

Herbicide resistance testing

The best investment a grain grower can make is to test any weedy outbreak that is suspected of having herbicide resistance. It provides valuable information about the herbicides that don't work, but more importantly the herbicides that are effective. An approximate cost of a broad spectrum test is $600 to $700. This would include at least six to seven herbicides. This cost is rather insignificant compared to a widespread spray failure over 200 hectares that costs $30/ha in herbicides; totalling $6,000 in wasted herbicide, not including crop yield losses and the blow out in weed seed for future years.

There are two types of tests available; a quick test and a seed test. The quick test involves live seedlings being sent away for re-potting and spraying. Once the plants have fully recovered they are sprayed with herbicides of your choice. Results are usually reported between four and eight weeks after arrival at the testing facility. This is usually too late to enable re-treatment of the 'suspect' patches, but does provide early knowledge about the nature of the problem and what is likely to work in the future. One disadvantage of the quick test is it cannot test for pre-emergence herbicides, as the plants are already emerged.

A seed test requires seed to be sent and often involves breaking seed dormancy upon arrival. It is a useful test if you require herbicide resistance testing of pre-emergence herbicides. The turnover time is approximately four months and results are usually sent to clients in April (if seed was sent in December). This will allow ample time to decide what herbicides to use for the next crop.

Which herbicides should I test?

Ideally test any and every herbicide that you might wish to use in the future for the target weed species (there are a few exceptions – read on). Any application of herbicide that results in survivors setting seed will classify as some selection pressure for resistance. Be sure to include some herbicides that you have not yet used.

There are two reasons for this; firstly you may have developed cross resistance, i.e. confirmed resistance without a history of it being used, or new crop rotations in the future will allow the use of new herbicide groups. A good mixture of 'fop' and 'dim' herbicides is recommended and if you intend to use Axial® ('den' herbicide) include it. If ARG (annual ryegrass) is your key weed and you grow wheat, pulse or a Clearfield crop it is worthwhile including a sulfonylurea herbicide (e.g. Glean®, Ally® or Logran®) and an imidazolinone herbicide (e.g. Spinnaker®, Raptor®). Testing for trifluralin or Avadex® resistance would only be required if you have a history of using them for at least 10 applications in that paddock of concern.

The inclusion of Mataven® in the list of herbicides is essential if wild oats are to be tested because it can be applied late post-emergence in wheat crops to prevent wild oat seed set and is a Group Z herbicide – could be a vital tool in herbicide resistance management – but it has a history of often being cross resistant with Group A resistance.

Lastly, never under-estimate the number of glyphosate applications these weeds could have received. As a cautious measure, including glyphosate as a test herbicide is a wise choice, especially for ARG. There are many cases of glyphosate resistant ARG in NSW. Although there is a chance of discovering glyphosate resistant weeds, resistance testing may discover concerning or low levels of survival following glyphosate application. If this occurs, it maybe the precursor for the development of glyphosate resistance.

What contact details do I need to get started?

There are two testing services; the contact details and other relevant information are provided in Table 1.

Table 1. Information about each herbicide resistance provider

Information	Plant Science Consulting	Charles Sturt Uni – Herbicide Resistance Testing Service
Office number	(08) 8342 4606 – fax	(02) 6933 2420, (02) 6933 2924 – fax
Mobile number	0400 664 460	N/A
Email	info@plantscienceconsulting.com	jbroster@csu.edu.au
Postal Address	22 Linley Avenue, Prospect SA 5082	Herbicide Resistance Testing, School of Agricultural and Wine Sciences, Charles Sturt University, Locked Bag 588, Wagga Wagga, NSW 2678
Webpage	www.plantscienceconsulting.com	N/A
Seed Test?	Yes	Yes
Quick Test?	Yes	No

Tony Cook, Technical Specialist, Weeds, NSW DPI, Tamworth

NSW GOVERNMENT Department of Primary Industries

11934

Tony Cook 3/14

Preventing herbicide resistance

Aim to:

- Reduce weed numbers by preventing seed set.
- Avoid spraying dense weed infestations and begin a cropping phase with low weed numbers.
- Use as many different control options (chemical and non-chemical) as possible in both crop and pasture phases.

When using herbicides:

- Rotate herbicides from different groups.
- Reduce reliance on high-risk herbicides (Groups A and B).
- Make every herbicide application count – use the rate that kills.
- The 'double knock' herbicide option; before sowing – glyphosate followed by paraquat + diquat.

Weed control options for crop and pasture phases

Pasture phase		Cropping phase	
Chemical	**Non-chemical**	**Chemical**	**Non-chemical**
Spray topping Winter cleaning Chemical Fallow	Competitive pasture Make silage or hay Cultivated fallow Grazing	Crop topping Pre-sow knockdown Selective spraytop Selective herbicides Lower risk herbicides Rotating modes of action	Competitive crop Timely cultivation Green manure crop Later sowing Silage or hay crops Collect or burn weed seeds

Mode of Action Groups (as at 27 June 2013)

Produced courtesy CropLife Australia Limited, Locked Bag 916, Canberra ACT 2601. Phone (02) 6230 6399 Fax (02) 6230 6355
Website www.croplifeaustralia.org.au Email info@croplifeaustralia.org.au

High Resistance Risk

CHEMICAL FAMILY	ACTIVE CONSTITUENT (FIRST REGISTERED TRADE NAME)
GROUP A Inhibitors of acetyl coA carboxylase (Inhibitors of fat synthesis/ACC'ase inhibitors)	
Aryloxyphenoxypropionates: (Fops):	clodinafop (Topik®), cyhalofop (Barnstorm®), diclofop (Cheetah® Gold*, Decision®*, Hoegrass®, Tristar® Advance*), fenoxaprop (Cheetah® Gold*,Tristar® Advance*, Wildcat®), fluazifop (Fusilade®), haloxyfop (Motsa®*, Verdict®, Exert®), propaquizafop (Shogun®), quizalofop (Targa®)
Cyclohexanediones: (Dims):	butroxydim (Factor®, Falcon®, Fusion®), clethodim (Motsa®*, Select®, Sequence®), profoxydim (Aura®), sethoxydim (Cheetah® Gold*, Decision®*, Sertin®), tepraloxydim (Arama®), tralkoxydim (Achieve®)
Phenylpyrazoles: (Dens):	pinoxaden (Axial®)
GROUP B Inhibitors of acetolactate synthase (ALS inhibitors)	
Sulfonylureas: (SUs):	azimsulfuron (Gulliver®), bensulfuron (Londax®), chlorsulfuron (Glean®), ethoxysulfuron (Hero®), formasulfuron (Tribute®), halosulfuron (Sempra®), iodosulfuron (Hussar®), mesosulfuron (Atlantis®), metsulfuron (Ally®, Associate®, Harmony®* M, Trounce®*, Ultimate Brushweed®* Herbicide), prosulfuron (Casper®), rimsulfuron (Titus®), sulfometuron (Oust®), sulfosulfuron (Monza®), thifensulfuron (Harmony®* M), triasulfuron, (Logran®, Logran® B-Power®*), tribenuron (Express®), trifloxysulfuron (Envoke®, Krismat®*)
Imidazolinones: (Imis):	imazamox (Raptor®, Claw®, Intervix®*), imazapic (Flame®, Midas®*, OnDuty®*, Sentry®*, Spark®), imazapyr (Arsenal Xpress®*, Midas®*, OnDuty®*, Intervix®*, Lightning®*), imazethapyr (Spinnaker®, Lightning®*)
Triazolopyrimidines: (Sulfonamides):	flumetsulam (Broadstrike®, Broadsword®), florasulam (Conclude®*,Torpedo®*, XPand®*), metosulam (Eclipse®), pyroxsulam (Crusader®)
Pyrimidinylthiobenzoates:	bispyribac (Nominee®), pyrithiobac (Staple®)

* This product contains more than one active constituent.

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Moderate Resistance Risk

CHEMICAL FAMILY	ACTIVE CONSTITUENT (FIRST REGISTERED TRADE NAME)
GROUP C Inhibitors of photosynthesis at photosystem II (PS II inhibitors)	
Triazines:	ametryn (Amigan®*, Primatol Z®, Gesapax®Combi*, Krismat®), atrazine (Gesaprim®, Gesapax® Combi*, Primextra® Gold*), cyanazine (Bladex®), prometryn (Gesagard®, Cotogard®*, Bandit®*), propazine (Agaprop®), simazine (Gesatop®), terbuthylazine (Terbyne®), terbutryn (Amigan®*, Igran®, Agtryne® MA*)
Triazinones:	hexazinone (Velpar® L, Velpar® K4*), metribuzin (Sencor®)
Uracils:	bromacil (Hyvar®, Krovar®*), terbacil (Sinbar®)
Pyridazinones:	chloridazon (Pyramin®)
Phenylcarbamates:	phenmedipham (Betanal®)
Ureas:	diuron (Karmex®, Krovar®*, Velpar® K4*, Diurex®), fluometuron (Cotoran®, Cotogard®*, Bandit®*), linuron (Afalon®), methabenzthiazuron (Tribunil®), siduron (Tupersan®), tebuthiuron (Graslan®)
Amides:	propanil (Stam®)
Nitriles:	bromoxynil (Buctril®, Bromicide®, Buctril® MA*, Barrel®*, Jaguar®*, Velocity®*, Flight®*), ioxynil (Totril®, Actril® DS*)
Benzothiadiazinones:	bentazone (Basagran®, Basagran® M60*, Dictate®, Dictate® M60)
GROUP D Inhibitors of microtubule assembly	
Dinitroanilines (DNAs):	oryzalin (Surflan®, Rout®*), pendimethalin (Stomp®), prodiamine (Barricade®), trifluralin (Treflan®)
Benzoic acids:	chlorthal (Dacthal®, Prothal®)
Benzamides:	propyzamide (Kerb®)
Pyridines:	dithiopyr (Dimension®), thiazopyr (Visor®)
GROUP E Inhibitors of mitosis / microtubule organisation	
Carbamates:	carbetamide (Carbetamex®), chlorpropham (Chlorpropham)
GROUP F Bleachers: Inhibitors of carotenoid biosynthesis at the phytoene desaturase step (PDS inhibitors)	
Nicotinanilides:	diflufenican (Brodal®, Jaguar®*, Tigrex®*, Chipco Spearhead®*, Minder®)
Picolinamides:	picolinafen (Paragon®*, Sniper®, Flight®*)
Pyridazinones:	norflurazon (Solicam®)
GROUP G Inhibitors of protoporphyrinogen oxidase (PPOs)	
Diphenylethers:	acifluorfen (Blazer®), oxyfluorfen (Goal®, Rout®*, Striker®)
N-phenylphthalimides:	flumioxazin (Pledge®, Valor®, Terrain®)
Oxadiazoles:	oxadiargyl (Raft®), oxadiazon (Ronstar®)
Triazolinones:	carfentrazone (Affinity®, Broadway®*, Nail™, Hammer®)
Pyrimidindiones:	butafenacil (Logran® B-Power®*, Resolva®), saflufenacil (Sharpen® WG)
Phenylpyrazole:	pyraflufen (Ecopar®, Pyresta®*)
GROUP H Bleachers: Inhibitors of 4-hydroxyphenyl-pyruvate dioxygenase (HPPDs)	
Pyrazoles:	benzofenap (Taipan®, Viper®), pyrasulfotole (Precept®*,Velocity®*)
Isoxazoles:	isoxaflutole (Balance®)
GROUP I Disruptors of plant cell growth (Synthetic Auxins)	
Phenoxycarboxylic acids (Phenoxys):	2,4-D (Amicide®, Actril DS®*, Pyresta®*, Baton®), 2,4-DB (Trifolamine®, Buttress®), dichlorprop (Lantana 600®), MCPA (MCPA, Agritone®, Buctril® MA*, Conclude®*, Banvel M®, Kamba® M, Midas®*, Paragon®*, Tigrex®*, Barrel®*, Tordon 242®*, Basagran® M60*, Chipco Spearhead®*, Agtryne® MA*, Precept®*, Flight®*), mecoprop (Methar Tri-Kombi®*, Multiweed®*, Mecopropamine®, Mecoban®)
Benzoic acids:	dicamba (Barrel®*, Kamba® M, Methar Tri-Kombi®*, Banvel®, Banvel M®, Casper®, Mecoban®)
Pyridine carboxylic acids (Pyridines):	aminopyralid (Hotshot®*, Grazon Extra®*), clopyralid (Lontrel®, Torpedo®*, Chipco Spearhead®*, Archer®), fluroxypyr (Starane®, Hotshot®*, Comet®), picloram (Tordon®, Tordon 242®*, Trooper®, Grazon Extra®*, Trinoc®*), triclopyr (Garlon®, Invader®, Grazon Extra®*, Ultimate Brushweed®* Herbicide, Concentrate Tough Roundup®* Weedkiller)
Quinoline carboxylic acids:	quinclorac (Drive®)

* This product contains more than one active constituent.

Moderate Resistance Risk (continued)

CHEMICAL FAMILY	ACTIVE CONSTITUENT (FIRST REGISTERED TRADE NAME)
GROUP J Inhibitors of fat synthesis (Not ACCase inhibitors)	
Chlorocarbonic acids:	2,2–DPA (Dalapon®), flupropanate (Frenock®)
Thiocarbamates:	EPTC (Eptam®), molinate (Ordram®), pebulate (Tillam®), prosulfocarb (Boxer® Gold*), thiobencarb (Saturn®), triallate (Avadex®), vernolate (Vernam®)
Phosphorodithioates:	bensulide (Prefar®)
Benzofurans:	ethofumesate (Tramat®)
GROUP K Inhibitors of cell division / Inhibitors of very long chain fatty acids (VLCFA inhibitors)	
Acetamides:	napropamide (Devrinol®)
Chloroacetamides:	dimethenamid (Frontier®-P, Outlook®), metolachlor (Boxer® Gold*, Bounce®, Dual® Gold, Primextra® Gold*), propachlor (Ramrod®, Prothal®*)
Isoxazolines:	proxasulfone (Sakura®)
GROUP L Inhibitors of photosynthesis at photosystem I (PSI inhibitors)	
Bipyridyls:	diquat (Reglone®, Revolver®, Spray Seed®*), paraquat (Gramoxone®, Nuquat®, Shirquat®, Spray Seed®*, Alliance®*)
GROUP M Inhibitors of EPSP synthase	
Glycines:	glyphosate (Gladiator®, Roundup®, Trounce®*, Illico®*, Arsenal Xpress®*, Broadway®*, Resolva®, Weedmaster®, Concentrate Tough Roundup®* Weedkiller)
GROUP N Inhibitors of glutamine synthetase	
Phosphinic acids:	glufosinate (Basta®, Biffo®, Liberty®)
GROUP O Inhibitors of cell wall (cellulose) synthesis	
Nitriles:	dichlobenil (Casoron®)
Benzamides:	isoxaben (Gallery®, X-Pand®*)
GROUP P Inhibitors of auxin transport	
Phthalamates:	naptalam (Alanap-L®)
GROUP Q Bleachers: Inhibitors of carotenoid biosynthesis unknown target	
Triazoles:	amitrole (Amitrole®, Illico®*, Alliance®*)
Isoxazolidinones:	clomazone (Command®, Director®, Viper®*)
GROUP R Inhibitors of dihydropteroate synthase (DHP inhibitors)	
Carbamates:	asulam (Asulox®)
GROUP Z Herbicides with unknown and probably diverse sites of action	
Arylaminopropionic acids:	flamprop (Mataven L®)
Dicarboxylic acids:	endothal (Endothal®)
Organoarsenicals:	DSMA (disodium methylarsonate) (Methar®), MSMA (Daconate®)

* This product contains more than one active constituent.

This strategy is a guide only and does not endorse particular products, groups of products or cultural methods in terms of their performance. Always follow the product label for specific use instructions. While all effort has been taken with the information supplied in this document no responsibility, actual or implied, is taken for the day to day accuracy of product or active constituent specific information. Readers should check with the Australian regulator's (APVMA) product database for contemporary information on products and actives. The data base can be sourced through www.apvma.gov.au. The information given in this strategy is provided in good faith and without any liability for loss or damage suffered as a result of its application and use.

Advice given in this strategy is valid as at 27 June 2013. All previous versions of this strategy are now invalid.

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Surveys for herbicide resistant grass weeds in southern Australia

Key points

- Herbicide resistance is common in annual ryegrass in most cropping regions of southern Australia
- Trifluralin and Select® resistance are increasing
- Resistance to herbicides is also present in wild oats and brome grass
- Glyphosate resistance occurs where there is intensive use of glyphosate and few or no other weed control tactics
- Some alternatives to glyphosate will control glyphosate-resistant annual ryegrass on fence lines.

Random surveys of weed populations across southern Australia have identified considerable levels of herbicide resistance in annual ryegrass across southern Australia. There are variations across regions, with trifluralin beginning to emerge as an issue (Table 1). These regional differences reflect differences in cropping practices and hence herbicide use patterns. Of particular concern is the increase in Select® resistance and was reported in 7% of samples (Table 3). More emphasis should be aimed at crop competition and annual ryegrass weed seed capture/destruction at harvest to maintain or extend the life of Select® and other effective post-emergence herbicides.

The incidence of multiple resistance within annual ryegrass concerning. Approximatley 80% of samples tested had resistance to at least 2 herbicide mode of actions. In some rare cases resistance to 4 herbicide groups has developed (Table 2).

Table 1. Percentage of annual ryegrass samples resistant or developing resistance to each herbicide group

	2009	2010	2011	2012	2013
A (fops)	90	90	83	96	90
A (dims)	16	26	43	50	12
A (dens)	100	70	100	81	84
B	91	93	74	85	93
C	0	1	0	1	0
D	12	13	3	5	3

Table 2. Results of annual ryegrass samples cross resistance screening showing percentage of samples resistant or developing resistance to different groups

No of groups	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)
5	0	0	0	0	0
4	0	1.4	5.6	1.3	0.5
3	21.5	27.0	19.4	12.8	10.8
2	60.0	56.8	47.2	66.0	68.6
1	16.9	13.5	27.8	18.0	16.8
0	1.6	1.3	0	1.9	3.2
No of samples	65	74	36	156	185

Management of wild oats was previously reliant on post-emergence herbicides. Consequently there is a high frequency of resistance to 'fops', 'dims', and 'den' chemistry. Although there is some reasonable benefit of using the 'dim' chemistry, in the past two years there has been a steady increase in resistance to this group (Table 4). More pre-emergence herbicides are being use in NSW cropping systems to combat these issues with wild oats. Effective crop competition in combination with effective pre- and post-emergence herbicide should prolong the effective life of these herbicides.

Herbicide resistance in winter broad leaf species is steadily increasing. In 2013, a population of wild radish was confirmed resistant to 2,4-D amine (Group I) in central NSW. There are other populations of this weed resistant to Group B in southern NSW. Fleabane is glyphosate resistant and is located over all of NSW due to its windborne seed. Another weed spread by wind, sowthistle, has been reported as glyphosate resistant in 2014 and is currently confined to northern NSW. However, Group B resistance is present in this species. Two brassica species, Indian hedge mustard and Charlock are reported to have Group B resistance in NSW.

Table 3. Results for ryegrass samples showing percentage resistant (Res) or developing resistance (DR) to individual Group A herbicides

	Tested	Res	DR	%	Susc.
'Fops'					
Hoegrass®	176	147	11	90	18
Verdict®	14	12	0	86	2
'Dims'					
Select®	231	7	9	7	215
Achieve®	17	12	1	76	4
Factor®	7	1	0	14	6
'Den'					
Axial®	43	34	2	84	7
'Fop' and 'Dim'					
Decision®	3	3	0	100	0

Table 4. Percentage of wild oat samples found to be resistant since 2010 (number tested in brackets)

	2010 % (no)	2011 % (no)	2012 % (no)	2013 % (no)
'Fops'	84 (25)	89 (9)	74 (71)	81 (43)
'Dims'	0 (25)	0 (8)	7 (75)	9 (55)
'Dens'	33 (6)	50 (4)	12 (51)	46 (26)
B	17 (6)	0 (4)	12 (52)	8 (52)
Z	14 (21)	13 (8)	67 (3)	44 (9)

Glyphosate resistance in annual ryegrass

There are now 347 confirmed sites with glyphosate resistant annual ryegrass in Australia. These come from four states and a variety of situations (Table 5). Glyphosate resistant annual ryegrass occurs when populations are treated intensively with glyphosate, where no other herbicides are applied and where there is little or no tillage. Relying solely on glyphosate for weed control is the greatest risk factor for glyphosate resistant weeds.

Table 5: Situations containing glyphosate resistant annual ryegrass

Situation		Number of sites	States
Broadacre cropping	Chemical fallow	29	NSW
	Winter grains	99	NSW, Vic, SA, WA
	Irrigated crops	1	SA
	Summer grains	1	NSW
Horticulture	Tree crops	5	NSW, SA
	Vine crops	22	SA, WA
	Vegetables	2	Vic
Other	Driveway	4	NSW, Vic, SA, WA
	Fence line/Crop margin	82	NSW, Vic, SA, WA
	Around buildings	2	NSW
	Irrigation channel/Drain	12	NSW, Vic, SA
	Airstrip	1	SA
	Railway	2	NSW, WA
	Roadside	85	NSW, SA, WA

From Preston, C. (2009) Australian Glyphosate Resistance Register. Australian Glyphosate Sustainability Working Group. Online. Available from www.glyphosateresistance.org.au

Table 6: Glyphosate resistant fleabane across Australia

Situation		Number of sites	States
Broadacre cropping	Chemical fallow	8	NSW, Qld
	Around buildings	1	NSW
	Irrigation channel/Drain	10	NSW
	Railway	3	NSW
	Roadside	27	NSW, Qld, SA

Table 7: Percentage of paddocks with herbicide resistant broadleaf weeds in cropping regions of Victoria

Region	Year	Indian hedge mustard		Wild radish		Sowthistle
		Populations resistant (%)				
		Glean®	2,4-D	Glean®	2,4-D	Glean®
Vic – Western	2010	35	0	nt	nt	81
Vic – Southern	2010	nt	nt	0	0	64

Current March 2014. Tony Cook, Technical Specialist, Weeds, NSW DPI, Tamworth. Chris Preston[1], Peter Boutsalis[1], Jenna Malone[1], Gurjeet Gill[1] and John Broster[2].
[1] School of Agriculture, Food & Wine, University of Adelaide, PMB1 Glen Osmond SA 5064. [2] School of Agricultural & Wine Sciences, Charles Sturt University, Locked Bag 588, Wagga Wagga NSW 2678. GRDC Projects UA00098 and UA00104.

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Table 12. Herbicides for weed control for cereal rye and triticale – Early post-emergence – Part 1

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Fenoxaprop-p-ethyl 69 g/L + Cloquintocet-mexyl 34.5 g/L **Foxtrot®**	Chlorsulfuron 750 g/kg **Glean®**		Metsulfuron-methyl 600 g/kg **Ally®**		Bromoxynil 200 g/L **Bromicide®**		Terbutryn 500 g/L **Igran®** Triticale only		Bromoxynil + Diflufenican 250 + 25 g/L **Jaguar®**		Bromoxynil + MCPA 200 + 200 g/L **Buctril® MA**		Bromoxynil + MCPA + Dicamba 140 + 280 + 40 g/L **Broadside®**	Picolinafen + MCPA 50g + 500 g/L **Paragon®**		Picolinafen + MCPA + Bromoxynil 35 g/L + 350 g/L + 210 g/L **Flight® EC**		Pyraflufen-ethyl 20g/L **Ecopar®** Triticale only	Dicamba 500 g/L **Kamba® 500**		MCPA + Dicamba 340 + 80 g/L **Kamba® M**		Picloram + MCPA 26 + 420 g/L **Tordon™ 242** Triticale only		MCPA LVE 570 g/L **LVE Agritone®**		Fluroxypyr 333 g/L **Starane™ Advanced** Triticale only		Clopyralid 300 g/L + Florasulam 50 g/L **Torpedo™** Triticale only	MCPA 375 g/L + Florasulam 7 g/L **Conclude™** Triticale only	
Apply at crop growth stage	**2 L–5 L**	**2 L–Ea Till**		**3 L–Jo**		**3 L–Ful Till**		**3 L–Ea Till**		**2 L–F Till**		**5 L–Ful Till**		**3 L–Ful Till**	**3 L–5 L**		**3 L–Late Till**		**2 L–Mid Till**	**5 L–Ea Till**		**Ea–Fully Till**		**Ea Till–Full Till**		**3–5 L**		**3 L–Flag leaf**		**2 L–1st node**	**3 L–Flag**	
Zadoks code	**12–15**	**12–23**		**13–35**		**13–30**		**13–21**		**13–29**		**15–30**		**13–30**	**13–15**		**13–28**		**12–25**	**15–22**		**21–30**		**22–30**		**13–15**		**13–39**		**12–31**	**13–39**	
Weed controlled	**(litres)**	**(grams)**		**(grams)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**	**(litres)**		**(litres)**		**(litres)**	**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**	**(litres)**	
amsinckia	–	15	Moist soil or rain within 7 days improves results. Add wetter.	5 or 7	Add surfactant.	1.4–2.0	Not on undersown medics. Avoid spraying when temperatures above 20°C. Aerial application can be unsatisfactory.	0.55–0.85	Avoid spraying when temperatures exceed 18°C. Do not use on undersown lucerne and medics.	0.75	Can be used on clover and lucerne. Not on annual medics. Application should be made from first to eighth trifoliate leaf stage.	1.4–2.0	1.4 L/ha can be used at 3-leaf stage.	0.75–1.0	–	Do not use 0.5 L/ha rate on crops younger than 5 leaf. Do not apply rates higher than 0.25 L/ha to crops in the 3 leaf stage.	–		–	Damage can occur if crop not actively growing or after mid-tillering stage.	–	Damage can occur if crop not actively growing. Do not apply after the fully tillered stage.	–	Do not plant susceptible crops within 12 months of applying the product.	–	Maximum rate at 3–5-leaf crop stage 0.44 L/ha.	–	Can be tankmixed with Ally®, MCPA LVE and MCPA amine to broaden weed control.	–	–	Always add Uptake™ spraying oil at 500 mL/100 L water, unless tankmixing with Ally®. When tankmixing with Ally® add a non-ionic wetter at 200 mL/200 L.
annual ryegrass	–	20 or 25a		–		–		–		–		–		–	–		–		–	–		–		–		–		–	–		–	
annual phalaris	0.635– 0.8	–		–		–		–		–		–		–	–		–		–	–		–		–		–		–	–		–	
bedstraw	–	–		–		1.4–2.0		–		1.0 (S)		–		–	–		–		0.4 d	–		–		–		–		0.3		0.1 e	0.7	
black bindweed	–	20		–		1.4–2.0		–		0.5–1.0		1.4–2.0		1.0–1.4	–		–		–	0.28		1.7		1.0		–		0.3–0.4		–	–		–	
capeweed	–	–		–		1.4–2.0		0.55–0.85		0.5–1.0		1.4–2.0		0.75–1.0	0.25–0.5		0.36–0.72		0.4 d	0.16 c		1.0–1.7		–		0.44		–		0.1 e	0.7 (S)		–	
canola – volunteer	–	–		–		–		–		0.5–0.75 j		–		1.4	0.25 j		0.36		0.4 d j	–		–		–		0.44 j		–		–	–		–	
charlock	–	15		5		–		0.55–0.85 b		0.5–0.75		1.4–2.0		–	0.25–0.5		0.36–0.72		–	0.16 c		1.0–1.7		–		0.44		–		–	–		–	
cleavers	–	–		–		–		–		–		–		–	–		–		–	–		–		–		–		0.6		–	–		–	
clover	–	–		5		–		–		–		–		–	–		–		0.4 fi	0.28		1.7		–		–		–		–	–		–	
corn gromwell	–	20		–		1.4–2.0		0.55–0.85		0.5–0.75		1.4–2.0		1.0–1.4	0.5		0.72		–	–		–		–		–		–		–	–		–	
deadnettle	–	15 or 20		5		–		0.55–0.85		0.5–0.75		–		–	0.5 (S)		0.72 (S)		0.4 f	–		–		–		–		0.9		–	–		–	
dock – seedling	–	–		–		–		–		1.0 (S)		–		0.75–1.0	–		–		–	0.16 c		1.0–1.7		–		–		–		–	–		–	
fumitory	–	20		5		2.0		0.55–0.85		0.75–1.0 (S)		1.4–2.0		1.0–1.4	0.5 (S)		0.54–0.72 (S)		0.4 f	–		–		–		0.44		–		–	–		–	
Mexican poppy	–	–		–		2.0		–		–		1.4–2.0		–	–		–		–	–		–		–		–		–		–	–		–	
mintweed	–	20		–		–		–		1.0 (S)		1.4–2.0		–	–		–		–	–		1.7		–		–		–		–	–		–	
mustards	–	15		5		2.0		0.55–0.85 b		0.5–1.0		1.4–2.0		0.75–1.0	0.25–0.5		0.36–0.72		0.4 d	0.16 c		1.0–1.7		1.0		0.44		–		0.075–0.1 e	0.7		–	
New Zealand spinach	–	–		–		–		–		–		–		–	–		–		–	0.28		1.7		1.0 (S)		–		–		–	–		–	
Paterson's curse	–	15		5 or 7		2.0		0.55–0.85		0.5–0.75		1.4–2.0		–	–		–		0.4 f	–		–		–		0.44		–		–	–		–	
radish – wild	–	15 or 20		–		2.0		–		0.5–1.0 g		1.4–2.0		0.75–1.0	0.25–0.5		0.36–0.72		0.3–0.4 d	0.16 c		1.0–1.7		1.0		0.44 k		–		0.075–0.1 e	0.7		–	
Rough poppy	–	20		5		–		–		0.5–0.75		1.4–2.0		–	–		–		–	–		–		–		–		–		–	–		–	
saffron thistle	–	–		–		1.4–2.0		–		1.0		1.4–2.0		–	0.5		0.72		–	–		1.7		1.0		0.44		–		–	–		–	
shepherd's purse	–	20		5		1.4–2.0		–		1.0		1.4–2.0		–	0.25–0.5		0.36–0.72		–	–		–		–		–		–		–	–		–	
skeleton weed	–	–		7 (S)		–		–		1.0 (S)		–		–	–		–		–	–		–		1.0		0.44		–		–	–		–	
slender thistle	–	–		–		–		–		–		1.4–2.0		–	–		–		–	–		–		–		0.44		–		–	–		–	
sorrel	–	–		5		–		–		1.0 (S)		–		–	–		–		0.4 f	–		1.0–1.7		–		–		–		–	–		–	
soursob	–	20		5		–		–		–		–		–	–		–		0.4 f	–		–		–		–		–		–	–		–	
sowthistle	–	–		5		–		–		–		1.4–2.1 h		–	0.5(S)		0.72 (S)		0.4 f	–		–		1.0		–		0.6		–	–		–	
spiny emex	–	–		5 or 7		2.0		0.55–0.85 b		0.5–0.75		1.4–2.0		0.75–1.0	0.5(S)		0.72 (S)		0.4 f	0.16 c		1.0–1.7		1.0		–		0.9		0.1 e	0.7		–	

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Table 12. Herbicides for weed control for cereal rye and triticale – Early post-emergence – Part 1 (continued)

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Fenoxaprop-p-ethyl 69 g/L + Cloquintocet-mexyl 34.5 g/L **Foxtrot®**	Chlorsulfuron 750 g/kg **Glean®**	Metsulfuron-methyl 600 g/kg **Ally®**	Bromoxynil 200 g/L **Bromicide®**	Terbutryn 500 g/L **Igran®** Triticale only	Bromoxynil + Diflufenican 250 + 25 g/L **Jaguar®**	Bromoxynil + MCPA 200 + 200 g/L **Buctril® MA**	Bromoxynil + MCPA + Dicamba 140 + 280 + 40 g/L **Broadside®**	Picolinafen + MCPA 50g + 500 g/L **Paragon®**	Picolinafen + MCPA + Bromoxynil 35 g/L + 350 g/L + 210 g/L **Flight® EC**	Pyraflufen-ethyl 20 g/L **Ecopar®** Triticale only	Dicamba 500 g/L **Kamba® 500**	MCPA + Dicamba 340 + 80 g/L **Kamba® M**	Picloram + MCPA 26 + 420 g/L **Tordon™ 242** Triticale only	MCPA LVE 570 g/L **LVE Agritone®**	Fluroxypyr 333 g/L **Starane™ Advanced** Triticale only	Clopyralid 300 g/L + Florasulam 50g/L **Torpedo™** Triticale only	MCPA 375 g/L + Florasulam 7 g/L **Conclude™** Triticale only
Apply at crop growth stage	2L–5L	2 L–Ea Till	3 L–Jo	3 L–Ful Till	3 L–Ea Till	2 L–F Till	5L–Ful Till	3 L–Ful Till	3 L–5 L	3L–Late Till	2L–Mid Till	5L–Ea Till	Ea–Fully Till	Ea Till–Full Till	3–5 L	3 L–Flag leaf	2L–1st node	3 L–Flag
Zadoks code	12–15	12–23	13–35	13–30	13–21	13–29	15–30	13–30	13–15	13–28	12–25	15–22	21–30	22–30	12–29	13–39	12–31	13–39
Weed controlled	(litres)	(grams)	(grams)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)
toad rush	–	–	–	–	0.55–0.85	1.0 (S)	–	–	0.5	0.72	–	–	–	–	–	–	–	–
turnip weed	–	15	5	2.0	0.55–0.85 b	0.5–0.75	1.4–2.0	–	0.25–0.5	0.36–0.72	0.4 f	0.16 c	1.0–1.7	1.0	0.44	–	0.1 e	0.7
variegated thistle	–	–	–	1.4–2.0	–	1.0	1.4–2.0	–	–	–	–	0.28	1.7	1.0	0.44	–	–	–
volunteer fieldpea	–	–	7	–	–	0.75 (S)	–	–	–	–	–	–	–	–	–	–	0.075–0.1	–
wild lettuce	–	–	–	–	–	1.0 (S)	–	–	0.25–0.5	0.36–0.72	0.4 d	–	–	–	–	0.3	–	–
wild oats	0.475–0.635	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
wild turnip	–	15	5	2.0	0.55–0.85 b	0.5–0.75	1.4–2.0	–	0.25–0.5	0.36–0.72	0.4 d	0.16 c	1.0–1.7	1.0	0.44	–	–	0.7
wireweed	–	20	5 or 7	2.0	–	1.0	1.4–2.0	0.75–1.0	–	–	0.4 f	0.16 c	1.0–1.7	1.0 (S)	–	0.9	–	–
Rec water L/ha Boom	50–100	30 min	50 min	50–200	50–100	50 min	50–200	50 min	50 min	50 –150	70 –150	50 min	50 min	50 min	30–120	50 min	50–100	50–100
Herbicide group	A	B	B	C	C	C + F	C + I	C + I	F + I	C + F + I	G	I	I	I	I	I	I + B	I + B

a = No more than 3 leaves of annual ryegrass. Use more than 50 L/ha water.
b = Tankmix with 0.3 L/ha MCPA 500 g/L or 0.3 L/ha 2,4-D amine 500 g/L for control.
c = Tankmix with 0.7 L/ha MCPA amine 500 g/L for control.
d = Add 500 mL/ha MCPA 500 for control (NOT MCPA LVE).
e = See label for tankmix options.
f = Add 500 mL MCPA 500 + 5 g/ha Esteem® WDG.
g = Tankmix 500 mL/ha Jaguar® with 200–400 mL/ha MCPA LVE (500 g/L) for control.
h = Northern NSW only.
i = Sub clover only.
j = See label for controlling RR canola volunteers.
j = See label for tankmix options with Nugrex® for improved control.
(S) = Suppression only.

is a preferred option where NO legumes are to be undersown with the crop. is a option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 12. Herbicides for weed control for cereal rye and triticale – Early post-emergence – Part 2

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Fenoxaprop-p-ethyl 110 g/L **Wildcat®**		Diclofop-methyl + Fenoxaprop-p-ethyl 250 g + 13 g/L **Tristar® Advance**		Diclofop-methyl 500 g/L **Hoegrass® 500** (Rhino® 375) i		Tralkoxydim 400 g/kg **Achieve® WG** (Pentagon®) e		Flamprop-m-methyl 90 g/L **Mataven® 90** (Judgement®) c Triticale only		Metosulam 100 g/L **Eclipse® 100 SC**		Thifensulfuron + Metsulfuron-methyl 682 + 68 g/kg **Harmony® M** Triticale only		Flumetsulam 800 g/kg **Broadstrike™**		Diuron WG ◆ + MCPA 900 g/kg + 500 g/L **Diurex® WG** g + MCPA Amine 500		Pyrasulfotole 37.5 g/L + Bromoxynil 10 g/L **Velocity®**		Pyrasulfotole 50 g/L + MCPA 250 g/L **Precept® 300 EC** b		Dicamba 700 g/kg **Cadence®**		Clopyralid 600 g/L **Lontrel™ Advanced** s Triticale only		Fluroxypyr 140 g/L + Aminopyralid 10 g/L **Hotshot™** Triticale only		MCPA + Diflufenican 250 + 25 g/L **Tigrex®**	
Apply at crop growth stage	**2 L–Mid Till**		**2 L–Ea Till**		**2 L–Early Till**		**2 L–Ea Till**		**3 L–Full Till**		**2 L–1st node**		**3 L–Boot**		**Mid Till–Ea Jo**		**3–5 L Till**		**2 L–Full Till**		**3 L–1st node**		**3 L–Mid Till**		**2 L–Boot**		**3 L–1st node**		**3–5 L to L Till**	
Zadoks code	**12–24**		**12–22**		**13–21**		**12–22**		**13–30**		**12–31**		**13–30**		**23–31**		**13–23**		**12–30**		**13–31**		**13–25**		**12–35/45**		**13–31**		**13–30**	
Weeds controlled	**(litres)**		**(litres)**		**(litres)**		**(grams)**		**(litres)**		**(millilitres)**		**(grams)**		**(grams)**		**(kg + L)**		**(litres)**		**(litres)**		**(grams)**		**(litres)**		**(litres)**		**(litres)**	
amsinckia	–	Add wetting agent e.g. BS1000® at 250 mL/100 L spray.	–	Suppression of annual phalaris may be improved by the addition of 250 mL BS1000®/100 L spray.	–	Add wetting agent e.g. 250 mL BS1000®/100 L water. Diclofop-methyl is also available in a 375 g/L formulation (Rhino®, Hostage®).	–	Add 0.75 or 1 L Supercharge® or Amplify® 100 L spray.	–	Spray wild oats from 3-leaf to end of tillering stage. Spray crop before beginning of jointing. Do not use any wetting agent.	50	Apply with 0.5 L Uptake™ spraying oil or 1 L D-C-Trate® oil/100 L water. Can be tankmixed with 0.35–0.5 L/ha LVE MCPA for improved control. See label.	–	Safe on undersown lucerne, medics, sub-clover, after the 2–3 trifoliate leaf stage. Use Uptake™ spraying oil on wetting agents such as BS1000® with triticale and cereal rye.	25	Use only on moist soils.	0.28 + 0.5	Add Hasten™ (1% v/v). Note recropping intervals on label. For best results apply in warmer temperatures and high light intensity and > 1 hr of daylight left after application.	0.6–1.0	Spray grade liquid ammonium sulfate, Hasten™ (1% v/v), Supercharge® (0.75% v/v) or Uptake™ (0.5% v/v) must be used with Precept®. Note recropping intervals on label. For best results apply in warmer temperature and high light intensity and > 1 hr of daylight left after application.	0.75–1.0	Add wetting agent. Do not apply after mid-tillering stage, as crop damage may occur.	–	Lontrel™ also available as soluble granule 750 g/kg formulation.	–	Add BS1000® (when mixing with mesulfuron-methyl).	–	Can be used on undersown sub-clover and other clovers. See label. Not on lucerne or annual medics. Application should be made from the third to the eighth trifoliate leaf stage.
annual ryegrass	a		1.5		0.75		380–500		–		–		–		–		–		–		–		–		–		–		–	
annual phalaris	0.4–0.5 k		1.5(S)		–		380–500 (S)		–		–		–		–		–		–		–		–		–		–		–	
bedstraw	–		–		–		–		–		50 (S) y		–		–		–		0.67–1.0		0.75–1.0		–		–		–		–	
black bindweed	–		–		–		–		–		–		40		–		–		0.5–1.0		–		200 w		–		0.5–0.75 v		–	
canola – volunteer	–		–		–		–		–		50 o		–		25 o		–		0.5–1.0 A		0.5–1.0 A		–		–		–		0.5 A	
capeweed	–		–		–		–		–		35–50 y		–		25		0.28 + 0.5		0.5–1.0		0.5 u		115 t		0.15		–		0.5–1.0	
charlock	–		–		–		–		–		–		–		25		0.28 + 0.5		–		–		115 t		–		–		0.5–1.0	
chickpea – volunteer	–		–		–		–		–		35–50 y		–		–		–		0.5–1.0 (S)		0.5 u		–		0.125		0.75 v		–	
cleavers	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
clover	–		–		–		–		–		50 (S) xy		–		–		–		–		0.5 x		115 t		0.075 x		–		–	
common barbgrass	–		–		j		–		–		–		–		–		–		–		–		–		–		–		–	
corn gromwell	–		–		–		–		–		–		–		–		0.28 + 0.5		0.5–1.0		0.5–1.0		–		–		–		1.0	
deadnettle	–		–		–		–		–		–		30		–		0.28 + 0.5		0.5–1.0		0.5–1.0		115 p w		–		0.5–0.75 fv		1.0	
dock	–		–		–		–		–		–		–		–		–		–		–		115 t		–		–		1.0 (S)	
faba bean – volunteer	–		–		–		–		–		35–50 y		–		–		–		0.5–1.0		0.5 u		200 w		0.125		0.5–0.75 d		–	
field pea – volunteer	–		–		–		–		–		50 (S) y		–		–		–		0.5 (S) 0.67–1.0		0.5–1.0 u		115 t		0.075		0.5–0.75 d		–	
fumitory	–		–		–		–		–		–		40		25 n		–		0.5–1.0		0.5–1.0		–		–		–		0.75	
lupin – volunteer	–		–		–		–		–		35–50 y		–		25 n		–		0.5–1.0		0.5–1.0		–		0.125		0.5 m		1.0 (S)	
Mexican poppy	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
mintweed	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
mustards	–		–		–		–		–		50		45		25		0.28 + 0.5		0.5–1.0		0.5 l		115 t		–		–		0.5–1.0	
New Zealand spinach	–		–		–		–		–		–		40		25 (S)		–		–		–		200 w		–		–		–	
Paterson's curse	–		–		–		–		–		–		–		25 (S) n		–		0.5–1.0		0.5–1.0		–		–		–		1.0 (S)	
peppercress	–		–		–		–		–		–		30–40		25		–		–		–		–		–		–		1.0 (S)	
radish – wild	–		–		–		–		–		50		–		25 (S) n		0.28 + 0.5		0.5–1.0		0.5–1.0		115 t		–		–		0.5–1.0 q	
rough poppy	–		–		–		–		–		–		–		–		–		–		–		115 p w		–		–		1.0 (S)	
saffron thistle	–		–		–		–		–		35–50 y		–		–		–		0.67–1.0		–		–		Tankmix M		–		1.0	
shepherd's purse	–		–		–		–		–		–		–		25		–		0.5–1.0		–		115 p w		–		–		0.5–1.0	
skeleton weed	–		–		–		–		–		–		–		–		–		–		–		–		0.25 h		–		1.0 (S)	
slender thistle	–		–		–		–		–		35–50 y		–		–		–		–		–		–		Tankmix M		–		–	
sorrel	–		–		–		–		–		–		–				–		–		–		–		–		–		–	
soursob	–		–		–		–		–		–		–		–		1.1 w		–		–		–		–		–		–	
sowthistle	–		–		–		–		–		35–50 y		30–40		–		–		0.5–1.0		0.5–1.0		115 p w		–		0.5–0.75 q v or f		1.0 (S)	
spear/black thistle	–		–		–		–		–		35–50 y		–		–		–		–		–		–		–		–		–	
spiny emex	–		–		–		–		–		–		40–45		25 (S)		0.28 + 0.5		0.75–1.0 (S)		0.75–1.0 (S)		115 t		–		0.5–0.75 qv		1.0 (S)	

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Table 12. Herbicides for weed control for cereal rye and triticale – Early post-emergence – Part 2 (continued)

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Fenoxaprop-p-ethyl 110 g/L **Wildcat®**	Diclofop-methyl + Fenoxaprop-p-ethyl 250 g + 13 g/L **Tristar® Advance**	Diclofop-methyl 500 g/L **Hoegrass® 500** (Rhino® 375) i	Tralkoxydim 400 g/kg **Achieve® WG** (Pentagon®) e	Flamprop-m-methyl 90 g/L **Mataven® 90** (Judgement®) c Triticale only	Metosulam 100 g/L **Eclipse® 100 SC**	Thifensulfuron + Metsulfuron-methyl 682 + 68 g/kg **Harmony® M** Triticale only	Flumetsulam 800 g/kg **Broadstrike™**	Diuron WG ◆ + MCPA 900 g/kg + 500 g/L **Diurex® WG** g + MCPA Amine 500	Pyrasulfotole 37.5 g/L + Bromoxynil 10 g/L **Velocity®**	Pyrasulfotole 50 g/L + MCPA 250 g/L **Precept® 300 EC** b	Dicamba 700 g/kg **Cadence®**	Clopyralid 600 g/L **Lontrel™ Advanced** s Triticale only	Fluroxypyr 140 g/L + Aminopyralid 10 g/L **Hotshot™** Triticale only	MCPA + Diflufenican 250 + 25 g/L **Tigrex®**
Apply at crop growth stage	**2 L–Mid Till**	**2 L–Ea Till**	**2 L–Early Till**	**2 L–Ea Till**	**3 L–Full Till**	**2 L–1st node**	**3 L–Boot**	**Mid Till–Ea Jo**	**3–5 L Till**	**2 L–Full Till**	**3 L–1st node**	**3 L–Mid Till**	**2 L–Boot**	**3 L–1st node**	**3–5 L to L Till**
Zadoks code	**12–24**	**12–22**	**13–21**	**12–22**	**13–30**	**12–31**	**13–30**	**23–31**	**13–23**	**12–30**	**13–31**	**13–25**	**12–35/45**	**13–31**	**13–30**
Weeds controlled	**(litres)**	**(litres)**	**(litres)**	**(grams)**	**(litres)**	**(millilitres)**	**(grams)**	**(grams)**	**(kg + L)**	**(litres)**	**(litres)**	**(grams)**	**(litres)**	**(litres)**	**(litres)**
toad rush	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.0
turnip weed	–	–	–	–	–	35–50	30	15–25	0.28 + 0.5	0.5–1.0	0.5–1.0	115 t	–	–	0.5–1.0
variegated thistle	–	–	–	–	–	35–50 y	–	–	–	–	–	200 w	Tankmix M	0.5–0.75 q v	1.0 (S)
vetch	–	–	–	–	–	35–50 y	–	–	–	0.5–1.0 (S)	0.5 u	115 t	0.05	0.5–0.75 d	–
wild lettuce	–	–	–	–	–	35–50 y	40	–	–	0.5–1.0	0.5–1.0	115 p w	–	0.75 v	0.5–1.0
wild oats	0.3–0.4 k	1.5	1.1–1.5	300–500	2.5 c	–	–	–	–	–	–	–	–	–	–
wild turnip	–	–	–	–	–	50	–	25	0.28–0.5	0.5–1.0	0.5–1.0	115 t	–	–	0.5–1.0
wireweed	–	–	–	–	–	–	40	–	–	0.5 (S) 0.67–1.0	0.5–1.0	115 t	–	0.5–0.75 f v	0.75 (S)
Rec water L/ha boom	**50–100**	**50–100**	**50–150**	**50–150**	**30–100**	**50–100**	**50 min**	**50–150**	**20–100**	**50–150**	**50–100**	**50 min**	**50 min**	**80 min**	**50 min**
Herbicide group	**A**	**A**	**A**	**A**	**Z**	**B**	**B**	**B**	**C + I**	**H + C**	**H + I**	**I**	**I**	**I**	**I + F**

Note: Monza® (sulfosulfron 750 g/kg) is registered for post-emergent use on triticale for control of amsinckia, field pea – volunteer, wild radish, vulpia, and wild turnip (herbicide group B). Tigrex® and Bromoxynil damage medics.

a = Can be tankmixed with Hoegrass®
b = Also available as Precept® 150. See label for rates.
c = Contains 75 g/L flamprop-M-methyl. Use 3 L/ha rate.
d = 500 mL (southern NSW), 750 mL (northern NSW).
e = Tralkoxydim also available in 600 g/L formulation, see label for rates.
f = Add 5 g metsulfuron-methyl (600 g/kg) and non-ionic wetter at 100 mL/100 L of water.
g = Alternatively Diuron Flowable® 500, 500 g/L.
h = Add 1.0 L/ha MCPA 500 g/L for control.
i = Rhino® contains 375 g/L diclofop – methyl. See label for rates.
j = Rhino® and Hostage® registered for control.
k = Mixtures with broadleaf herbicides may result in reduced grass weed control – see label. Use alone for phalaris control.
l = Indian hedge mustard only.
m = Southern NSW only.
n = See label for tankmix of Broadstrike™ and other herbicides for control.
o = Not Clearfield Canola volunteers.
p = Tankmix 115 g/ha Cadence® with 5 g/ha Ally® for control. Add surfactant such as 100 mL BS1000®/100 L spray.
q = Add 500–700 mL MCPA LVE. See label.
r = Tankmix 115 g/ha Cadence® with 50 mL/ha Eclipse® 100 SC for control. Apply with Uptake™ spraying oil at 0.5 L/100 L water or D-C-Trate® oil at 1 L/100 L water.
s = Clopyralid also available in 750 SG. See label for rates.
t = Tankmix 115 g/ha Cadence® with 0.7 L/ha MCPA amine (500 g/L)/ha for control.
u = Add Lontrel™ 750 SG for control. See label for rates.
v = Northern NSW only.
w = Triticale only.
x = Subclover only.
y = Add partner herbicide for control. See label.
z = *Angustifolius* (narrow-leaf) lupin.
M = Mix 25 mL/ha Lontrel™ Advanced with 1 L/ha MCPA Amine (500 g/L) or 0.7 L/ha LVE MCPA (500 g/L) for control.
A = See label for controlling RR canola volunteers.
(S) = Suppression only.
◆ = See *What's new in 2014* on page 3.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 13. Herbicides for weed control for cereal rye and triticale – Late post-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Flumetsulam 800 g/kg **Broadstrike™**	Low Volatile 2,4-D Ester 680 g/L **Estercide® Xtra 680**	2,4-D amine 700 g/L **Amicide® Advance 700**	2,4-D amine 800 g/kg **Baton® Low**	2,4-DB 500 g/L **Buttress®**	MCPA 750 g/L **Thistle-Killem® 750** Triticale only	MCPA LVE 570 g/L **LVE Agritone®**	Picloram + MCPA 26 + 420 g/L **Tordon™ 242** Triticale only	Picloram + 2,4-D + aminopyralid (75 + 300 + 7.5 g/L) **FallowBoss™ Tordon™** Triticale only
Apply at crop growth stage	**Flower to early dough**	**Fully Till–Boot**	**Fully Till–Boot**	**Fully Till–Boot**	**Fully Till–Boot**	**Fully Till–Boot**	**5 L–Boot**	**Ea Till–Full Till**	**Mid Till–Joint**
Zadoks code	**61–83**	**31–37**	**31–37**	**31–37**	**15–33**	**31–37**	**15–37**	**22–30**	**23–31**
Weeds controlled	**(grams)**	**(litres)**	**(litres)**	**(kilograms)**	**(litres)**	**(litres)**	**(litres)**	**(litres)**	**(litres)**
amsinckia	–	–	–	–	–	–	–	–	–
annual ryegrass	–	–	–	–	–	–	–	–	–
black bindweed	–	–	–	–	–	0.46–1.45	–	1.0	0.3
capeweed	–	0.53–0.8	–	–	2.1-3.2	0.46–1.45	0.44–1.4	–	–
canola – volunteer	–	–	0.9-1.25	–	–	–	1.31 a	–	–
charlock	–	0.41	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	–	–
clover	–	0.62–0.8	0.285–1.25	0.25–1.1	–	–	–	–	–
corn gromwell	–	0.8	–	–	–	–	–	–	–
deadnettle	–	0.8	–	–	–	–	–	–	–
fumitory	–	0.8	–	–	2.1-3.2	–	0.44–1.4	–	–
Mexican poppy	–	0.8	–	–	2.1-3.2	–	–	–	–
mintweed	–	0.8	0.285–1.25	0.25–1.1	–	0.46–1.45	–	–	0.3 b
mustards	–	0.41–0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	1.0	0.3 b
New Zealand spinach	–	0.8	0.285–1.25	0.25–1.1	–	–	–	1.0 (S)	0.3
Paterson's curse	–	0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	–	–
Prickly Lettuce	–	–	–	–	2.1-3.2	–	–	–	–
radish – wild	25	0.41–0.8	0.285–1.25	0.25–1.1	–	0.46–1.45	0.44–1.4 d	1.0	0.3 b
rough poppy	–	0.41–0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	–	–	–
saffron thistle	–	0.41–0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	1.0	0.3
Scotch thistle	–	–	–	–	–	–	0.44–1.4	–	–
shepherd's purse	–	0.8	0.285–1.25	0.25–1.1	2.1-3.2	–	–	–	–
skeleton weed	–	0.8	0.285–1.25	0.25–1.1	–	0.46–1.45	0.44–1.4	1.0	–
slender thistle	–	0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	–	–
sorrel	–	–	0.285–1.25	0.25–1.1	–	–	–	–	–
sowthistle	–	–	0.285–1.25	–	2.1-3.2	–	–	1.0	0.3
spear thistle	–	–	–	–	2.1-3.2	0.46–1.45	0.44–1.4	–	–
spiny emex	–	–	–	–	2.1-3.2	–	–	1.0	0.3
turnip weed	25	0.41–0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	1.0	0.3 b
variegated thistle	–	0.41–0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	1.0	0.3 b
wild oats	–	–	–	–	–		–	–	–
wild turnip	–	0.41–0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	1.0	–
wireweed	–	0.8	–	–	2.1-3.2	–	–	1.0 (S)	0.3 b
Recom water L/ha boom	**100 min**	**30–100**	**30–120**	**30–120**	**110–220**	**60–220**	**30–120**	**50 min**	**50 min**
Herbicide group/mode	**B**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**

Salvage spray to prevent seed set in wild radish and turnip weed. Spray least-mature weeds from early flowering to early pod set of most mature weeds, and crop from flowering to early dough stage. Add Uptake™ oil or wetter. Can be used on undersown lucerne clovers and annual medics.

Boom only. Good quality water essential.

Undersown sub-clovers may be slightly retarded. Do not apply to undersown medics or lucerne. See label for comments regarding weed size and application rate.

Undersown legumes tolerant to lower rates – see label. Not on medics or lucerne.

Do not plant susceptible crops within 12 months of applying the product.

Do not plant susceptible crops within 12 months of applying the product.

All the above herbicides will damage undersown legumes except 2,4-DB, which has not been fully tested on all lucerne varieties and may cause unacceptable damage. 2,4-DB is safe for use on sub-clover and medics. 2,4-DB is not safe on woolly pod vetch, berseem and red clovers.

is a preferred option where NO legumes are to be undersown with the crop. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

a = See label for controlling RR canola volunteers.
b = Tank mix with 0.375 L/ha 2,4-D amine (625 g/L) for control.
c = See label for tankmix options.
d = See label for tankmix options with Nugrex® for improved control in wild radish.
h = Can be tankmixed with MCPA or 2,4-D amine.
(S) = Suppression only.

Table 14. Herbicides for weed control for canola – Pre-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Pre-emergence								
	Terbuthylazine 750 g/kg Terbyne® Triazine Tolerant (TT) canola only		Simazine and/or Atrazine Gesatop® and/or Gesaprim® Triazine Tolerant (TT) canola only	Trifluralin 480 g/L Triflur® X	Pendimethalin 440 g/L Stomp® 440	Trifluralin + Oryzalin 125g + 125 g/L Duet® 250 EC	Tri-allate 500 g/L Avadex® Xtra	S-Metolachlor 960 g/L Dual® Gold	Metolachlor 960 g/L Clincher® Plus
Incorporation/growth stage application	IBS	PSPE	PSI, IBS PSPE	PSI IBS	PSI IBS	PSI IBS	PSI IBS	IBS PSPE	IBS PSPE
Weeds controlled	(kilograms)		(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)
Notes	Terbyne® can be used IBS or PSPE. Use the lower rate on light soils and the high rate on heavier soils. Sufficient rain is necessary within 2–3 weeks after application.		Use on triazine-tolerant varieties only. Can be applied pre-emergence or post-sowing pre-emergence. Rates depend on soil type. See label for rates and use pattern.	Light soils 1.2 L/ha, medium soils 1.5 L/ha and heavy soils 1.7 L/ha. Apply and incorporate up to just before sowing. For IBS situations incorporate within 24 hrs of application. For best results in PSI and IBS incorporate as soon as practical after application.	Southern NSW only. Apply up to 24 hrs before sowing. Incorporate well.Canola seed can be placed within the treated band. Use lower rate on lighter soils and higher rate on heavier soils.	Use 1.6 L rate for conventional cultivation and incorporate before sowing or at sowing with full disturbance. Use 2.3 L rate for direct drill and incorporate with full disturbance at sowing. Apply up to 5 days before sowing. Canola should be sown at normal depth of 2–4 cm. See label.	Apply and incorporate immediately prior to sowing or up to 3 weeks before sowing.	Apply at or immediately after planting and before crops and weeds emerge. Apply to moist soil.	Apply at or immediately after planting and before crops and weeds emerge. Apply to moist soil.
amsinckia	–	–	–	–	–	–	–	–	–
annual phalaris	–	1.0–1.4 (S)	–	1.2–1.7 or 1.5–3.0 (IBS) d	–	1.6 or 2.3	a	–	–
annual ryegrass	–	1.0–1.4 (S)	(S)	1.2–1.7 or 1.5–3.0 (IBS) d	1.35–2.25	1.6 or 2.3	a c	–	–
barley grass	–	–	(S)	1.5–3.0 (S) (IBS) d	–	–	–	–	–
bedstraw	–	–	–	–	–	–	–	–	–
brome grass	–	–	(S)	1.5–3.0 (S) (IBS) d	–	–	–	–	–
capeweed	–	–	✓	–	–	–	–	–	–
cereals – volunteer	–	–	–	–	–	–	–	–	–
charlock	–	–	✓	–	–	–	–	–	–
common barbgrass	–	–	–	–	–	–	–	–	–
corn gromwell	–	1.0–1.4	✓	1.5–3.0 (IBS) d	–	–	–	–	–
deadnettle	–	1.0–1.4	–	1.5–3.0 (S) (IBS)	–	1.6 or 2.3	–	–	–
fababean – volunteer	–	–	–	–	–	–	–	–	–
field pea – volunteer	–	–	–	–	–	–	–	–	–
fumitory	–	–	✓	1.2–1.7 (S) or 1.5–3.0 (IBS) d	–	1.6 or 2.3 (S)	–	–	–
lupin – volunteer	–	–	–	–	–	–	–	–	–
Mexican poppy	–	–	–	–	–	–	–	–	–
medics – volunteer	–	1.0–1.4	–	–	–	–	–	–	–
mustards	–	–	✓	–	–	–	–	–	–
Paterson's curse	–	–	✓	–	–	–	–	–	–
saffron thistle	–	–	–	–	–	–	–	–	–
scotch thistle	–	–	–	–	–	–	–	–	–
shepherd's purse	–	1.0–1.4	✓	–	–	–	–	–	–
skeleton weed	–	–	–	–	–	–	–	–	–
spiny emex	1.0–1.4 (S)	1.0–1.4 (S)	✓	1.5–3.0 (S) (IBS) d	–	–	–	–	–
sub. clover	–	–	✓	–	–	–	–	–	–
toadrush	–	–	–	–	–	–	–	0.15–0.25	0.225–0.375
turnips – wild	–	1.0–1.4	✓	–	–	–	–	–	–
variegated thistle	–	–	–	–	–	–	–	–	–
vulpia	–	–	✓	1.5–3.0 (S) (IBS) d	1.5–2.25 (S)	1.6 (S)	–	–	–
wild mustard	–	1.0–1.4	–	–	–	–	–	–	–
wild oats	–	1.0–1.4 (S)	(S)	1.2–1.7 (S) or 1.5–3.0 (IBS) d	1.35–2.25 (S)	1.6 or 2.3 (S)	1.6 a	–	–
wild radish	1.0–1.4 (S)	1.0–1.4	(S)	–	–	–	–	–	–
winter grass	–	–	–	–	–	–	–	–	–
wireweed	–	1.0–1.4	–	1.2–1.7 or 1.5–3.0 (IBS) d	1.35–2.25	1.6 or 2.3	c	–	–
Rec water L/ha boom	50 min		50–100	70–450	50–200	50–100	30–100	60 min	60 min
Herbicide group	C		C	D	D	D	J	K	K

a = Add 0.7 L/ha trifluralin for mixed infestations of wild oats and annual ryegrass or wireweed. See label.
c = 1.6–2.0 L/ha Avadex® Xtra + 1.5–2.0 L/ha Triflur® X.

d = Alternatively apply 1.5–2.0 L/ha Triflur® X + 1.6–2.0 L/ha Avadex® Xtra for control using IBS incorporation. When adding Avadex® Xtra incorporate within 6 hrs.
(S) = Suppression.
✓ = Control, refer label for rate.

Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergence.

Table 14. Herbicides for weed control for canola – Early post-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Early post-emergence										
	Propaquizafop 100 g/L **Shogun®**	Clethodim 240 g/L **Status®** a	Butroxydim 250 g/kg **Factor® WG**	Fluazifop-P 128 g/L **Fusilade® Forte**	Haloxyfop-R 520 g/L **Verdict™ 520**	Quizalofop-p-ethyl 200 g/L **Elantra® Xtreme®**	Imazamox 33 g/L + Imazapyr 15 g/L **Intervix®** Clearfield canola only	Atrazine 600 g/L **Gesaprim®** Triazine Tolerant (TT) canola only	Terbuthylazine 750 g/kg **Terbyne®** Triazine Tolerant (TT) canola only	Clopyralid 600 g/L **Lontrel™ Advanced** c	Glyphosate 690 g/kg **Roundup Ready® Herbicide** Roundup Ready® Canola only
Apply at crop growth stage	**Any time until 16 weeks before harvest**	**Before budding**	**Not before 4 Leaf**	**Not after 6 Leaf**	**2 Leaf and prior to bud formation**	**Not before 5 Leaf**	**2–6 Leaf only**		**Early post-emergent**	**2–8 Leaf**	**Cotyledon to 6 leaf (prior to bud formation)**
Weeds controlled	(litres)	(litres)	(grams)	(litres)	(litres)	(litres)	(litres)	(litres)	(kilograms)	(litres)	(kilograms)
amsinckia	–	–	–	–	–	–	–	–	–	–	–
annual phalaris	–	0.15–0.5 m	80 u	0.41	0.05–0.1	–	–	–	0.7–1.4 (S)	–	**0.9 w**
annual ryegrass	0.45	0.15–0.5	80 u	0.41	0.075–0.1	0.15 or 0.19	0.3–0.75 b	✓	0.7–1.4 (S)	–	0.9
barley grass	0.2	0.175–0.5	80 u	0.41	0.05–0.1	0.125	0.3–0.75 b	–	–	–	0.9
bedstraw	–	–	–	–	–	–	0.6–0.75 (S) b	–	–	–	–
brome grass	0.3	0.175–0.5	80 u	0.5	0.05–0.1	0.15 or 0.19	0.3–0.75 b	–	–	–	0.9
capeweed	–	–	–	–	–	–	0.3–0.75 b	–	–	0.15	0.9
cereals – volunteer	0.2 i	0.2–0.5 n	80 u	0.41	0.05–0.1	0.125	–	–	–	–	0.9
charlock	–	–	–	–	–	–	0.6–0.75 b			–	–
chickpea – volunteer	–	–	–	–	–	–	–	–	–	0.125	–
corn gromwell	–	–	–	–	–	–	–	–	–	–	–
deadnettle	–	–	–	–	–	–	–	–	0.7–1.4	–	–
field pea – volunteer	–	–	–	–	–	–	0.3–0.75 b	–	–	0.075	–
fumitory	–	–	–	–	–	–	0.6–0.75 b x	–	–	–	–
lupin – volunteer	–	–	–	–	–	–	0.3–0.75 b	–	–	0.125	–
Mexican poppy	–	–	–	–	–	–	–	–	–	–	–
medics – volunteer	–	–	–	–	–	–	0.3–0.75 b	–	–	0.075	–
mustards	–	–	–	–	–	–	0.3–0.75 b h	✓	–	–	–
Paterson's curse	–	–	–	–	–	–	–	–	–	–	0.9
saffron thistle	–	–	–	–	–	–	–	–	–	0.15	0.9
scotch thistle	–	–	–	–	–	–	–	–	–	–	0.9
shepherd's purse	–	–	–	–	–	–	–	–	–	–	–
skeleton weed	–	–	–	–	–	–	–	–	–	0.15	–
spear thistle	–	–	–	–	–	–	–	–	–	–	0.9
spiny emex	–	–	–	–	–	–	0.6–0.75 (S) b	–	0.7–1.4 (S)	–	–
sub. clover	–	–	–	–	–	–	0.3–0.75 b	–	–	0.075	–
toadrush	–	–	–	–	–	–	–	–	–	–	–
turnips – wild	–	–	–	–	–	–	0.3–0.5	✓	–	–	0.9
variegated thistle	–	–	–	–	–	–	–	–	–	–	0.9
vulpia	–	0.25–0.5 (S)	–	–	–	–	0.6–0.75 (S) b	–	–	–	0.9
wild mustard	–	–	–	–	–	–	–	–	–	–	0.9
wild oats	0.25	0.175–0.5	80 u	0.41	0.0375–0.1 f	0.065 or 0.125	0.3–0.75 b	–	0.7–1.4 (S)	–	0.9
wild radish	–	–	–	–	–	–	0.3–0.575 b	✓	0.7–1.4	–	0.9
winter grass	–	–	–	–	–	–	–	–	–	–	0.9
wireweed	–	–	–	–	–	–	–	–	–	–	–
Rec water L/ha boom	**30–150**	**50 min**	**50–150**	**50–100**	**50–150**	**50–150**	**70 min**	**50–100**	**50 min**	**50 min**	**< 80**
Herbicide group	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**C**	**C**	**I**	**M**

Always add either BS1000® at 200 mL/100 L spray or Hasten™ or Kwickin™ at 500 mL/100 L spray. Correct® can be tankmixed with Sertin® to broaden grass spectrum and improve control. See label. Grass weeds 3-leaf to early tillering.

Add 2 L D-C-Trate® or 1 L Hasten™ or Kwickin™ or 0.5 L Uptake™ oil/100 L spray.

Add Supercharge® at 1 L/100 L or aerial application 1 L/ha. Canola may be sensitive to Factor®. See label.

Add Uptake™ spraying oil at 0.5 L/100 L water. Use a minimum of 250 mL/ha Uptake™. Use wetter only when tank mixing with broadleaf herbicides except Lontrel™ Advanced.

Add non-ionic surfactant at 200 mL/100 L or non-ionic surfactant at 100 mL/100 L + mineral spray oil at 1 L/100 L or Hasten™ at 1 L/100 L. See label.

Add Supercharge® at 0.5 L/100 L spray solution. Tank mixes of Intervix® and Transit® are possible. See label.

Use on triazine-tolerant varieties only. Can be used prior to crop 3-leaf stage and small weeds. Add surfactant. See label for use pattern. **DO NOT** apply this product on raised beds or where furrows have been created in soil for the purposes of holding or channelling water.

Always add Hasten™ at 1% v/v. Do not add any other herbicide or adjuvant.

No additional surfactant required. Sequential application must be at least 14 days apart. See label. No tank mixtures recommended. Be familiar with the Roundup Ready® canola resistance management plan before using.

a = Status® is registered to a higher maximum rate of 500 mL/ha, however under certain scenarios significant crop damage may occur at this maximum rate. See label.
b = See label for tankmix options.
c = Also available as Lontrel™ 750 SG (750 g/kg).
f = Use 0.0375–0.075 L/ha in southern and central NSW and 0.05–0.1 L/ha in northern NSW.
h = Indian hedge mustard only.
i = Volunteer triticale 0.25 L/ha.
m = Use higher rate on *Phalaris paradoxa*.
n = Use higher rate on volunteer barley.
u = Add an effective rate of Fop herbicide for control. See label.
w = Canary grass only.
x = Denseflower fumitory only.
(S) = Suppression.
✓ = Control, refer label for rate.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 15. Herbicides for weed control for safflower

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	pre-sowing						early post-emergence					
	Trifluralin 480 g/L **Triflur® X**		Pendimethalin 330 g/L **Stomp® 330EC f**		Tri-allate 500 g/L **Avadex® Xtra**		Diclofop-methyl 375 g/L **Rhino®**		Propaquizafop 100 g/L **Shogun®**		Metsulfuron-methyl 600 g/kg **Ally® g**	
Incorporation/growth stage application	PSI IBS		PSI IBS		PSI IBS		–		Any time until 20 weeks before harvest		4–6 Leaf	
Weeds controlled	(litres)		(litres)		(litres)		(litres)		(litres)		(grams)	
annual phalaris	1.2–1.7	Apply between 4 weeks and just before sowing and incorporate. See label. Apply 1.2 L/ha on light soils and between 1.5–1.7 L/ha on medium-heavy soils	–	In Northern NSW double incorporate at rate of 2.5–3.0 L/ha. In Southern NSW incorporate by sowing at rate of 2–3 L/ha. See label.	– c	Apply and incorporate immediately prior to sowing or up to 3 weeks before sowing.	–	Add wetting agent.	–	Always add either BS1000® at 200 mL/100 L spray or Hasten™ or Kwikdon™ at 500 mL/100 L water. Can be mixed with Sertin® to broaden and improve grass control. See label.	–	
annual ryegrass	1.2–1.7		2.0–3.0		– c		1.0		0.45		–	
barley grass	–		–		–		–		0.2		–	
brome grass	–		–		–		–		0.3		–	
capeweed	–		–		–		–		–		–	
cereals	–		–		–		–		0.2 e		–	
common barbgrass	–		–		–		1.25		–		–	
deadnettle	–		–		–		–		–		5.0	
field pea – volunteer	–		–		–		–		–		7.0	
fumitory	1.2–1.7 (S)		–		–		–		–		5.0	
Mexican poppy	–		–		–		–		–		–	
medics – volunteer	–		–		–		–		–		5.0	
mustards	–		–		–		–		–		5.0	
saffron thistle	–		–		–		–		–		–	
shepherd's purse	–		–		–		–		–		5.0	
skeleton weed	–		–		–		–		–		7.0 (S)	
subterranean clover	–		–		–		–		–		5.0	
wild oats	1.2–1.7 a		(S)		1.6 dc		1.5–2.0		0.25		–	
wireweed	1.2–1.7		2.0–3.0		c		–		–		5.0–7.0	
Rec water L/ha boom	70–450		50–200		30–100		50–150		30–150		50 L min	
Herbicide group/mode	D		D		J		A		A		B	

a = Tankmix with Avadex® Xtra for improved control.
c = Add 0.7 L/ha trifluralin for mixed infestations of wild oats and annual ryegrass or wireweed. See label.
d = Preferred option for northern NSW only.
e = 0.25 L/ha for volunteer triticale.
f = Pendimethalin also available in 440 g/L. See label for rates.
g = Sironaria, Saffola, Sirothora varieties only.
(S) = Suppression only.

Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergence.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 16. Herbicides for weed control for linseed and linola

Rate per hectare	Pre-emergence		Early post-emergence									
Various trade names sometimes available under these concentrations. See specific labels for details.	Trifluralin 480 g/L	Tri-allate 500 g/L	Fluazifop-P 128 g/L	Propaquizafop 100 g/L	Sethoxydim 186 g/L	Haloxyfop-R 520 g/L	Butroxydim 250 g/kg	Diclofop-methyl 375 g/L	Bromoxynil 200 g/L	Bromoxynil + MCPA 200 + 200 g/L	MCPA 750 g/L	Picloram + MCPA 26 + 420 g/L
	Triflur® X	Avadex® Xtra	Fusilade® Forte	Shogun®	Sertin®	Verdict™ 520	Factor® WG	Rhino®	Bromicide®	Bromoxynil MA	Thistle-Killem® 750	Tordon™ 242
	Not Linola	Not Linola	Not Linola	Not Linola	Not Linola		Not Linola	Not Linola	Not Linola	Not Linola	Not Linola	
Incorporation/growth stage application	PSI / IBS	PSI / IBS	Any time until 17 weeks before harvest	Any time until 16 weeks before harvest	Before budding	5 cm to flowering	Not before 4 Leaf	3–6 weeks after sowing	5–15 cm high	5–15 cm high	10–15 cm high and well before budding	8–20 cm high
Weeds controlled	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(grams)	(litres)	(litres)	(litres)	(litres)	(litres)
amsinckia	–	–	–	–	–	–	–	–	1.4–2.0	1.4–2.0	–	–
annual phalaris	1.2–1.7	c	0.41	–	0.5–1.0	0.05–0.1	80–180 f	–	–	–	–	–
annual ryegrass	1.2–1.7	c	0.41	0.45	0.5–1.0	0.075–0.1	80–180 f	1.0	–	–	–	–
barley grass	–	–	0.41	0.2	–	0.05–0.1	80–180 f	–	–	–	–	–
black bindweed	–	–	–	–	–	–	–	–	–	1.4–2.0	–	0.67–0.84
brome grass	–	–	0.5	0.3	–	0.05–0.1	80–180 f	–	–	–	–	–
capeweed	–	–	–	–	–	–	–	–	1.4–2.0	1.4–2.0	–	–
cereals	–	–	0.41	0.2 h	1.0 k	0.05–0.1	80–180 f	–	–	–	–	–
charlock	–	–	–	–	–	–	–	–	–	1.4–2.0	0.5–1.0	–
corn gromwell	–	–	–	–	–	–	–	–	1.4–2.0	1.4–2.0	–	–
fumitory	1.2–1.7 (S)	–	–	–	–	–	–	–	2.0	1.4–2.0	–	–
Mexican poppy	–	–	–	–	–	–	–	–	2.0	1.4–2.0	–	–
mustards	–	–	–	–	–	–	–	–	2.0	1.4–2.0	1.0	0.67–0.84
New Zealand spinach	–	–	–	–	–	–	–	–	–	–	–	0.67–0.84 (S)
Paterson's curse	–	–	–	–	–	–	–	–	2.0	1.4–2.0	1.0	–
radish – wild	–	–	–	–	–	–	–	–	2.0	1.4–2.0	0.7–1.0	0.67–0.84
rough poppy	–	–	–	–	–	–	–	–	–	1.4–2.0	0.7–1.0	–
saffron thistle	–	–	–	–	–	–	–	–	1.4–2.0	1.4–2.0	1.1	0.67–0.84
shepherd's purse	–	–	–	–	–	–	–	–	–	1.4–2.0	1.4–2.0	–
skeleton weed	–	–	–	–	–	–	–	–	–	–	–	0.67–0.84
slender thistle	–	–	–	–	–	–	–	–	–	1.4–2.0	1.1	–
spiny emex	–	–	–	–	–	–	–	–	2.0	1.4–2.0	–	0.67–0.84
turnip weed	–	–	–	–	–	–	–	–	2.0	1.4–2.0	1.0	–
variegated thistle	–	–	–	–	–	–	–	–	1.4–2.0	1.4–2.0	1.1	0.67–0.84
wild oats	1.2–1.7 a	1.6 d	0.41	0.25	0.75–1.0	0.0375–0.1 j	80–180 f	1.5–2.0	–	–	–	–
wild turnip	–	–	–	–	–	–	–	–	2.0	1.4–2.0	0.7–1.0	0.67–0.84
wireweed	1.2–1.7	c	–	–	–	–	–	–	2.0	1.4–2.0	–	0.67–0.84 (S)
Comments	Light soils 1.2 L/ha. Medium soils 1.5 L/ha. Heavy soils 1.7 L/ha. Sow 1.3–2.5 cm. Can sow in band. Deeper sowing may result in stand reduction. Apply and incorporate 2–4 weeks before sowing. See label.	Apply and incorporate 1–3 weeks before sowing. See label. Can be tankmixed with trifluralin for control of mixed infestations of wild phalaris, ryegrass and wireweed.		Always add either BS1000® at 200 mL/100 L spray, or Hasten™ or Kwickin™ at 0.5 L/100 L spray. Can be tankmixed with Sertin® to broaden grass weed spectrum and improve control. See label.	Add 1 L/ha DC Tron™ or Uvapron® crop oil.	Add Uptake™ spraying oil at 0.5 L/100 L water. Use a minimum 250 mL/ha Uptake™ or 1 L other oils + wetter per 100 L spray.	Ad Supercharge® at 1 L/100 L, or aerial application 1 L/ha. Canola may be sensitive to Factor®. See label.	Can be used on undersown legumes. Add wetting agent. Do not spray over 25°C.	Can be used on undersown legumes except medics. Apply when weeds are less than six leaves, crop 5–15 cm high. Some damage possible. Boom only. Avoid application when temperature > 20°C or if likely to be within a few days.	Slight crop damage – leaf burning can occur. Spray when 5–15 cm high. Boom only.	Apply 170 L water/ha min. Maximum rate in NSW 730 mL/ha.	Not if legumes to follow crop – one year.
Rec water L/ha boom	70–450	30–100	50–100	50–150	40–40	40–400	50–150	50–150	50–200	220	min 170	50 min
Herbicide group	D	J	A	A	A	A	A	A	C	C + I	I	I

a = Refer to label for details.
c = Add 0.7 L/ha trifluralin for mixed infestations of wild oats, annual ryegrass or wireweed, see label.
d = Preferred option for northern NSW only.
f = Add an effective Fop herbicide for control. See label.

h = 0.25 L/ha for volunteer triticale.
j = Use 0.0375–0.1 L/ha in southern and central NSW and 0.05–0.1 L./ha in northern NSW.
k = Volunteer oats and wheat only.
m = Volunteer wheat, barley, oats and triticale.
(S) = Suppression only.

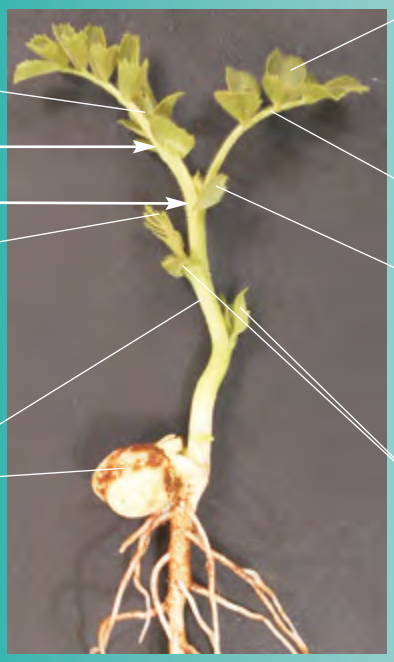
Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergence.

[blue] is a preferred option where NO legumes are to be undersown with the crop. [yellow] is a preferred option where legumes are to be sown with the crop. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Pulse crop growth stages

All pulse species have the same basic structure based on a main stem which can be divided into basic units known as nodes. Two scale leaves appear first and the nodes where they occur are not counted as true nodes. A node is made up of a petiole which has stipules where it joins the stem, and leaflets along its length. In some species it terminates in a simple or more complex tendril.

Chickpea (*Cicer arietinum*)



Growing point

2nd Node

1st Node

Branch
- originate in leaf axil or node

Stem

Cotyledons
- remain underground (hypogeal emergence)

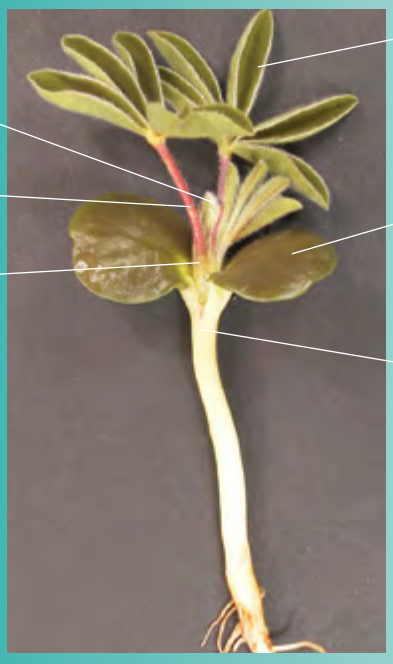
Leaflet
- many pairs of leaflets
- more in older leaves towards the top of plant
- shape varies with variety

Petiole
- small stem that holds the leaflets

Stipule
- in pairs
- each side of the leaf axis where it joins the stem
- smaller than leaflets
- size varies slightly with variety

Scale leaves
- two found at base of plant close to ground level
- not counted as true nodes

Lupin – albus (*Lupinus albus*), pictured, and narrow-leafed (*L. angustifolius*)



Growing point

Petiole
- small stem that holds the leaflets

Stipule
- in pairs
- each side of the leaf axis where it joins the stem

1st Node
- where 1st petiole joins stem
- equivalent to 1st fully open leaf

2nd Node
- where 2nd petiole joins stem
- equivalent to 2nd fully open leaf

Leaflet
- in a whorl on the end of the petiole
- more in older leaves towards the top of plant

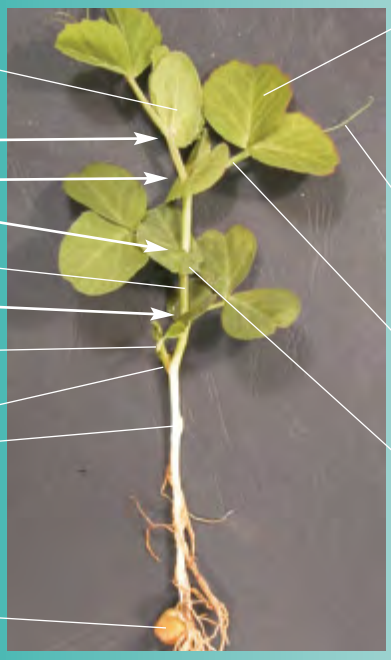
Cotyledons
- are pushed above the ground (epigeal emergence)

Stem

Branch
- originate in leaf axil or node (visible later in growth when stem elongates)

Field pea – conventional leaf type (*Pisum sativum*)

e.g. Dundale, Parafield, Alma.



Growing point
- inside stipules

4th Node

3rd Node

2nd Node

Stem

1st Node

Branch
- originate in leaf axil or node

Scale leaves
- two found at base of plant close to ground level
- not counted as true nodes

Cotyledons
- remain underground (hypogeal emergence)

Leaflet
- 1 to many pairs of leaflets depending on variety
- more in older leaves towards the top of plant
- size and shape varies with variety

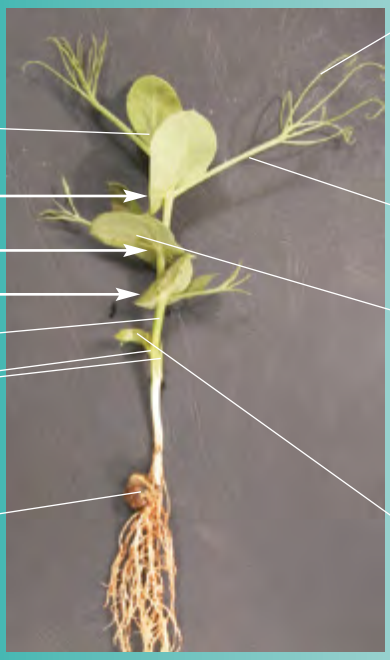
Tendrils
- simple in young leaves, more complex in older leaves towards the top of plant

Petiole
- small stem that holds the leaflets, terminating with a tendril

Stipule
- in pairs
- each side of the leaf axis where it joins the stem
- size varies with variety

Field pea – semi-leafless type (*Pisum sativum*)

e.g. Kaspa, Excell, Snowpeak, Mukta, Morgan.



Growing point
- inside stipules

3rd Node

2nd Node

1st Node

Stem

Scale leaves
- two found at base of plant close to ground level
- not counted as true nodes

Cotyledons
- remains underground (hypogeal emergence)

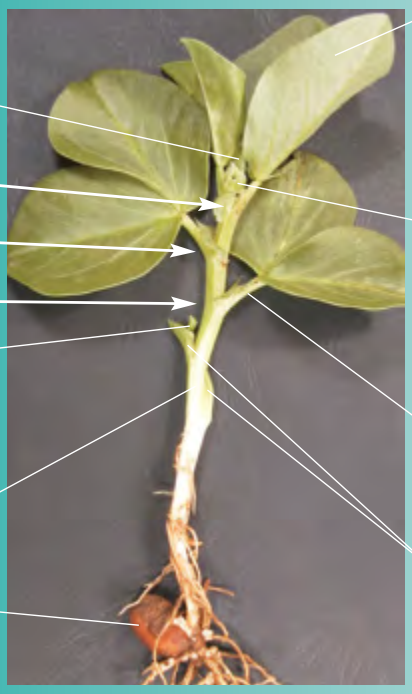
Tendrils
- well developed in semi-leafless field peas
- simple in young leaves, more complex in older leaves towards the top of plant

Petiole
- small stem that terminates with a well developed tendril

Stipule
- in pairs
- each side of the leaf axis where it joins the stem
- size much larger than in conventional leaf types

Branch
- originate in leaf axil or node

Faba bean (*Vicia faba*)



Growing point
- new leaves and flowers

3rd Node

2nd Node

1st Node

Branch
- originate in leaf axil or node

Stem

Cotyledons
- remains underground (hypogeal emergence)

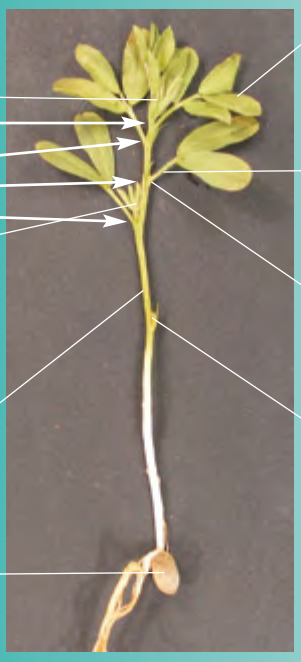
Leaflet
- 1 to 4 pairs of leaflets depending on variety
- more and larger in older leaves towards the top of plant
- size varies with variety

Stipule
- in pairs
- each side of the leaf axis where it joins the stem
- size varies with variety
- some varieties have dark spot

Petiole
- small stem that holds the leaflets, terminating with undeveloped tendril-like wisps

Scale leaves
- two found at base of plant close to ground level
- not counted as true nodes

Lentil (*Lens culinaris*)



Growing point
- new leaves and flowers

4th Node

3rd Node

2nd Node

1st Node

Branch
- originate in leaf axil or node

Stem

Cotyledons
- remains underground (hypogeal emergence)

Leaflet
- 1 to many pairs of leaflets
- more in older leaves towards the top of plant

Petiole
- small stem that holds the leaflets, terminating with undeveloped tendril-like wisps

Stipule
- in pairs
- each side of the leaf axis where it joins the stem

Scale leaves
- two found at base of plant close to ground level
- not counted as true nodes

The Pulse Crop Growth Stages diagrams are reproduced with the permission of Di Holding and Annabel Bowcher, formerly CRC for Australian Weed Management.

Do it once.
Do it well.

BALANCE®

Balance® activates again and again to effectively control a wide range of broadleaf weeds in chickpeas.

- UV stable and can be applied to hot and dry soils.
- Reactivated by rain or irrigation to provide long residual control.
- Excellent residual control of problem weeds such as wild radish, Indian hedge mustard, sowthistle, prickly lettuce and turnip weed.
- Can be applied with simazine for improved grass weed control.

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Bayer CropScience

Table 17. Herbicides for weed control for chickpea

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Dimethenamid-P 720 g/L **Outlook®**		Terbuthylazine 750 g/kg **Terbyne®**		Metribuzin 480 g/L **Sencor® 480** e		Prometryn 900 g/kg **Prometryn 900 DF**		Cyanazine 900 g/kg **Bladex®**		Simazine 500 g /L **Simazine 500** n		Diuron 500 g/L ◆ **Diuron 500** f		Trifluralin 480 g/L **Triflur® X**		Pendimethalin 330 g/L **Stomp® 330 EC** g		Isoxaflutole 750 g/kg **Balance® 750 WG**		Tri-allate 500 g/L **Avadex® Xtra**	
Incorporation/growth stage application	**IBS Knifepoint and Presswheel only**		**IBS**	**PSPE**	**PSPE**		**PSPE**		**PSI, IBS** **PSPE**		**PSI, IBS** **PSPE**		**IBS**	**PSPE**	**PSI** **IBS**		**PSI** **IBS**		**PSPE**		**PSI** **IBS**	
Weeds controlled	**(litres)**		**(kilograms)**		**(litres)**		**(kilograms)**		**(kilograms)**		**(litres)**		**(litres)**	**(litres)**	**(litres)**		**(litres)**		**(grams)**		**(litres)**	
amsinckia	–	Outlook® has demonstrated annual ryegrass control in low weed populations only (<100 plant/m²). Use in higher weed populations will only yield suppression. Apply as late as possible before sowing and sow with a knifepoint and presswheel seeder before weeds germinate. Do not use with disc openers/planting equipment. See label.	–	–	0.28–0.58	Terbyne® can be used IBS or PSPE. Use the lower rate on light soils and the high rate on heavier rate on heavier soils. Sufficient rain is necessary within 2–3 weeks after application.	–	Only spray post-sowing pre-emergence. Chickpea southern NSW only. Chickpea sown at least 5 cm deep. Rate depends on soil type – lower rate on light soils, higher rate on heavy soils.	–	Use higher rate on heavier soils. Where ryegrass or wireweed are a problem add Stomp® 330 EC or trifluralin for control.	–	Apply immediately post-sowing. 20–30 mm rainfall is required within 2–3 weeks for incorporation. Lower rates on alkaline soils, higher rates on red soils. Can be tankmixed with trifluralin (pre-sow), Balance® or prometryn (Gesagard®) to broaden weed control. Simazine also available as 600 g/L formulation in Gesatop® 600 applied at slightly lower rates – see label.	–	–	–	Light soils 1.2–1.5 L/ha. Medium-heavy soils 1.5–1.7 L/ha. Can sow in band. Apply and incorporate from 4 weeks up to just before sowing.	–	In Northern NSW incorporate twice at rate of 2.5–3 L/ha. In Southern NSW incorporate by sowing process (IBS) at rate of 2–3 L/ha. See label.	–	Apply immediately post-sowing. Not on sandy soils with less than 10% clay. Use only where following crops in rotation are cereals or maize. Can be tankmixed with simazine to broaden weed control.	–	Apply and incorporate immediately prior to sowing or up to 3 weeks before sowing. See Label. Can be tankmixed with trifluralin.
annual phalaris	–		–	0.7–1.0 (S)	–		–		–		–		–	–	1.2–1.7 h		–		–		a	
annual ryegrass	0.75–1.0		–	0.7–1.0 (S)	–		–		1.7 or 2.2		1.0–2.0 t		–	–	1.2–1.7 h		2.0–3.0		–		a	
barley grass	–		–	–	–		–		(S)		1.0–2.0 t		–	–	–		–		–		–	
brome grass	–		–	–	–		–		(S) k		1–2 t (S)		–	–	–		–		–		–	
capeweed	–		–	–	0.28–0.58		–		1.7 or 2.2		1.0–2.0 t		1.5–2.0	1.0–1.5	–		–		100		–	
cereals	–		–	–	–		–		–		–		–	–	–		–		–		–	
cockspur – Maltese	–		–	–	–		–		–		1.5–2.0		–	–	–		–		–		–	
corn gromwell	–		–	0.7–1.0	–		–		–		1.0–2.0 t		–	–	–		–		–		–	
crassula	–		–	–	–		–		1.7 or 2.2		–		1.5–2.0	1.0–1.5	–		–		100		–	
deadnettle	–		–	0.7–1.0	0.28–0.58		0.83 j		1.7 or 2.2		–		–	–	–		–		100 w		–	
fumitory	–		–	–	–		–		(S)		1.0–2.0 t		–	–	1.2–1.7 h (S)		–		–		–	
goosefoot – purple	–		–	–	–		0.83 j		–		1.5 –2.0		–	–	–		–		–		–	
lettuce – wild	–		–	0.7–1.0	–		0.83 j		1.7 or 2.2		1.5–2.0 (S)		–	–	–		–		100		–	
medic	–		–	0.7–1.0	–		–		–		–		–	–	–		–		100		–	
mustards	–		–	0.7–1.0	0.28–0.58		0.83 j		1.7 or 2.2		1.5–2.0 t		–	–	–		–		100		–	
Paterson's curse	–		–	–	–		–		–		–		–	–	–		–		–		–	
radish – wild	–		1.0–1.4 (S)	0.7–1.0 (S)	0.28–0.58		–		–		–		1.5–2.0	1.0–1.5	–		–		100		–	
rough poppy	–		–	–	0.28–0.58		–		1.7 or 2.2		1.5–2.0		–	–	–				–		–	
saffron thistle	–		–	–	–		–		–		–		–	–	–		–		100 w (S)		–	
shepherds purse	–		–	0.7–1.0	0.28–0.58		0.83 j		–		1.5– 2.0 S)		–	–	–		–		–		–	
sowthistle	–		–	0.7–1.0	0.28–0.58		–		1.7 or 2.2		1.5–2.0		–	–	–		–		100		–	
spear thistle	–		–	–	–		–		–		–		–	–	–		–		100 w		–	
spiny emex	–		1.0–1.4 (S)	0.7–1.0 (S)	0.28–0.58		–		1.7 or 2.2		–		1.5–2.0	1.0–1.5	–		–		100 w (S)		–	
toad rush	–		–	0.7–1.0	0.28–0.58		–		–		–		1.5–2.0	1.0–1.5	–		–		–		–	
turnip weed	–		–	0.7–1.0	–		0.83 j		1.7 or 2.2		1.5–2.0		–	–	–		–		100		–	
vulpia	–		–	–	–		–		–		–		–	–	–		(S)		100 w		–	
wild oats	–		–	0.7–1.0 (S)	–		–		–		1–2 t (S)		–	–	1.2–1.7 b h		(S)		–		1.6 c	
wild turnip	–		–	0.7–1.0	0.28–0.58		–		1.7 or 2.2		1.0–2.0 t		1.5–2.0	1.0–1.5	–		–		–		–	
winter grass	–		–	–	0.28–0.58		–		–		–		–	–	1.2–1.7 h		–		–		–	
wireweed	–		–	0.7–1.0	–		0.83 j		(S)		1.0–2.0 t		–	–	1.2–1.7 h		2.0–3.0		100 w (S)		a	
Rec water L/ha boom	**70–120**		**50 min**	**50 min**	**50–100**		**50–100**		**80–200**		**50–100**		**50–100**	**50–100**	**70–450**		**50–200**		**50 min**		**30–100**	
Herbicide group/mode	**K**		**C**	**C**	**C**		**C**		**C**		**C**		**C**	**C**	**D**		**D**		**H**		**J**	

a = Add 0.7 L/ha trifluralin for mixed infestations of wild oats.
b = Refer to label.
c = Preferred option northern NSW only.
e = Metribuzin also available as 750 g/kg formulation, see label for rates.
f = Diuron 900 DF is also registered. See label for rates.
g = Pendimethalin also available in 440 g/L. See label for rates.
h = Use low rate when applying immediately prior to sowing, and higher rate when applying to dry soil before the planting rain.
j = Tank mix with 830 g/ha simazine 900 DF for control.
k = Great brome only.
n = Both simazine and prometryn are available in other formulations (WG and DF).
t = Tankmix with 0.8 L/ha 480 g/L trifluralin for control and apply and incorporate presowing.
w = Tankmix with 1.5 L simazine (500 g/L) per ha.
(S) = Suppression only.
◆ = See *What's new in 2014* on page 3.

Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergent.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 17. Herbicides for weed control for chickpea (continued)

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Early post-emergence						
	Fluazifop-P 128 g/L **Fusilade® Forte**	Haloxyfop-R 520 g/L **Verdict™ 520**	Butroxydim 250 g/kg **Factor® WG**	Quizalofop- p-ethyl 200 g/L **Elantra® Xtreme®**	Clethodim 240 g/L **Status®**	Propaquizafop 100 g/L **Shogun®**	Flumetsulam 800 g/kg **Broadstrike™**
Apply at crop growth stage	7 weeks before harvest	2 Leaf to flowering	–	Not before 5 Leaf and up until 12 weeks before harvest	Not beyond full flower	Any time until 12 weeks before harvest	4–6 Leaf
Weeds controlled	(litres)	(litres)	(grams)	(litres)	(litres)	(litres)	(grams)
amsinckia	–	–	–	–	–	–	25
annual phalaris	0.41	0.05–0.1	80–180	–	0.15–0.5 r	–	–
annual ryegrass	0.41	0.075–0.1	80–180	0.15 or 0.19	0.15–0.5	0.45	–
barley grass	0.41	0.05–0.1	80–180	0.125	0.175–0.5	0.2	–
brome grass	0.5	0.05–0.1	80–180	0.15 or 0.19	0.175–0.5	0.3	–
capeweed	–	–	–	–	–	–	–
cereals	0.41	0.05–0.1	80–180	0.125	0.2–0.5 j	0.2 m	–
cockspur – Maltese	–	–	–	–	–	–	–
corn gromwell	–	–	–	–	–	–	–
deadnettle	–	–	–	–	–	–	–
fumitory	–	–	–	–	–	–	–
goosefoot – purple	–	–	–	–	–	–	–
lettuce – wild	–	–	–	–	–	–	–
medic	–	–	–	–	–	–	–
mustards	–	–	–	–	–	–	25
Paterson's curse	–	–	–	–	–	–	–
radish – wild	–	–	–	–	–	–	25 (S)
rough poppy	–	–	–	–	–	–	–
saffron thistle	–	–	–	–	–	–	–
shepherds purse	–	–	–	–	–	–	25
sowthistle	–	–	–	–	–	–	–
spear thistle	–	–	–	–	–	–	–
spiny emex	–	–	–	–	–	–	–
toad rush	–	–	–	–	–	–	–
turnip weed	–	–	–	–	–	–	25
vulpia	–	–	–	–	0.25–0.5 (S)	–	–
wild oats	0.41	0.0375–0.1 f	80–180	0.065 or 0.125	0.175–0.5	0.25	–
wild turnip	–	–	–	–	–	–	25
winter grass	–	–	–	–	–	–	–
wireweed	–	–	–	–	–	–	–
Rec water L/ha boom	50–100	50–150	50 min	50–150	50 min	30–150	50–150
Herbicide group/mode	A	A	A	A	A	A	B

Add Uptake™ spraying oil at 0.5 L/100 L water. Use a minimum of 250 mL/ha Uptake™ or 1 L other oils + wetter per 100 L water.

Factor® has good activity on barley grass and wild oats but weaker on brome grass and volunteer cereals. Adding a Fop herbicide is recommended. See label.

Add non-ionic surfactant at 200 mL/100 L or non-ionic surfactant at 100 mL/100 L + mineral spray oil at 1 L/100 L or Hasten™ at 1 L/100 L. See label.

Add 2 L D-C-Tate® or 1 L Hasten™ or Kwickin™ or 0.5 L Uptake™ oil/100 L spray. Use lower rates on small actively growing weeds.

Always add BS1000® at 200 mL/100 L spray or Hasten™ or Kwickin™ at 500 mL/100 L spray. Can be tankmixed with Sertin® to broaden and improve grass control. See label.

DO NOT use any spray additives or tankmix any other chemicals. May cause transient crop yellowing, reddening and height suppression. Flowering may be delayed resulting in yield suppression. Crop stage 4–6 branches. See label.

d = Volunteer oats and wheat only.
f = Use 0.0375–0.1 L/ha in southern and central NSW and 0.05–0.1 L/ha in northern NSW.
j = Use higher rate on volunteer barley.
m = Volunteer triticale 0.25 L/ha.
r = Use higher rate on *Phalaris paradoxa*
(S) = Suppression only.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 18. Herbicides for weed control for field pea – Pre-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Pre-sowing								Post-sowing–pre-emergence					
	Dimethenamid-P 720 g/L **Outlook®**	Terbuthylazine 750 g/kg **Terbyne®**		Cyanazine 900 g/kg **Bladex®**	Trifluralin 480 g/L **Triflur® X**	Pendimethalin 330 g/L **Stomp® 330 EC** g	Triallate 500 g/L **Avadex® Xtra**	Imazethapyr 700 g/kg **Spinnaker® 700 WDG**	Metribuzin 480 g/L **Sencor® 480 SC**	Metribuzin 750 g/kg **Sencor® 750 WG**	Cyanazine 900 g/kg **Bladex®**	Diuron 500 g/L ◆ **Diuron 500** e	
Incorporation	IBS Knifepoint and Presswheel only	IBS	PSPE	PSI, IBS	PSI, IBS	PSI, IBS	PSI, IBS	PSPE	PSPE	PSPE	PSPE	IBS	PSPE
Weeds controlled	(litres)	(kilograms)		(kilograms)	(litres)	(litres)	(litres)	(grams)	(litres)	(kilograms)	(kilograms)	(litres)	(litres)
amsinckia	–	–	–	–	–	–	–	70–100	0.28–0.58	0.18–0.38	–	–	–
annual phalaris	–	–	0.7–1.0 (S)	–	1.2–1.7 b	–	a	–	–		–	–	–
annual ryegrass	0.75–1.0	–	0.7–1.0 (S)	1.7 or 2.2 k	1.2–1.7 b	1.2–3.0	a	70 f	0.28–0.58 (S)		1.1 or 1.7	–	–
barley grass	–	–	–	(S)	–	–	–	70 f	–		(S)	–	–
capeweed	–	–	–	1.7 or 2.2	–	–	–	70–100	0.28–0.58	0.18–0.38	1.1 or 1.7	1.5–2.0	1.0–1.5
charlock	–	–	–	–	–	–	–	–	0.28–0.58	0.18–0.38	–	–	–
chickweed	–	–	–	1.7 or 2.2	–	–	–	70–100	0.28–0.58	0.18–0.38	1.1 or 1.7	–	–
corn gromwell	–	–	0.7–1.0	–	–	–	–	–	0.28–0.58	0.18–0.38	–	–	–
cotula – common	–	–	–	–	–	–	–	–	0.28–0.58	0.18–0.38	–	–	–
crassula	–	–	–	1.7 or 2.2	–	–	–	–	–	–	1.1 or 1.7	1.5–2.0	1.0–1.5
deadnettle	–	–	0.7–1.0	1.7 or 2.2	–	–	–	70	0.28–0.58	0.18–0.38	1.1 or 1.7	–	–
fumitory	–	–	–	(S)	1.2–1.7 b	–	–	–	0.28–0.58	0.18–0.38	(S)	–	–
mustards	–	–	0.7–1.0	1.7 or 2.2	–	–	–	70 m	0.28–0.58	0.18–0.38	1.1 or 1.7	–	–
Paterson's curse	–	–	–	–	–	–	–	70	–		–	–	–
prickly lettuce	–	–	0.7–1.0	1.7 or 2.2	–	–	–	70–100	–		1.1 or 1.7	–	–
radish – wild	–	1.0–1.4 (S)	0.7–1.0 (S)	(S)	–	–	–	70 h (S)	0.28–0.58	0.18–0.38	(S)	1.5–2.0	1.0–1.5
rough poppy	–	–	–	1.7 or 2.2	–	–	–	–	0.28–0.58	0.18–0.38	1.1 or 1.7	–	–
shepherd's purse	–	–	0.7–1.0	–	–	–	–	70	0.28–0.58	0.18–0.38	–	–	–
sowthistle	–	–	0.7–1.0	1.7 or 2.2	–	–	–	–	0.28–0.58	0.18–0.38	1.1 or 1.7	–	–
spiny emex	–	1.0–1.4 (S)	0.7–1.0 (S)	1.7 or 2.2	–	–	–	70	0.28–0.58	0.18–0.38	1.1 or 1.7	1.5–2.0	1.0–1.5
stinging nettle	–	–	–	1.7 or 2.2	–	–	–	70	–		1.1 or 1.7	–	–
toad rush	–	–	0.7–1.0	–	–	–	–	70	0.28–0.58	0.18–0.38	–	1.5–2.0	1.0–1.5
turnip weed	–	–	0.7–1.0	1.7 or 2.2	–	–	–	70	–		1.1 or 1.7	–	–
vulpia	–	–	–	–	–	2–3 (S)	–	–	–		–	–	–
wild oats	–	–	0.7–1.0 (S)	–	1.2–1.7 c b	(S)	1.6 d	70 f (S)	–		–	–	–
wild turnip	–	–	0.7–1.0	1.7 or 2.2	–	–	–	–	0.28–0.58	0.18–0.38	1.1 or 1.7	1.5–2.0	1.0–1.5
winter grass	–	–	–	–	1.2–1.7 b	–	–	–	0.28–0.58	0.18–0.38	–	–	–
wireweed	–	–	0.7–1.0	(S) k	1.2–1.7 b	1.2–3.0	a	70	0.28–0.58	0.18–0.38	(S)	–	–
Rec water L/ha Boom	70–120	50 min		80–200	70–450	50–200	30–100	50–100	50–100	50–100	80–200	–	–
Herbicide group	K	C		C	D	D	J	B	C	C	C	C	C

Outlook® has demonstrated annual ryegrass control in low weed populations only (<100 plant/m²). Use in higher weed populations will only yield suppression. Apply as late as possible before sowing and sow with a knifepoint and presswheel seeder before weeds germinate. Do not use with disc openers/planting equipment. See label.

Terbyne® can be used IBS or PSPE. Use the lower rate on light soils and the high rate on heavier soils. Sufficient rain is necessary within 2–3 weeks after application.

Use higher rate on heavier soil types. Pre-sowing application: apply between 14 days before and up to sowing.

Spray and incorporate 0–4 weeks before sowing. See label. Apply 1.2 L/ha on light soils and 1.5–1.7 L/ha on medium to heavy soils.

Sow seed under chemical band. See label. Lower rates where fully incorporated and/or northern NSW.

Apply and incorporate immediately prior to or up to 3 weeks before sowing. See label. Can be tankmixed with trifluralin for control of mixed infestations of ryegrass, wild phalaris and wireweed.

Apply immediately post-sowing. Note recropping intervals Table 2. Refer label.

Do not tank mix with other herbicides for field pea. Check label for suitable rate. Rate depends on soil type. Best results with moist soil surface. Use higher rate on heavier soil types. See label.

Do not tank mix with other herbicides for field pea. Check label for suitable rate. Best results with moist soil surface. Use higher rate on heavier soil types. See label.

Use higher rate on heavier soil types. Post-sowing pre-emergence application: apply 1.1 or 1.7 kg/ha from immediately after until 1 week after sowing.

a = Add 0.7 L/ha trifluralin for mixed infestations of wild oats, annual ryegrass or wireweed – see label.
c = Refer to label for details.
d = Preferred option for northern NSW only.
e = Diuron 900 DF is also registered. See label for rates.
f = Eight weeks suppression of grass weeds. For full control of grass weeds a follow up spray with a grass herbicide may be required.
g = Pendimethalin also available as a 440 g/L formulation. See label.
h = A follow up treatment with another product may be needed for control of wild radish under high weed pressure or rainfall conditions.
k = Add trifluralin or Stomp® 330 EC.
m = Indian hedge mustard.
(S) = Suppression only.
◆ = See *What's new in 2014* on page 3.

Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergence.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 19. Herbicides for weed control for field pea – Early post-emergence – Part 1

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Quizalofop-p-ethyl 200 g/L **Elantra® Xtreme®**	Clethodim 240 g/L **Status®**	Propaquizafop 100 g/L **Shogun®**	Haloxyfop-R 520 g/L **Verdict™ 520**	Butroxydim 250 g/kg **Factor® WG**	Fluazifop-p 128 g/L **Fusilade® Forte**	Imazethapyr 700 g/kg **Spinnaker®700 WDG**	Imazamox 700 g/kg **Raptor®**
Apply at crop growth stage	**Up until 9 weeks before harvest**	**Not beyond full flowering**	**Any time until 12 weeks before harvest**	**2 node to before flowering**	**–**	**Any time, until 7 weeks before harvest**	**–**	**Not after 4th node**
Weeds controlled	**(litres)**	**(litres)**	**(litres)**	**(litres)**	**(grams)**	**(litres)**	**(grams)**	**(grams)**
amsinckia	–	–	–	–	–	–	–	–
annual phalaris	–	0.15–0.5 k	–	0.05–0.1	80–180	0.41	–	–
annual ryegrass	0.15 or 0.19	0.15–0.5	0.45	0.075–0.1	80–180	0.41	–	–
barley grass	0.125	0.175–0.5	0.2	0.05–0.1	80–180	0.41	–	45
brome grass	0.15 or 0.19	0.175–0.5	0.3 a	0.05–0.1	80–180	0.5	–	45 (S)
capeweed	–	–	–	–	–	–	–	45
cereals	0.125	0.2–0.5 i	0.2 b	0.05–0.1	80–180	0.41	–	–
charlock	–	–	–	–	–	–	–	45
chickweed	–	–	–	–	–	–	–	–
corn gromwell	–	–	–	–	–	–	–	–
cotula – common	–	–	–	–	–	–	–	–
deadnettle	–	–	–	–	–	–	–	–
dock	–	–	–	–	–	–	70	45
fat hen	–	–	–	–	–	–	–	–
fumitory	–	–	–	–	–	–	–	45
heliotrope	–	–	–	–	–	–	–	–
mustards	–	–	–	–	–	–	70 n	–
Paterson's curse	–	–	–	–	–	–	–	45
radish – wild	–	–	–	–	–	–	–	–
rough poppy	–	–	–	–	–	–	–	–
shepherd's purse	–	–	–	–	–	–	–	45 (S)
skeleton weed	–	–	–	–	–	–	–	–
sorrell	–	–	–	–	–	–	–	45 (S)
sowthistle	–	–	–	–	–	–	–	–
spiny emex	–	–	–	–	–	–	–	–
storksbill	–	–	–	–	–	–	–	45 (S)
toad rush	–	–	–	–	–	–	70	–
turnip weed	–	–	–	–	–	–	–	45
variegated thistle	–	–	–	–	–	–	–	–
wild lettuce	–	–	–	–	–	–	–	–
wild oats	0.065 or 0.125	0.175–0.5	0.25	0.0375–0.1 f	80–180	0.41	–	45
wild turnip	–	–	–	–	–	–	–	45
winter grass	–	–	–	–	–	–	–	–
wireweed	–	–	–	–		–	70	45 (S)
Rec water L/ha Boom	**50–150**	**50 min**	**30–150**	**50–150**	**50 min**	**50–100**	**50–100**	**50 min**
Herbicide group	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**B**

Add non-ionic surfactant at 200 mL/100 L or non-ionic surfactant at 100 mL/100 L + mineral spray oil at 1 L/100 L or Hasten™ at 1 L/100 L. See label.

Add 2 L D-C-Trate® or 1 L Hasten™ or KwikKin™ or 0.5 L Uptake™ oil/100 L spray.

Always add either BS1000® at 200 mL/100 L spray or Hasten™ or KwikKin™ at 500 mL/100 L spray. Can be tankmixed with Sertin® Plus or Sertin® to broaden grass spectrum and improve control. See label.

Add Uptake™ spraying oil at 0.5 L/100 L. Use wetter only when tankmixing with broadleaf herbicides. Products also available containing 130 g/L haloxyfop-R formulation (Asset®).

Factor® has good activity on barley grass and wild oats but weaker on brome grass and volunteer cereals. Adding a Fop herbicide is recommended. See label.

Alma, Dun, Dundale, WrrfGA_varieties only. Weeds cotyledon to 3-leaf stage. Add non-ionic surfactant at 200 mL per 100 L water. See Table 2 for recropping intervals.

Apply only on varieties Alma, Banzee, Dun, Dundale, Glenroy, Laura and Wirrega. Add BS1000® or equivalent at 200 mL/100 L water. Small weeds. See Table 2 for plant-back requirements.

a = Great brome only.
b = Volunteer triticale 250 mL/ha.
e = Volunteer oats and wheat only.
f = Use 0.0375–0.1 L/ha in southern and central NSW and 0.05–0.1 L/ha in northern NSW.
i = Use high rate for volunteer barley.
k = Use high rate on *Phalaris paradoxa*
n = Indian hedge mustard
(S) = Suppression only.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 19. Herbicides for weed control for field pea – Early post-emergence – Part 2

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Flumetsulam 800 g/kg **Broadstrike™**		Metribuzin 480 g/L **Sencor® 480 SC**		Metribuzin 750 g/kg **Sencor® 750 WG**		Cyanazine 900 g/kg **Bladex®**		Diflufenican 500 g/L **Brodal® Options**		Picolinafen 750g/kg **Sniper®**		MCPA 250 g/L (present as sodium salt only) **MCPA 250** a		MCPA 750 g/L **Thistle-Killem® 750**	
Apply at crop growth stage	**2–6 nodes**		**Before 3rd node**		**Before 3rd node**		**After 2 node but before flowering**		**3rd node to flowering**		**3 node to before flowering**		**6 node to before flowering**		**3 node to before flowering**	
Weeds controlled	**(grams)**		**(litres)**		**(grams)**		**(kilograms)**		**(litres)**		**(grams)**		**(litres)**		**(litres)**	
amsinckia	25	Do not add any spray additives. May cause yellowing, reduced height and delayed flowering.	0.28–0.58	Do not tank mix with other herbicides for field pea. Check label for suitable rate and influence of variety and disease. Best results with moist soil surface. Two sunny days before spraying improves crop tolerance. See label.	180–380	Do not tank mix with other herbicides for field pea. Check label for suitable rate and influence of disease and variety. Best results with moist soil surface. Two sunny days before spraying improves crop tolerance. See label.	–	Not on Wirrega field pea post-emergent. Use higher rate on larger weeds.	0.2 (S)	Apply before crop canopy obscures weeds. Caution on alkaline soils.	–	Apply when most wild radish is at the 2–6 leaf stage and capeweeds at 2–4 leaf stage. Maybe some residual control. Not on high pH soils. Not in northern NSW.	–	May delay crop maturity.	–	May delay crop maturity. Apply early post-emergence after the 3rd node stage and before the start of flowering. Weeds 4–6 leaf stage.
annual phalaris	–		–		–		–		–		–		–		–	
annual ryegrass	–		0.28–0.58 (S)		–		0.85 or 1.1		–		–		–		–	
barley grass	–		–		–		– (S)		–		–		–		–	
bedstraw	–		–		–		– (S)		–		–		–		–	
brome grass	–		0.28–0.58		180–380		0.85 or 1.1		–		50 (S)		–		–	
capeweed	–		–		–		–		0.2 (S)		–		–		–	
cereals – volunteer	–		0.28–0.58		180–380		–		–		–		–		–	
charlock	–		0.28–0.58		180–380		0.85 or 1.1		0.2		–		0.9–1.4		0.08–0.1 b	
chickweed	–		0.28–0.58		180–380		–		0.2 (S)		–		–		–	
corn gromwell	–		0.28–0.58		180–380		–		0.2 (S)		–		–		–	
cotula – common	–		0.28–0.58		180–380		0.85 or 1.1		–		–		–		–	
deadnettle	–		0.28–0.58		180–380		–		0.2		–		–		–	
fumitory	–		0.28–0.58		180–380		0.85 or 1.1		–		–		–		–	
lupin – volunteer	25		0.28–0.58		180–380		–		–		–		–		–	
marshmallow	25		0.28–0.58		180–380		–		0.2 (S)		–		–		–	
mustards	25		0.28–0.58		180–380		0.85 or 1.1		0.15–0.2		–		0.9–1.4		–	
mustard – Indian hedge	25		–		–		–		–		–		–		–	
Paterson's curse	–		0.28–0.58		180–380		– (S)		0.2 (S)		33–50		–		–	
prickly – lettuce	–		0.28–0.58		180–380		0.85 or 1.1		0.2		–		–		0.08–0.1 b	
radish – wild	25 (S)		0.28–0.58		180–380		–		0.2		–		–		–	
rough poppy	–		–		–		–		0.2 (S)		–		–		–	
shepherds purse	25		0.28–0.58		180–380		–		0.2 (S)		–		–		–	
skeleton weed	–		0.28–0.58		180–380		0.85 or 1.1		0.2 (S)		–		–		–	
sowthistle	–		0.28–0.58		180–380		0.85 or 1.1		–		–		–		–	
spiny emex	–		0.28–0.58		180–380		–		–		–		–		–	
toad rush	–		0.28–0.58		180–380		–		0.2 (S)		–		–		–	
turnip weed	25		–		–		0.85 or 1.1		0.2		–		–		–	
variegated thistle	–		–		–		–		–		–		–		–	
vulpia	–		–		–		–		–		–		–		–	
wild oats	–		–		–		–		–		–		–		–	
wild turnip	25		0.28–0.58		180–380		0.85 or 1.1		0.15–0.2		–		0.9–1.4		–	
winter grass	–		0.28–0.58		180–380		–		–		–		–		–	
wireweed	–		0.28–0.58		180–380		– (S)		0.2 (S)		–		–		–	
Rec water L/ha Boom	**50–150**		**50–100**		**50–100**		**80–200**		**70–100**		**50 min**		**220–300**		**30–120**	
Herbicide group	**B**		**C**		**C**		**C**		**F**		**F**		**I**		**I**	

a = Label rates will change if a different salt is present. (S) = Suppression only.
b = Add 125–150 mL Agility®.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 20. Herbicides for weed control for lupin – Pre-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Dimethenamid-P 720 g/L **Outlook®**		Terbuthylazine 750 g/kg **Terbyne®**		**Simazine 900 g/kg**		**Simazine 500 g/L**		Trifluralin 480 g/L **Triflur® X**		Pendimethalin 330 g/L **Stomp® 330 EC** i		Tri-allate 500 g/L **Avadex® Xtra** b	
					Light soils **Simazine 900 DF** a b	Loam soils **Simazine 900 DF** a b	Light soils **Simazine 500** a b	Loam soils **Simazine 500** a b						
Incorporation	**IBS Knifepoint and Presswheel only**		**IBS**	**PSPE**	**PSPE**	**PSPE**	**PSPE**	**PSPE**	**IBS, PSI**		**IBS, PSI**		**IBS, PSI**	
Weeds controlled	**(litres)**		**(kilograms)**		**(kilograms)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**	
amsinckia	–	Outlook® has demonstrated annual ryegrass control in low weed populations only (<100 plant/m²). Use in higher weed populations will only yield suppression. Apply as late as possible before sowing and sow with a knifepoint and presswheel seeder before weeds germinate. Do not use with disc openers/planting equipment. See label.	–	–	–	Apply to level seedbed within 2 days after sowing.	–	Apply to level seedbed within 2 days of sowing. Simazine also available as 600 g/L. See appropriate label for rates.	–	Apply to level seedbed within 2 days of sowing. Simazine also available as 600 g/L. See appropriate label for rates.	–	Light soils 1.2 L/ha. Medium-heavy soils 1.5–1.7 L/ha. Can sow in band. Apply and incorporate from 4 weeks up to just before sowing.	–	In Northern NSW double incorporate at 2.5–3 L/ha. In Southern NSW IBS at 2–3 L/ha. See label.	–	Apply and incorporate immediately prior to or up to 3 weeks before sowing.
annual phalaris	–		–	0.7–1.0 (S)	–		–		1.2–1.7		–		– g	
annual ryegrass	0.75–1.0		–	0.7–1.0 (S)	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		1.2–1.7		2.0–3.0		– g	
barley grass	–		–	–	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		–		–		–	
brome grass	–		–	–	0.8–1.1 (S)		1.3–2.2 (S)		1.5–2.0 (S)		2.5–4.0 (S)		–		–		–	
capeweed	–		–	–	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		–		–		–	
cereals	–		–	–	–		–		–		–		–		–		–	
charlock	–		–	–	–		–		–		–		–		–		–	
corn gromwell	–		–	0.7–1.0	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		–		–		–	
deadnettle	–		–	0.7–1.0	–		–		–		–		–		–		–	
fumitory	–		–	–	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		1.2–1.7 (S)		–		–	
mustards	–		–	0.7–1.0	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		–		–		–	
Paterson's curse	–		–	–	–		–		1.5–2.0		2.5–4.0		–		–		–	
radish–wild	–		1.0–1.4 (S)	0.7–1.0 (S)	–		–		–		–		–		–		–	
rough poppy	–		–	–	–		–		–		–		–		–		–	
shepherd's purse	–		–	0.7–1.0	–		–		1.5–2.0		2.5–4.0		–		–		–	
skeleton weed	–		–	–	–		–		–		–		–		–		–	
sowthistle	–		–	0.7–1.0	–		–		–		–		–		–		–	
spiny emex	–		1.0–1.4 (S)	0.7–1.0 (S)	–		–		–		–		–		–		–	
toadrush	–		–	0.7–1.0	–		–		–		–		–		–		–	
turnip weed	–		–	0.7–1.0	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		–		–		–	
wild lettuce	–		–	0.7–1.0	–		–		–		–		–		–		–	
wild oats	–		–	0.7–1.0 (S)	0.8–1.1 (S)		1.3–2.2 (S)		1.5–2.0 (S)		2.5–4.0 (S)		1.2–1.7 d		2.0–3.0 (S)		1.6 e	
wild turnip	–		–	0.7–1.0	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		–		–		–	
winter grass	–		–	–	–		–		1.5–2.0		2.5–4.0		1.2–1.7		–		–	
wireweed	–		–	0.7–1.0	0.8–1.1		1.3–2.2		–		–		1.2–1.7		2.0–3.0		g	
Rec water L/ha boom	**70–120**		**50 min**		**50–100**		**50–100**		**50–100**		**50–100**		**70–450**		**50–200**		**30–100**	
Herbicide group	**K**		**C**		**C**		**C**		**C**		**C**		**D**		**D**		**J**	

a = Simazine and Brodal® can be tankmixed.
b = Trifluralin, Avadex® Xtra can be tankmixed.
d = Refer to label.
e = Preferred option northern NSW only.
g = Add 0.7 L/ha trifluralin for mixed infestations of wild oats, annual ryegrass or wireweed – see label.
i = Pendimethalin also available in 440 g/L. See label for rates.
(S) = Suppression only.

Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergent.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 21. Herbicides for weed control for lupin – Post-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Diclofop-methyl 375 g/L **Rhino®**		Fluazifop-P 128 g/L **Fusilade® Forte** k	Haloxyfop-R 520 g/L **Verdict™ 520**		Quizalofop-P-ethyl 200 g/L **Elantra® Xtreme®**		Butroxydim 250 g/kg **Factor® WG**		Clethodim 240 g/L **Status®**		Propaquizafop 100 g/L **Shogun®**		Metosulam 100 g/L **Eclipse® 100 SC** x		Picolinafen 750 g/kg **Sniper®**		Diflufenican 500 g/L **Brodal® Options**		Paraquat 250 g/L **Gramoxone®**	
Apply at crop growth stage	–		Any time until 17 weeks before harvest	2 Leaf to flowering		Up until 6 weeks before harvest		–		Before 80% flowering		Any time until 15 weeks before harvest		2–10 Leaf		2–6 Leaf		2 Leaf to flowering		Physiological maturity	
Weeds controlled	(litres)		(litres)	(litres)		(litres)		(grams)		(litres)		(litres)		(millilitres)		(grams)		(litres)		(litres)	
amsinckia	–	1.25 L/ha controls common barley grass. Add wetting agent.	–	–	Add 0.5 L Uptake™ spraying oil/100 L water. Use a minimum of 250 mL/ha or other oils at 1 L + wetter/100 L water.	–	Add non-ionic surfactant at 200 mL/100 L or non-ionic surfactant at 100 mL/100 L + mineral spray oil at 1 L/100 L or Hasten™ at 1 L/100 L. See label.	–	Factor® has good activity on barley grass and wild oats but weaker on brome grass and volunteer cereals. Adding a fop herbicide is recommended. See label.	–	Add 2 L D-C-Trate® or 1 L Hasten™ or Kwickin™ or 0.5 L Uptake™ oil/100 L spray. Use lower rates on small actively growing weeds.	–	Always add either BS1000® at 200 mL/100 L water or Hasten™ or Kwickin™ at 500 mL/100 L of spray. Can be tankmixed with Sertin® to broaden grass spectrum and improve control. See label.	–	Apply at 2–10 leaf stage of lupin and weeds up to 8 leaf stage. Do not apply with crop oils, surfactants or wetters. At least 10 days should elapse between application of Eclipse® and grass herbicide. Not on Merrit after 8 leaf stage.	–	Narrow leaf lupin only. Apply at 2–6 leaf stage of crop and 2–8 leaf stage of wild radish. (capeweed 2–4-leaf stage). Not in Northern NSW.	0.2 (S)	Apply from 2-leaf stage of crop and before the start of primary flowering. Young weeds actively growing 4–6 weeks after sowing (up to 4-leaf stage).	–	Spray top ryegrass to reduce seedset when most of the ryegrass heads have emerged and are flowering or just past flowering. 7 days WHP. Ensure crop has reached physiologically mature stage to avoid yield loss. 7 days WHP.
annual phalaris	–		0.41–0.82	0.05–0.1		–		80–180		0.15–0.5 m		–		–		–		–		–	
annual ryegrass	1.0		0.41–0.82	0.075–0.1		0.15 or 0.19		80–180		0.15–0.5		0.45		–		–		–		0.4–0.8	
barley grass	–		0.41–0.82	0.05–0.1		0.125		80–180		0.175–0.5		0.2		–		–		–		–	
brome grass	–		0.41–0.82	0.05–0.1		0.15 or 0.19		80–180		0.175–0.5		0.3		–		–		–		–	
capeweed	–		–	–		–		–		–		–		–		50(S)		0.2 (S)		–	
cereals	–		0.41–0.82	0.05–0.1		0.125		80–180		0.2–0.5 j		0.2 b		–		–		–		–	
charlock	–		–	–		–		–		–		–		–		–		0.2		–	
corn gromwell	–		–	–		–		–		–		–		–		–		0.2 (S)		–	
deadnettle	–		–	–		–		–		–		–		–		–		0.2		–	
fumitory	–		–	–		–		–		–		–		–		–		–		–	
mustards	–		–	–		–		–		–		–		–		–		0.15–0.2		–	
Paterson's curse	–		–	–		–		–		–		–		–		–		0.2 (S)		–	
radish–wild	–		–	–		–		–		–		–		50–70		33–50		0.2		–	
rough poppy	–		–	–		–		–		–		–		–		–		0.2 (S)		–	
shepherd's purse	–		–	–		–		–		–		–		–		–		0.2 (S)		–	
skeleton weed	–		–	–		–		–		–		–		–		–		0.2 (S)		–	
sowthistle	–		–	–		–		–		–		–		–		–		–		–	
spiny emex	–		–	–		–		–		–		–		–		–		–		–	
toadrush	–		–	–		–		–		–		–		–		–		0.2 (S)		–	
turnip weed	–		–	–		–		–		–		–		–		–		0.2		–	
vulpia	–		–	–		–		–		0.25–0.5 (S)		–		–		–		–		–	
wild lettuce	–		–	–		–		–		–		–		–		–		0.2		–	
wild oats	1.5–2.0		0.41–0.82	0.0375–0.1 i		0.065 or 0.125		80–180		0.175–0.5		0.25		–		–		–		–	
wild turnip	–		–	–		–		–		–		–		–		–		0.15–0.2		–	
winter grass	–		–	–		–		–		–		–		–		–		–		–	
wireweed	–		–	–		–		–		–		–		–		–		0.2 (S)		–	
Rec water L/ha boom	50–150		50–100	50–150		50–150		50 min		50 min		30–150		50–100		50 min		70–100		50–100	
Herbicide group	A		A	A		A		A		A		A		B		F		F		L	

b = 0.25 L/ha for volunteer triticale.
h = Volunteer oats and wheat only.
i = Use 0.0375–0.075 L/ha in central and southern NSW and 0.05–0.1 L/ha in northern NSW.
j = Use high rate for volunteer barley.
k = Use the lower rate when grass weeds are actively growing at 2–5 leaf stage before tillering commences. Use the higher rate when grass weeds are growing actively at 5-leaf to early tillering.
m = Use higher rate on *Phalaris paradoxa*.
p = Volunteer wheat, barley and oats only.
x = Jindalee, Kiev, Quilinock and Wonga varieties. Do not apply past 8-leaf in Wonga.
(S) = Suppression only.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 22. Herbicides for weed control for faba bean and lentil – Pre-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Imazethapyr 700 g/kg **Spinnaker® 700 WDG** Faba bean only		Terbuthylazine 750 g/kg **Terbyne®**			Simazine 600 g/L **Gesatop® 600 SC** Faba bean only		Cyanazine 900 g/kg **Bladex®**		Metribuzin 480 g/L **Sencor® 480** c Faba bean only		Diuron 500 g/L ◆ **Diuron 500** d		Trifluralin 480 g/L **Triflur® X** Lentil only		Pendimethalin 330 g/L **Stomp® 330 EC** e Faba bean only		Triallate 500 g/L **Avadex® Xtra** Faba bean only	
Incorporation	PSPE		IBS	PSPE		PSI, IBS, PSPE		PSI, IBS		PSPE		IBS	PSPE	PSI, IBS		PSI, IBS		PSI, IBS	
Weeds controlled	(grams)		(kilograms)			(litres)		(kilograms)		(litres)		(litres)	(litres)	(litres)		(litres)		(litres)	
amsinckia	70–100	Apply post-sowing pre-emergence to weed-free seedbed. Note recropping intervals on Table 2. Check label.	–	–	Terbyne® can be used IBS or PSPE. Use the lower rate on light soils and the high rate on heavier soils. Sufficient rain is necessary within 2–3 weeks after application.	–	Apply either pre-seeding or immediately post-sowing. Sow crop at least 5 cm deep. Use lower rates on light textured soils.	–	Use higher rates on heavier soil types. Post-emergent application will cause crop damage.	0.28–0.58	Spray post-sowing pre-emergence. Rate depends on soil type	–	–	–	Light soils 0.8 L/ha. Medium-heavy soils 1.2 L/ha. Can sow in band. Apply and incorporate 1–4 weeks before sowing.	–	In Northern NSW double incorporate at 2.5–3.0 L/ha. In Southern NSW incorporate by sowing (IBS) at 2.0–3.0 L/ha. See label.	–	Apply and incorporate immediately prior to sowing or up to 3 weeks before sowing. See label. Can be tankmixed with trifluralin for control of mixed infestations of ryegrass, wild phalaris and wireweed.
annual phalaris	–		–	0.7–1.0 (S)		1.7–2.1		–		–		–	–	0.8–1.2		–		b	
annual ryegrass	70 h		–	0.7–1.0 (S)		0.83–1.25 m		1.7 or 2.2		–		–	–	0.8–1.2		2.0–3.0		b	
barley grass	70 h		–	–		1.7–2.1		(S)		–		–	–	–		–		–	
brome grass	–		–	–		1.7–2.1		(S) f		–		–	–	–		–		–	
capeweed	70–100		–	–		1.7–2.1		1.7 or 2.2		0.28–0.58		1.5–2.0	1.0–1.5	–		–		–	
canola – volunteer	–		–	–		1.7–2.1 g		–		–		–	–	–		–		–	
cereals	–		–	–		–		–				–	–	–		–		–	
corn gromwell	–		–	0.7–1.0		1.7–2.1		–		–		–	–	–		–		–	
crassula	–		–	–		–		1.7 or 2.2		–		1.5–2.0	1.0–1.5	–		–		–	
deadnettle	70		–	0.7–1.0		1.7–2.1		1.7 or 2.2		0.28–0.58		–	–	–		–		–	
fumitory	–		–	–		1.7–2.1		(S)		–		–	–	–		–		–	
goosefoot – purple	–		–	–		–		–		–		–	–	–		–		–	
lettuce – prickly	70–100		–	0.7–1.0		–		1.7 or 2.2		–		–	–	–		–		–	
medics	–		–	0.7–1.0		1.7–2.1		–		–		–	–	–		–		–	
mustards	70 t		–	0.7–1.0		1.7–2.1		1.7 or 2.2		0.28–0.58		–	–	–		–		–	
Paterson's curse	70		–	–		–		–		–		–	–	–		–		–	
radish – wild	70 i (S)		1.0–1.4 (S)	0.7–1.0 (S)		–		(S)		0.28–0.58		1.5–2.0	1.0–1.5	–		–		–	
rough poppy	–		–	–		–		1.7 or 2.2		0.28–0.58		–	–	–		–		–	
saffron thistle	–		–	–		1.7–2.1		–		–		–	–	–		–		–	
shepherds purse	70		–	0.7–1.0		–		–		0.28–0.58		–	–	–		–		–	
soursob	–		–	–		1.7–2.1		–		–		–	–	–		–		–	
sowthistle	–		–	0.7–1.0		–		1.7 or 2.2		0.28–0.58		–	–	–		–		–	
spiny emex	70		1.0–1.4 (S)	0.7–1.0 (S)		–		1.7 or 2.2		0.28–0.58		1.5–2.0	1.0–1.5	–		–		–	
toad rush	70		–	0.7–1.0		–		–		0.28–0.58		1.5–2.0	1.0–1.5	–		–		–	
turnip weed	70		–	0.7–1.0		–		1.7 or 2.2		–		–	–	–		–		–	
vulpia	–		–	–		–		–		–		–	–	–		2.0–3.0 (S)		–	
wild oats	70 h		–	0.7–1.0 (S)		0.83–1.25 m (S)		–		–		–	–	0.8–1.2 b		2.0–3.0 (S)		1.6	
wild turnip	–		–	0.7–1.0		–		1.7 or 2.2		0.28–0.58		1.5–2.0	1.0–1.5	–		–		–	
winter grass	–		–	–		–		–		0.28–0.58		–	–	–		–		–	
wireweed	70		–	0.7–1.0		1.7–2.1		(S)		0.28–0.58		–	–	0.8–1.2		2.0–3.0		b	
Rec water L/ha boom	50–100		50 min			50–100		80–200		50–100		–	–	70–450		50–200		30–100	
Herbicide group/mode	B		C			C		C		C		C	C	D		D		J	

b = Refer to label for details.
c = Metribuzin also available as 750 g/kg formulation, see label for rates.
d = Diuron 900 DF is also registered. See label for rates.
e = 440 g/L pendimethalin also available.
f = Great brome only.
g = Not TT canola volunteers.
h = Eight weeks suppression of grass weeds. For full control a specific grass herbicide may be required.
i = Adequate control may not be obtained under high weed pressure or high rainfall.
m = Where ryegrass, wild phalaris,wireweed or wild oats are the major problem use tankmix of 1–1.5 L Gesatop® + 0.8 L trifluralin 480/ha and incorporate prior to sowing.
t = Indian hedge mustard
(S) = Suppression only.
◆ = See *What's new in 2014* on page 3.

Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergent.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 23. Herbicides for weed control for faba bean and lentil – Post-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	FluazifopP 128 g/L **Fusilade® Forte** Faba bean only	Haloxyfop-R 520 g/L **Verdict™ 520**	Quizalofop-p-ethyl 200 g/L **Elantra® Xtreme®**	Butroxydim 250 g/kg **Factor® WG**	Clethodim 240 g/L **Status®**	Propaquizafop 100 g/L **Shogun®**	Flumetsulam 800 g/kg **Broadstrike™** Lentil only	Diflufenican 500 g/L **Brodal® Options** Lentil only
Apply at crop growth stage	–	2 Leaf to flowering	Lentils and Faba beans up until 12 weeks before harvest	–	Faba – Not beyond full flowering Lentil – Up to 7 Node–Early branching	Any time until 7 weeks before harvest	4–8 Leaf	3 Leaf to flowering
Weeds controlled	(litres)	(litres)	(litres)	(grams)	(litres)	(litres)	(grams)	(litres)
amsinckia	–	–	–	–	–	–	25	0.2 (S)
annual phalaris	0.41	0.05–0.1	–	80–180	0.15–0.5 p	–	–	–
annual ryegrass	0.41	0.075–0.1	0.15 or 0.19	80–180	0.15–0.5	0.45	–	–
barley grass	0.41	0.05–0.1	0.125	80–180	0.175–0.5	0.2	–	–
brome grass	0.5	0.05–0.1	0.15 or 0.19	80–180	0.175–0.5	0.3	–	–
capeweed	–	–	–	–	–	–	–	0.2 (S)
canola – volunteer	–	–	–	–	–	–	25 a	–
cereals	0.41	0.05–0.1	0.125	80–180	0.2–0.5 j	0.2 n	–	–
corn gromwell	–	–	–	–	–	–	–	0.2 (S)
deadnettle	–	–	–	–	–	–	–	0.2
fumitory	–	–	–	–	–	–	–	–
goosefoot – purple	–	–	–	–	–	–	–	–
lettuce – prickly	–	–	–	–	–	–	–	0.2
medics	–	–	–	–	–	–	–	–
mustards	–	–	–	–	–	–	25	0.15–0.2
Paterson's curse	–	–	–	–	–	–	–	0.2 (S)
radish – wild	–	–	–	–	–	–	25 (S)	0.2
rough poppy	–	–	–	–	–	–	–	0.2 (S)
saffron thistle	–	–	–	–	–	–	–	–
shepherds purse	–	–	–	–	–	–	25	0.2 (S)
soursob	–	–	–	–	–	–	–	–
sowthistle	–	–	–	–	–	–	–	–
spiny emex	–	–	–	–	–	–	–	–
toad rush	–	–	–	–	–	–	–	0.2 (S)
turnip weed	–	–	–	–	–	–	25	0.2
vulpia	–	–	–	–	0.25–0.5 (S)	–	–	–
wild oats	0.41	0.0375–0.1 f	0.065 or 0.125	80–180	0.175–0.5	0.25	–	–
wild turnip	–	–	–	–	–	–	25	0.15–0.2
winter grass	–	–	–	–	–	–	–	–
wireweed	–	–	–	–	–	–	–	0.2 (S)
Rec water L/ha boom	50–100	50–150	50–150	50 min	50 min	30–150	50–150	70–100
Herbicide group/mode	A	A	A	A	A	A	B	F

Add Uptake™ spraying oil at 0.5 L/100 L water. Use a minimum of 250 mL/ha Uptake™ or other oils at 1 L + wetter/100 L spray. Asset® (130 g/L product) also available.

Add non-ionic surfactant at 200 mL/100 L or non-ionic surfactant at 100 mL/100 L + mineral spray oil at 1 L/100 L or Hasten™ at 1 L/100 L. See label.

Factor® has good activity on barley grass and wild oats but weaker on brome grass and volunteer cereals. Adding a fop herbicide is recommended. See label.

Add 2 L D-C-Tate® or 1 L Hasten™ or Kwickin™ or 0.5 L Uptake™ oil/100 L spray. Use lower rate on small actively growing weeds. Do not apply to lentil after the 7 node early-branching crop stage.

Always add either BS1000® at 200 mL/100 L water or Hasten™ or Kwickin™ at 500 mL/100 L spray. Can be tankmixed with Sertin® to broaden grass spectrum and improve control. See label.

Avoid spray overlap. Not on Northfield variety.

a = Not Clearfield canola volunteers.
e = Volunteer oats and wheat only.
f = Use 0.0375–0.075 L/ha in southern and central NSW and 0.05–0.1 L/ha in northern NSW.
j = Use higher rate on volunteer barley.
n = Volunteer triticale 0.25 L/ha.
p = Use higher rate on *Phalaris paradoxa.*
u = Volunteer wheat, barley and oats only.
(S) = Suppression only.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Sensitivity to herbicides in winter crop varieties

Some winter crop varieties are more susceptible than others to damage from certain herbicides. Small yield reductions to sensitive varieties caused by herbicide damage may not be easily detected but over large areas can be costly.

Symptoms of crop damage from herbicides do not always lead to lost yield but it is still important to recognise these signs to try and prevent future problems occurring.

For descriptions and pictures of herbicide injury see *Field crop herbicide injury: the Ute Guide* available form the GRDC Bookshop at www.grdc.com.au/Resources/Bookshop/2002/01/Field-Crop-Herbicide-Injury-The-Ute-Guide

In NSW, winter crop varieties are tested for herbicide tolerance at the Wagga Wagga Agricultural Institute. The testing is supported by the Grains Research and Development Corporation and is part of a National Herbicide Tolerance Program.

Results from the NSW program and other States are available from the National Variety Trials website. www.nvtonline.com.au

Tolerance testing methodology

Trial sites are chosen and managed to ensure:

- Minimal weed competition so that herbicide responses are due to varietal sensitivity rather than competitiveness with weeds.
- Representative and uniform soil types within each Australian region.

Trial assessments include:

- Visual observations 2 to 3 weeks after herbicide application and again (2–3 weeks later) or as appropriate.
- Normalised Difference Vegetative Index (NDVI) measurements using a Greenseeker™ approximately 21–30 days after treatment.
- Grain Yield and Climatic data.

Preliminary Evaluation (PE) trials

Wheat and barley lines continuing beyond the first year of National Variety Trials (NVT) are automatically eligible for inclusion in the first stage of cultivar tolerance evaluation, namely Preliminary Evaluation (PE) Trials. Within these trials, commonly used and often damaging herbicides/ tank mixes are applied at high rates in order to highlight cultivar sensitivities.

Within PE trials;

- Treatments are evaluated within very small plot or single row experiments,
- Herbicides/ tank mixes are selected according to the Herbicide Selection Protocol,
- Each cultivar X herbicide combination is evaluated across two seasons, unless the cultivar is discarded by the breeder after year one.
- Any herbicide/cultivar combination that incurs a significant yield penalty in at least one year of trial is progressed to Advanced Evaluation (AE) trials,
- If a herbicide/cultivar combination does not incur yield loss in either of the two seasons of PE testing it is given a safe rating.

Advanced Evaluation (AE) trials

This second stage of evaluation aims to validate and supplement results from PE trials with data on tolerance and safety margins gathered from more detailed experiments.

Within AE trials;

- Treatments are evaluated within replicated, large plot, split strip plot designed experiments,
- Only those herbicide/cultivar combinations which were found damaging within PE trials are evaluated,
- Herbicides are applied at the recommended rate and higher to obtain data on both tolerance at label rates, and safety margin,
- All treatments (cultivar and herbicide) are evaluated across a minimum of two seasons to account for seasonal variation in cultivar response.

Note: Within the pulse, oat and triticale species only AE trials are implemented. Within these trials cultivar selection is based on collaboration with breeders, and herbicide selection is based on discussions with regional agronomists, farmers and herbicide manufacturers.

Herbicide selection protocol

In making the choice of herbicides used in trials, consideration is given to;

1. Existing and widely used herbicides/tank mixtures with known variation in crop/cultivar safety
2. New or previously untested herbicides, New Chemistry trials allow for evaluation of a group of commonly grown varieties, to be tested against new or upcoming herbicides. If a new herbicide is found to be damaging AND there is expected to be significant farmer use, the herbicide is progressed to preliminary evaluation trials.

Results tables

The sensitivity of the variety compared to unsprayed controls of the same variety is summarised in results tables, using the following symbols based on the yield responses across all trials:

– not tested or insufficient data.

√ no significant yield reductions at higher than recommended rates in (z) trials.

N (w/z) narrow margin, significant yield reductions at higher than recommended rate, but not at recommended rate. Significant event occurring w years out of z years tested. Eg. (2/5) = tested for 5 years, 2 returning a significant yield loss.
x% **(1/z)** yield reduction (warning) significant yield reduction at recommended rate in 1 trial only in z years of testing.
x-y% **(w/z)** yield reductions (warning) significant yield reductions at recommended rate in w years out of z years tested.

Research site manager: Peter Lockley, NSW DPI
Research site location: Wagga Wagga, New South Wales
Site soil type : Red Brown earth
Site pH : 4.3–4.5
Site annual average rainfall: 523 mm

Acknowledgements

GRDC
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Your GRDC working with you

Table 24. Wheat variety response to herbicides Preliminary Evaluation trials 2008–2012

Herbicide		TriflurX® IBS Trifluralin 480	Boxer Gold® IBS S-Metolachlor	Achieve® Tralkoxydim	Ally® Metsulfuron-methyl	Affinity® + MCPA Carfentrazone + MCPA	Axial® Minoxaden	Glean® Chlorsulfuron	Wildcat® Fenoxaprop-p-ethyl	Hussar® Iodosulfuron-methyl-sodium	Banvel M® MCPA + Dicamba
Variety	Years Tested	2008–2012	2009–2012	2008–2012	2008–2012	2009–2012	2009–2012	2008–2012	2008–2012	2009–2012	2008–2012
AXE	2008–2012	✓(1/5)	N(1/4)	N(1/5)	N(2/5)	N(1/4)	N(1/4)	N(1/5)	N(1/5)	N(1/4)	N(4/5)
BARHAM	2010–2012	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)
BOLAC	2008–2012	N(2/5)	N(1/4)	N(1/5)	✓(5)	N(1/4)	✓(4)	✓(5)	N(2/5)	N(1/4)	N(2/5)
BOUNTY	2012	N(1/1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)
CAPAROI	2010–2012	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	N(2/3)	✓(3)	N(1/3)	✓(3)
CHARA	2010–2012	N(1/3)	N(1/3)	✓(3)	✓(3)	N(1/3)	N(1/3)	✓(3)	✓(3)	✓(3)	N(1/3)
CORACK	2011–2012	N(1/2)	N(1/2)	✓(2)	N(1/2)	N(1/2)	✓(2)	✓(2)	✓(2)	N(1/2)	N(1/2)
CORRELL	2010–2012	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	N(1/3)	✓(3)	N(1/3)
EGA BELLAROI	2008–2012	N(1/5)	N(1/4)	N(1/5)	N(2/5)	N(1/4)	✓(4)	✓(5)	N(2/5)	N(1/4)	✓(5)
EGA BOURKE	2008–2012	N(1/5)	N(1/4)	N(1/5)	N(1/5)	✓(4)	✓(4)	N(1/5)	N(1/5)	N(1/4)	N(5/5)
EGA GREGORY	2008–2010	✓(3)	N(1/2)	N(1/3)	N(1/3)	✓(2)	✓(2)	N(1/3)	N(1/3)	N(1/2)	N(2/3)
EGA STAMPEDE	2010–2012	N(2/3)	✓(3)	✓(3)	N(2/3)	✓(3)	✓(3)	N(2/3)	✓(3)	N(1/3)	N(1/3)
EGA WYLIE	2008–2012	N(2/5)	N(1/4)	✓(5)	✓(5)	✓(4)	✓(4)	N(3/5)	N(1/5)	N(1/4)	N(2/5)
ELLISON	2008–2012	N(1/5)	N(1/4)	✓(5)	N(2/5)	✓(4)	✓(4)	✓(5)	N(1/5)	N(1/4)	N(2/5)
ELMORE CL PLUS	2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)
EMU ROCK	2011–2012	N(2/2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	N(1/2)
ESPADA	2008–2012	N(3/5)	N(1/4)	N(2/5)	N(2/5)	✓(4)	N(1/4)	N(2/5)	✓(5)	N(1/4)	N(3/5)
ESTOC	2010–2012	N(1/3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)
FORREST	2011–2012	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	N(1/2)	✓(2)	✓(2)	N(1/2)
GASCOIGNE	2011–2012	N(2/2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	N(1/2)	N(1/2)	N(2/2)
GBA RUBY	2010–2012	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)
GLADIUS	2008–2012	✓(5)	N(1/4)	N(2/5)	N(2/5)	N(1/4)	N(1/4)	N(1/5)	N(1/5)	✓(4)	N(3/5)
GREGORY	2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)
GRENADE CL PLUS	2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)
HYPERNO	2010–2012	✓(4)	✓(4)	✓(4)	N(1/4)	✓(4)	✓(4)	✓(4)	✓(4)	✓(4)	N(1/4)
JANDAROI	2010–2012	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	N(1/3)	N(2/3)	N(1/3)	N(1/3)	N(1/3)
JANZ	2008–2012	✓(3)	N(1/2)	N(2/3)	N(1/3)	N(1/2)	✓(2)	✓(3)	N(1/3)	N(1/2)	N(2/3)
JUSTICA CL PLUS	2011–2012	N(2/2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	N(1/2)	✓(2)	✓(2)	N(2/2)
KORD CL PLUS	2011–2012	N(2/2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	N(2/2)
LANG	2010–2012	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	N(1/3)
LIVINGSTON	2008–2012	N(2/5)	N(1/4)	✓(5)	N(2/5)	✓(4)	✓(4)	✓(5)	N(2/5)	N(1/4)	N(5/5)
LRPB CRUSADER	2008–2012	✓(5)	N(1/4)	✓(5)	N(2/5)	N(1/4)	✓(4)	✓(5)	✓(5)	N(1/4)	N(3/5)
LRPB DAKOTA	2008–2012	N(2/5)	N(1/4)	✓(5)	N(1/5)	✓(4)	✓(4)	N(1/5)	✓(5)	N(1/4)	N(3/5)
LRPB DART	2011–2012	N(1/2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)
LRPB GAUNTLET	2010–2012	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)
LRPB GAZELLE	2010–2012	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)
LRPB IMPALA	2009–2012	N(3/4)	N(1/4)	N(1/4)	N(2/4)	✓(4)	✓(4)	N(2/4)	✓(4)	N(2/4)	N(2/4)
LRPB LINCOLN	2008–2012	N(1/5)	N(1/4)	✓(5)	N(1/5)	✓(4)	✓(4)	N(1/5)	✓(5)	✓(4)	N(2/5)
LRPB MAGENTA	2010–2012	✓(3)	N(1/3)	✓(3)	N(2/3)	N(1/3)	N(1/3)	✓(3)	✓(3)	N(1/3)	N(2/3)
LRPB MERLIN	2010–2012	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)	N(2/3)
LRPB PHANTOM	2011	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)
LRPB SCOUT	2011–2012	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	N(1/2)
LRPB SPITFIRE	2009–2012	N(1/3)	N(2/3)	✓(3)	N(2/3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)
MERINDA	2008–2012	N(3/5)	N(1/4)	✓(5)	N(1/5)	✓(4)	✓(4)	✓(5)	✓(5)	N(1/4)	N(3/5)
NAPAROO	2008–2009	✓(2)	✓(1)	✓(2)	✓(2)	✓(1)	✓(1)	✓(2)	✓(2)	✓(1)	N(1/2)
ORION	2009–2012	N(2/4)	N(2/4)	✓(4)	N(2/4)	✓(4)	✓(4)	N(2/4)	✓(4)	N(1/4)	N(2/4)
PEAKE	2008–2012	N(1/5)	N(1/4)	N(1/5)	N(2/5)	✓(4)	N(1/4)	✓(5)	N(1/5)	N(1/4)	✓(5)
SHIELD	2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)
STREZELECKI	2008–2012	N(1/3)	N(1/2)	✓(3)	✓(3)	✓(2)	✓(2)	✓(3)	✓(3)	✓(2)	N(2/3)
SUNCO	2010–2012	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	N(1/3)	✓(3)	N(2/3)
SUNGUARD	2009–2012	N(1/4)	N(1/4)	✓(4)	✓(4)	✓(4)	✓(4)	✓(4)	✓(4)	N(2/4)	N(1/4)
SUNSTATE	2010–2012	✓(3)	N(1/3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	N(1/3)	N(2/3)
SUNTOP	2011–2012	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)
SUNVALE	2010–2012	✓(3)	✓(3)	✓(3)	N(2/3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)	N(2/3)
SUNVEX	2008–2012	✓(5)	N(1/4)	✓(5)	N(2/5)	✓(4)	✓(4)	✓(5)	✓(5)	✓(4)	N(3/5)
SUNZELL	2010–2012	N(1/3)	✓(3)	✓(3)	N(1/3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	N(1/3)
VENTURA	2008–2012	✓(5)	N(1/4)	✓(5)	N(1/5)	N(1/4)	N(1/4)	✓(5)	N(1/5)	N(1/4)	N(2/5)
WAAGAN	2008–2012	N(1/3)	N(2/2)	✓(3)	✓(3)	✓(2)	✓(2)	N(1/3)	✓(3)	✓(2)	N(2/3)
WAKELIN	2011–2012	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)
WALLUP	2011–2012	N(1/2)	✓(2)	✓(2)	N(1/2)	N(1/2)	✓(2)	N(1/2)	✓(2)	N(1/2)	N(1/2)
WEDGETAIL	2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)
YENDA	2008–2012	N(1/5)	N(1/4)	✓(5)	✓(5)	✓(4)	✓(4)	✓(5)	✓(5)	✓(4)	✓(5)
YITPI	2008–2012	N(1/5)	N(1/4)	✓(5)	N(1/5)	N(3/4)	✓(4)	✓(5)	N(1/5)	N(1/4)	N(3/5)
YOUNG	2008–2009	✓(2)	N(1/1)	✓(2)	✓(2)	✓(1)	✓(1)	✓(2)	✓(2)	✓(1)	N(1/2)
Rates (Product/ha)		3.0 L	5.0 L	0.76 kg	14 g	120g + 1.0 L	600 ml	40 g	1.0 L	400 g	3.4 L
Crop stage at application		IBS	IBS	3 L	3-leaf	3-leaf	3 L	3-leaf	4 L	3-leaf	5-leaf

Table 24. Wheat variety response to herbicides Preliminary Evaluation trials 2008–2012 (continued)

Herbicide		Tigrex® Diflufenican + MCPA	Amicide 625® 2,4-D Amine	Logran® IBS Triasulfuron	Tordon 242® Picloram + MCPA	Hoegrass® Diclofop-methyl	Eclipse® + LVE MCPA Metosulam + LVE MCPA	Diuron + MCPA Diuron + MCPA	Bromicide® Bromoxynil	Broadstrike® + Buctril 200 Flumetsulam + Bromoxynil	Mataven® SST Flamprop-methyl
Variety	Years Tested	2008–2012	2008–2012	2008–2009	2008–2009	2008	2008–2009	2008	2008	2008	2008
AXE	2008–2012	✓(5)	N(2/5)	N(1/2)	N(2/2)	N(1/1)	N(1/2)	✓(1)	✓(1)	✓(1)	N(1/1)
BARHAM	2010–2012	✓(3)	N(1/3)	–	–	–	–	–	–	–	–
BOLAC	2008–2012	N(1/5)	N(3/5)	✓(2)	N(1/2)	✓(1)	N(1/2)	✓(1)	✓(1)	✓(1)	N(1/1)
BOUNTY	2012	✓(1)	N(1/1)	–	–	–	–	–	–	–	–
CAPAROI	2010–2012	✓(3)	✓(3)	–	–	–	–	–	–	–	–
CHARA	2010–2012	N(1/3)	✓(3)	–	–	–	–	–	–	–	–
CORACK	2011–2012	✓(2)	✓(2)	–	–	–	–	–	–	–	–
CORRELL	2010–2012	✓(3)	N(1/3)	–	–	–	–	–	–	–	–
EGA BELLAROI	2008–2012	✓(5)	✓(5)	N(1/2)	N(2/2)	✓(1)	✓(2)	✓(1)	✓(1)	✓(1)	N(1/1)
EGA BOURKE	2008–2012	N(1/5)	N(3/5)	N(1/2)	N(2/2)	✓(1)	N(2/2)	✓(1)	✓(1)	✓(1)	✓(1)
EGA GREGORY	2008–2010	N(2/3)	N(2/3)	N(1/2)	✓(2)	N(1/1)	✓(2)	✓(1)	✓(1)	✓(1)	N(1/1)
EGA STAMPEDE	2010–2012	✓(3)	N(1/3)	–	–	–	–	–	–	–	–
EGA WYLIE	2008–2012	N(1/5)	N(2/5)	N(1/2)	✓(2)	✓(1)	N(1/2)	✓(1)	✓(1)	✓(1)	N(1/1)
ELLISON	2008–2012	N(2/5)	N(2/5)	✓(2)	N(1/2)	N(1/1)	✓(2)	N(1/1)	✓(1)	✓(1)	N(1/1)
ELMORE CL PLUS	2012	✓(1)	✓(1)	–	–	–	–	–	–	–	–
EMU ROCK	2011–2012	✓(2)	✓(2)	–	–	–	–	–	–	–	–
ESPADA	2008–2012	✓(5)	N(1/5)	✓(2)	✓(2)	✓(1)	✓(2)	✓(1)	✓(1)	✓(1)	N(1/1)
ESTOC	2010–2012	N(1/3)	✓(3)	–	–	–	–	–	–	–	–
FORREST	2011–2012	N(1/2)	N(1/2)	–	–	–	–	–	–	–	–
GASCOIGNE	2011–2012	N(1/2)	N(1/2)	–	–	–	–	–	–	–	–
GBA RUBY	2010–2012	✓(3)	✓(3)	–	–	–	–	–	–	–	–
GLADIUS	2008–2012	N(2/5)	N(2/5)	✓(2)	N(1/2)	N(1/1)	✓(2)	N(1/1)	✓(1)	✓(1)	N(1/1)
GREGORY	2012	✓(1)	✓(1)	–	–	–	–	–	–	–	–
GRENADE CL PLUS	2012	✓(1)	N(1/1)	–	–	–	–	–	–	–	–
HYPERNO	2010–2012	✓(4)	✓(4)	–	–	–	–	–	–	–	–
JANDAROI	2010–2012	N(1/3)	N(2/3)	–	–	–	–	–	–	–	–
JANZ	2008–2012	✓(3)	N(1/3)	✓(2)	✓(2)	N(1/1)	✓(2)	✓(1)	✓(1)	✓(1)	✓(1)
JUSTICA CL PLUS	2011–2012	N(1/2)	N(1/2)	–	–	–	–	–	–	–	–
KORD CL PLUS	2011–2012	✓(2)	N(1/2)	–	–	–	–	–	–	–	–
LANG	2010–2012	✓(3)	N(1/3)	–	–	–	–	–	–	–	–
LIVINGSTON	2008–2012	N(2/5)	N(2/5)	✓(2)	N(1/2)	N(1/1)	✓(2)	✓(1)	✓(1)	✓(1)	✓(1)
LRPB CRUSADER	2008–2012	N(1/5)	N(2/5)	✓(2)	N(1/2)	✓(1)	N(1/2)	N(1/1)	✓(1)	✓(1)	✓(1)
LRPB DAKOTA	2008–2012	✓(5)	N(1/5)	✓(2)	✓(2)	✓(1)	✓(2)	✓(1)	✓(1)	✓(1)	N(1/1)
LRPB DART	2011–2012	✓(2)	✓(2)	–	–	–	–	–	–	–	–
LRPB GAUNTLET	2010–2012	N(1/3)	N(1/3)	–	–	–	–	–	–	–	–
LRPB GAZELLE	2010–2012	✓(3)	N(1/3)	–	–	–	–	–	–	–	–
LRPB IMPALA	2009–2012	N(1/4)	N(1/4)	✓(1)	✓(1)	–	✓(1)	–	–	–	–
LRPB LINCOLN	2008–2012	N(1/5)	N(1/5)	✓(2)	N(1/2)	N(1/1)	N(2/2)	✓(1)	✓(1)	✓(1)	N(1/1)
LRPB MAGENTA	2010–2012	N(1/3)	N(1/3)	–	–	–	–	–	–	–	–
LRPB MERLIN	2010–2012	N(3/3)	N(2/3)	–	–	–	–	–	–	–	–
LRPB PHANTOM	2011	✓(1)	✓(1)	–	–	–	–	–	–	–	–
LRPB SCOUT	2011–2012	✓(2)	✓(2)	–	–	–	–	–	–	–	–
LRPB SPITFIRE	2009–2012	✓(3)	N(1/3)	✓(1)	✓(1)	–	✓(1)	–	–	–	–
MERINDA	2008–2012	N(2/5)	N(2/5)	✓(2)	✓(2)	✓(1)	N(1/2)	N(1/1)	✓(1)	✓(1)	N(1/1)
NAPAROO	2008–2009	✓(2)	✓(2)	✓(2)	✓(2)	✓(1)	✓(2)	✓(1)	✓(1)	✓(1)	N(1/1)
ORION	2009–2012	✓(4)	N(1/4)	✓(1)	✓(1)	–	✓(1)	–	–	–	–
PEAKE	2008–2012	N(1/5)	✓(5)	N(1/2)	✓(2)	N(1/1)	N(2/2)	N(1/1)	✓(1)	✓(1)	N(1/1)
SHIELD	2012	✓(1)	✓(1)	–	–	–	–	–	–	–	–
STREZELECKI	2008–2012	✓(3)	N(1/3)	N(1/2)	N(1/2)	✓(1)	✓(2)	✓(1)	✓(1)	✓(1)	✓(1)
SUNCO	2010–2012	✓(3)	✓(3)	–	–	–	–	–	–	–	–
SUNGUARD	2009–2012	✓(4)	N(2/4)	✓(1)	✓(1)	–	✓(1)	–	–	–	–
SUNSTATE	2010–2012	✓(3)	✓(3)	–	–	–	–	–	–	–	–
SUNTOP	2011–2012	✓(2)	✓(2)	–	–	–	–	–	–	–	–
SUNVALE	2010–2012	✓(3)	N(1/3)	–	–	–	–	–	–	–	–
SUNVEX	2008–2012	✓(5)	✓(5)	N(1/2)	✓(2)	N(1/1)	✓(2)	✓(1)	✓(1)	✓(1)	N(1/1)
SUNZELL	2010–2012	N(1/3)	N(2/3)	–	–	–	–	–	–	–	–
VENTURA	2008–2012	N(2/5)	✓(5)	✓(2)	N(2/2)	✓(1)	N(1/2)	✓(1)	✓(1)	✓(1)	N(1/1)
WAAGAN	2008–2012	N(2/3)	N(1/3)	N(1/2)	✓(2)	N(1/1)	N(1/2)	N(1/1)	N(1/1)	✓(1)	✓(1)
WAKELIN	2011–2012	N(1/2)	✓(2)	–	–	–	–	–	–	–	–
WALLUP	2011–2012	N(2/2)	N(1/2)	–	–	–	–	–	–	–	–
WEDGETAIL	2012	✓(1)	✓(1)	–	–	–	–	–	–	–	–
YENDA	2008–2012	N(1/5)	✓(5)	✓(2)	✓(2)	N(1/1)	N(1/2)	✓(1)	✓(1)	✓(1)	N(1/1)
YITPI	2008–2012	✓(5)	N(2/5)	✓(2)	✓(2)	✓(1)	✓(2)	N(1/1)	✓(1)	✓(1)	N(1/1)
YOUNG	2008–2009	N(1/2)	✓(2)	✓(2)	N(1/2)	✓(1)	N(1/2)	N(1/1)	✓(1)	✓(1)	N(1/1)
Rates (Product/ha)		1.5 L	3.4 L	70 g	2.0 L	4.0 L	10 g + 1.0 L	1.0 L + 1.0 L	4 L	40 g + 1.4 L	4.5 L
Crop stage at application		5-leaf	5-6 L	IBS	5 L	4-5 L	3-leaf	3-leaf	3 L	5-leaf	spray-top

Table 25. Wheat variety response to herbicides – Advanced Evaluation trials 2010–2012

Herbicide		TriflurX® IBS Trifluralin 480	Boxer Gold® IBS S-Metolachlor	Achieve® Tralkoxydim	Ally® Metsulfuron-methyl	Affinity® + MCPA Carfentrazone + MCPA	Axial® Pinoxaden	Glean® Chlorsulfuron	Wildcat® Fenoxaprop-p-ethyl	Hussar® Iodosulfuron-methyl-sodium	Banvel M® MCPA + Dicamba	Tigrex® Diflufenican + MCPA	Amicide 625® 2,4-D Amine
Variety	Years Tested	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012
AXE	2010–2012	✓(1)	✓ (2)	N(1/2)	✓ (2)	✓(1)	✓(1)	✓(1)	✓(2)	N(1/2)	10(1/3)	–	N(1/2)
BARHAM	2011–2012	–	–	–	✓(2)	–	–	–	–	–	–	–	–
BOLAC	2010–2012	✓(1)	✓(2)	✓(2)	–	✓(1)	–	–	✓(3)	✓(2)	✓(2)	N(1/2)	6(1/2)
CAPAROI	2011–2012	–	–	–	✓(2)	–	–	N(1/2)	–	✓(2)	–	–	–
CORACK	2012	–	–	–	–	–	–	–	–	✓(1)	–	–	–
DIAMONDBIRD	2010–2012	–	✓(2)	–	–	N(1/2)	✓(2)	–	✓(2)	✓(2)	–	–	–
EGA BELLAROI	2010–2012	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	–	–	✓(2)	–	–	–	–
EGA BURKE	2010–2012	✓(1)	✓(2)	✓(2)	✓(2)	–	–	N(2/2)	✓(1)	✓(2)	9(1/3)	✓(3)	9(1/3)
EGA GREGORY	2010–2012	–	✓(2)	✓(3)	8(1/3)	–	–	9–11(2/3)	✓(3)	N(1/3)	N(2/3)	14(1/3)	12(1/3)
ELLISON	2010–2012	✓(2)	✓(2)	–	✓(3)	–	–	–	✓(2)	N(1/2)	N(1/2)	✓(2)	N(1/2)
EMU ROCK	2012	✓(1)	–	–	–	–	–	–	–	–	–	–	–
ESPADA	2010–2012	✓(1)	✓(2)	–	✓(2)	–	✓(3)	✓(2)	–	–	N(1/1)	–	–
ESTOC	2012	✓(1)	–	–	✓(1)	–	–	–	–	–	–	✓(1)	–
FORREST	2012	–	–	–	–	–	–	–	–	–	–	✓(1)	–
GASCOIGNE	2012	✓(1)	–	–	✓(1)	–	–	–	–	–	N(1/1)	✓(1)	–
GAZELLE	2011–2012	–	–	–	✓(2)	–	–	–	–	24(1/2)	–	–	✓(2)
GLADIUS	2010–2012	–	✓(2)	N(1/2)	6(1/2)	✓(3)	✓(2)	5–11(2/2)	✓(2)	–	9(1/2)	✓(3)	✓(2)
HYPERNO	2011–2012	–	–	–	–	–	–	–	–	–	✓(2)	–	–
JANDAROI	2011–2012	–	–	–	6(1/2)	–	✓(1)	6(1/2)	✓(2)	✓(2)	✓(2)	✓(1)	✓(2)
JUSTICA CL PLUS	2012	✓(1)	–	–	–	✓(1)	–	–	–	–	19(1/1)	✓(1)	–
KORD CL PLUS	2012	✓(1)	–	–	–	–	–	–	–	–	20(1/1)	–	–
LIVINGSTON	2010–2012	✓(3)	✓(2)	–	6(1/2)	–	–	–	✓(3)	✓(2)	N(1/3)	10(1/2)	N(1/3)
LPB CRUSADER	2012	–	–	–	–	✓(1)	–	–	–	–	–	–	–
LPB DAKOTA	2012	✓(1)	–	–	✓(1)	–	–	–	–	✓(1)	N(1/1)	–	–
LPRB GAUNTLET	2012	–	–	–	✓(1)	✓(1)	✓(1)	–	✓(1)	–	N(1/1)	✓(1)	✓(1)
LRPB CRUSADER	2010–2012	–	✓(2)	–	✓(2)	✓(1)	–	–	✓(2)	13(1/2)	N(1/2)	✓(2)	✓(2)
LRPB DAKOTA	2010–2012	7(1/3)	✓(2)	–	✓(2)	N(1/2)	✓(2)	12(1/2)	✓(2)	✓(2)	N(2/3)	10(1/2)	8(1/2)
LRPB DART	2012	✓(1)	–	–	–	–	–	–	–	–	–	–	–
LRPB GAUNTLET	2011	–	–	–	✓(1)	–	–	–	–	–	–	–	–
LRPB IMPALA	2010–2012	✓(1)	✓(2)	–	✓(1)	–	–	✓(1)	–	✓(2)	–	–	–
LRPB LINCOLN	2010–2012	✓(1)	6(1/2)	–	N(1/2)	✓(1)	–	N(2/2)	✓(3)	–	N(2/3)	10(1/3)	5(1/3)
LRPB MAGENTA	2011–2012	–	✓(1)	–	✓(2)	–	✓(1)	–	–	✓(2)	N(2/2)	✓(1)	9(1/2)
LRPB MERLIN	2012	✓(1)	–	–	–	–	–	–	–	–	N(1/1)	✓(1)	–
LRPB PHANTOM	2012	–	–	–	–	–	–	–	–	–	N(1/1)	–	–
LRPB SCOUT	2012	–	–	–	✓(1)	–	–	–	N(1/1)	–	–	–	–
LRPB SPITFIRE	2010–2012	–	✓(2)	–	–	–	–	–	–	–	–	–	–
MERINDA	2010–2012	✓(3)	✓(2)	–	N(1/2)	–	–	–	✓(2)	✓(2)	8(1/2)	N(1/2)	✓(2)
PEAKE	2010–2012	6(1/2)	✓(2)	✓(2)	N(1/2)	–	✓(1)	–	✓(2)	✓(2)	–	✓(2)	–
STREZELECKI	2010–2012	–	–	✓(2)	✓(2)	–	✓(2)	N(1/2)	–	✓(3)	–	–	N(1/2)
SUNGUARD	2011–2012	✓(1)	–	–	–	–	–	–	–	✓(2)	–	–	✓(2)
SUNSTATE	2011–2012	–	✓(1)	–	–	✓(1)	–	–	–	✓(2)	17(1/2)	–	–
SUNTOP	2012	–	–	–	✓(1)	–	–	–	–	–	–	–	–
SUNVALE	2011–2012	–	–	–	✓(2)	–	–	–	–	✓(1)	14(1/2)	–	N(1/2)
SUNVEX	2010–2012	–	✓(2)	–	N(1/2)	–	–	–	✓(1)	–	N(2/3)	✓(3)	✓(1)
SUNZELL	2011–2012	✓(2)	–	–	✓(2)	–	✓(1)	–	–	–	–	✓(2)	✓(2)
VENTURA	2010–2012	–	✓(2)	–	✓(2)	✓(1)	✓(2)	–	✓(1)	✓(3)	N(1/2)	✓(1)	–
WAAGAN	2011–2012	–	–	✓(2)	N(1/2)	–	–	9(1/2)	–	✓(2)	–	–	10(1/2)
WALLUP	2012	–	–	–	✓(1)	✓(1)	–	–	–	–	–	✓(1)	–
YENDA	2010–2012	✓(1)	✓(2)	–	–	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	–	✓(2)	–
YITPI	2010–2012	–	✓(2)	–	✓(2)	✓(3)	–	–	–	–	N(1/2)	–	N(1/2)
Recommended Rates (product/ha)		1.5 L	2.5 L	0.38 kg	7 g	60 g + 0.5 L	300 ml	20 g	0.5 L	200 g	1.7 L	0.75 L	1.7 L
Crop stage at application		IBS	IBS	3 L	3-leaf	3-leaf	3 L	3-leaf	3 L	3-leaf	5-leaf	5-leaf	5-6 L

Table 26. Barley variety response to herbicides Preliminary Evaluation trials 2008–2012

Herbicide		TriflurX® 480 Trifluralin	Achieve WG® Tralkoxydim	Tristar Advance® Diclofop-methyl + Fenoxaprop-p-ethyl	Bromoxynil Bromoxynil	Ally® Metsulfuron	Hotshot® Floroxypyr + Aminopyralid	Glean® Chlorsulfuron	Axial® Pinoxaden	Tigrex® MCPA +Diflufenican	Amicide 625® 2,4-D Amine	Banvel M® Dicamba + MCPA	Tordon 242® Picloram + MCPA
Variety	Years tested	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012
BASS	2009–2012	✓(4)	N(1/4)	N(1/4)	✓(4)	N(1/4)	✓(4)	N(1/4)	✓(4)	✓(4)	N(2/4)	N(1/4)	N(1/4)
BAUDIN	2009–2012	N(1/4)	N(1/4)	N(1/4)	✓(4)	✓(4)	✓(4)	N(1/4)	✓(4)	✓(4)	N(1/4)	✓(4)	✓(4)
BULOKE	2008–2012	N(1/5)	N(1/5)	N(2/5)	N(1/5)	N(1/5)	✓(4)	N(2/5)	✓(4)	✓(5)	N(1/5)	N(1/5)	N(1/5)
COMMANDER	2008–2012	N(2/5)	N(1/5)	✓(5)	N(1/5)	N(2/5)	✓(4)	N(2/5)	✓(4)	✓(5)	✓(5)	N(1/5)	✓(5)
COWABBIE	2009–2012	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)
FAIRVIEW	2009–2012	✓(4)	N(1/4)	N(1/4)	N(1/4)	✓(4)	✓(4)	N(1/4)	N(1/4)	N(1/4)	✓(4)	✓(4)	✓(4)
FATHOM	2011–2012	N(2/2)	N(2/2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	N(1/2)	✓(2)
FINNISS	2010–2012	✓(3)	N(1/3)	✓(3)	N(1/3)	N(1/3)	✓(3)	N(1/3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)
FLEET	2008–2012	✓(5)	N(1/5)	N(1/5)	N(1/5)	N(3/5)	N(1/4)	N(3/5)	N(1/4)	N(3/5)	N(2/5)	N(3/5)	✓(5)
FLINDERS	2011–2012	N(2/2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)
GAIRDNER	2008–2012	N(1/5)	N(1/5)	N(1/5)	✓(5)	N(1/5)	N(1/4)	N(1/5)	✓(4)	N(1/5)	✓(5)	N(1/5)	N(1/5)
GRANGE	2012	N(1/1)	N(1/1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)
HENLEY	2011–2012	N(1/2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)	N(1/2)	✓(2)
HINDMARSH	2008–2012	N(1/5)	N(1/5)	✓(5)	N(1/5)	N(2/5)	✓(4)	N(2/5)	✓(4)	N(1/5)	N(1/5)	N(2/5)	✓(5)
MACQUARIE	2009–2012	N(1/4)	N(1/4)	✓(4)	✓(4)	N(1/4)	N(1/4)	N(2/4)	N(1/4)	✓(4)	✓(4)	✓(4)	✓(4)
NAVIGATOR	2010–2012	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)
OXFORD	2009–2012	N(1/4)	N(1/4)	✓(4)	✓(4)	N(1/4)	✓(4)	N(1/4)	✓(4)	✓(4)	N(2/4)	✓(4)	✓(4)
SCHOONER	2008–2012	✓(5)	N(2/5)	N(1/5)	N(1/5)	N(3/5)	✓(4)	N(1/5)	✓(4)	✓(5)	N(1/5)	N(2/5)	✓(5)
SCOPE	2010–2012	✓(3)	N(1/3)	N(1/3)	✓(3)	N(1/3)	N(1/3)	N(1/3)	✓(3)	✓(3)	✓(3)	N(2/3)	✓(3)
SHEPHERD	2010–2012	✓(3)	N(1/3)	✓(3)	✓(3)	N(1/3)	✓(3)	N(1/3)	✓(3)	✓(3)	N(2/3)	N(2/3)	✓(3)
SKIPPER	2010–2012	N(1/2)	N(1/2)	✓(2)	✓(2)	N(1/2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)
SY RATTLER	2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)	✓(1)	✓(1)	✓(1)
TULLA	2010	✓(1)	N(1/1)	✓(1)	✓(1)	N(1/1)	✓(1)	N(1/1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)
URAMBIE	2008–2012	✓(5)	N(2/5)	✓(5)	N(1/5)	N(1/5)	✓(4)	N(2/5)	N(1/4)	✓(5)	✓(5)	N(1/5)	✓(5)
WESTMINSTER	2011–2012	N(1/2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)
WIMMERA	2010–2012	N(2/3)	N(1/3)	N(1/3)	N(1/3)	✓(3)	N(1/3)	N(1/3)	N(1/3)	N(1/3)	N(2/3)	N(1/3)	N(2/3)
Rates (product/ha)		3.0 L	0.76 kg	3.0 L	4.0 L	10 g	1.5 L	40–50 g	600 ml	1.5 L	2.6 L	2.8–3.4 L	2.0 L
Crop stage at spraying		IBS	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	5-leaf	5-leaf	5-leaf	5-leaf

Table 27. Barley variety response to herbicides Advanced Evaluation trials 2010–2012

Herbicide		Trifluralin	Tralkoxydim	Diclofop-methyl + Fenoxaprop-p-ethyl	Bromoxynil	Metsulfuron	Floroxypyr + Aminopyralid	Cchlorsulfuron	Pinoxaden	MCPA +Diflufenican	2,4-D Amine	Dicamba + MCPA	Picloram + MCPA
Variety	Years tested	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012
BASS	2010–2012	N(1/1)	✓(2)	✓(3)	–	✓(2)	–	✓(2)	–	–	✓(2)	N(1/3)	–
BAUDIN	2010–2012	✓(1)	–	✓(3)	✓(1)	✓(3)	–	✓(2)	–	–	✓(3)	✓(1)	–
BULOKE	2010–2012	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	–	✓(2)	✓(3)	–	✓(3)	✓(3)	7(1/3)
COMMANDER	2010–2012	✓(3)	✓(2)	–	✓(4)	11–11(2/4)	–	19–21(2/4)	–	9(1/3)	✓(4)	✓(4)	11–12(2/4)
COWABBIE	2011	–	–	–	✓(1)	✓(1)	–	–	–	–	–	✓(1)	✓(1)
FAIRVIEW	2011–2012	–	✓(2)	✓(2)	–	–	–	✓(2)	✓(1)	✓(1)	–	–	–
FATHOM	2012	✓(1)	✓(1)	–	–	–	✓(1)	13(1/1)	✓(1)	✓(1)	–	8(1/1)	–
FINNISS	2011–2012	–	✓(2)	–	–	✓(2)	–	✓(2)	✓(2)	–	–	N(1/2)	–
FLEET	2010–2012	–	✓(1)	8(1/2)	✓(3)	N(1/3)	8(1/3)	36(1/3)	✓(2)	13(1/3)	N(1/3)	✓(3)	–
FLINDERS	2012	✓(1)	–	–	–	–	–	–	–	–	–	–	–
GAIRDNER	2010–2012	✓(3)	9(1/2)	✓(2)	✓(1)	✓(2)	N(1/3)	✓(2)	15(1/3)	–	–	13(1/3)	✓(3)
HENLEY	2012	✓(1)	–	–	–	–	–	–	–	–	✓(1)	11(1/1)	–
HINDMARSH	2010–2012	✓(3)	✓(3)	✓(1)	✓(3)	N(1/2)	N(1/3)	✓(2)	✓(3)	10–12(2/3)	✓(3)	N(1/3)	✓(1)
MACQUARIE	2011–2012	✓(1)	✓(2)	–	–	✓(2)	9(1/1)	✓(2)	✓(2)	–	–	–	–
NAVIGATOR	2011–2012	✓(1)	✓(1)	–	✓(1)	10(1/2)	✓(1)	✓(2)	✓(1)	✓(1)	–	✓(1)	–
OXFORD	2011–2012	–	✓(2)	–	–	✓(2)	–	✓(2)	–	–	✓(2)	–	–
SCHOONER	2010–2012	✓(1)	✓(3)	N(1/3)	✓(3)	N(1/3)	✓(3)	38(1/3)	✓(3)	N(1/1)	✓(3)	15(1/3)	✓(3)
SCOPE	2011–2012	–	✓(2)	✓(2)	–	9(1/2)	✓(1)	10(1/2)	–	–	–	✓(2)	–
SHEPHERD	2011–2012	–	✓(2)	–	–	10(1/2)	–	✓(2)	–	–	✓(2)	N(2/2)	–
SKIPPER	2011–2012	✓(1)	✓(2)	✓(2)	✓(1)	N(1/2)	✓(1)	N(1/2)	7(1/2)	✓(1)	✓(1)	✓(2)	–
URAMBIE	2010–2012	–	✓(3)	–	✓(3)	✓(2)	–	13(1/2)	✓(2)	–	–	N(1/3)	–
WESTMINSTER	2012	✓(1)	–	–	–	–	–	✓(1)	–	–	–	15(1/1)	–
WIMMERA	2012–2011	✓(1)	✓(2)	–	–	✓(1)	–	✓(2)	–	–	✓(2)	–	✓(1)
Rates (product/ha)		1.5 L	0.38 kg	1.5 L	2.0 L	5 g	750 ml	20–25 g	300 ml	0.75 L	1.3 L	1.4–1.7 L	1.0 L
Crop stage at spraying		IBS	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	5-leaf	5-leaf	5-leaf	5-leaf

Table 28. Triticale variety response to herbicides Advanced Evaluation trials 1996–2011

Herbicide		**Triflurx®** 480 Trifluralin	**AchieveWG®** Tralkoxydim	**Tristar Advance®** Diclofop-methyl + fenoxaprop-p-ethyl	**Bromoxynil** bromoxynil	**Ally®** metsulfuron	**Hotshot®** Floroxypyr + aminopyralid	**Glean®** chlorsulfuron	**Tigrex®** MCPA +Diflufenican	**Amicide 625® or Amicide 500** 2,4-D Amine	**Banvel M®** Dicamba + MCPA	**Tordon 242®** Picloram + MCPA	**Starane** Fluroxypyr	**Hoegrass®** Diclofop-methyl
Variety	**Years tested**	**2002–2011**	**1996–2011**	**2000–2011**	**2001–2011**	**1998–2011**	**2009**	**1996–2011**	**1997–2011**	**1999–2011**	**2001–2011**	**2001–2011**	**2009**	**1996–1999**
ABACUS	1996–2005	✓(9)	✓(3)	✓(9)	✓(6)	N(2/5)	14(1/6)	10(1/3)	N(1/3)	10(1/3)	N(2/5)	N(1/3)	–	18(1/3)
BERKSHIRE	2008–2010	✓(3)	✓(3)	N(1/3)	✓(3)	20(1/2)	14(1/1)	N(1/3)	✓(3)	N(1/3)	20(1/2)	16(1/2)	✓(1)	–
BREAKWELL	2003–2010	✓(5)	N(1/5)	✓(5)	✓(5)	✓(5)	N(1/5)	9(1/3)	N(4/5)	9(1/3)	✓(5)	N(4/5)	✓(1)	–
CHOPPER	2012	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	–	–
CRACKERJACK	2008–2010	N(1/3)	N(1/3)	✓(3)	✓(3)	N(1/3)	N(1/3)	N(1/3)	17(1/3)	N(1/3)	N(1/3)	17(1/2)	✓(1)	–
CREDIT	1998–2005	✓(8)	✓(3)	✓(7)	N(1/6)	✓(5)	9(1/5)	N(1/6)	N(2/3)	N(1/6)	✓(5)	N(2/3)	–	N(1/2)
CURRENCY	1996–1998	✓(2)	–	N(1/3)	✓(1)	–	N(1/2)	–	–	–	–	–	–	11(1/2)
DUVAL	2003–2005	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	–	–
ELEANOR	2001–2003	✓(1)	✓(1)	✓(1)	✓(1)	9(1/1)	✓(1)	✓(1)	✓(1)	✓(1)	9(1/1)	✓(1)	–	–
ENDEAVOUR	2004–2012	✓(7)	N(1/7)	✓(7)	7(1/3)	✓(7)	N(2/7)	✓(7)	N(1/7)	✓(6)	✓(6)	N(1/6)	✓(1)	–
EVEREST	2000–2005	✓(6)	✓(3)	N(2/5)	✓(4)	✓(5)	9–10(2/3)	✓(5)	N(1/3)	✓(5)	✓(5)	N(1/3)	–	–
FALCON	2005	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	–	–
FUSION	2012	✓(1)	✓(1)	N(1/1)	7(1/1)	N(1/1)	✓(1)	8(1/1)	✓(1)	✓(1)	✓(1)	✓(1)	–	–
GOANNA	2011–2012	✓(2)	7(1/2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	N(1/2)	✓(1)	✓(1)	✓(1)	–	–
HAWKEYE	2008–2010	✓(3)	✓(3)	✓(3)	N(1/3)	N(1/3)	N(2/3)	✓(3)	N(1/3)	✓(3)	N(1/3)	N(1/3)	✓(1)	–
HILLARY	2001	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)	✓(1)	N(1/1)	N(1/1)	N(1/1)	N(1/1)	N(1/1)	–	–
JACKIE	2001–2004	✓(2)	✓(2)	N(1/2)	N(1/2)	N(1/2)	N(1/2)	17(1/2)	12(1/1)	17(1/1)	N(1/2)	12(1/1)	–	–
JAYWICK	2008–2010	N(1/3)	✓(3)	✓(3)	N(1/3)	N(1/3)	N(2/3)	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(1)	–
KOSCIUSZKO	2003–2011	✓(5)	✓(5)	✓(5)	✓(5)	N(1/5)	✓(5)	✓(5)	6(1/5)	✓(5)	N(1/5)	6(1/3)	✓(1)	–
MAIDEN	1996–1999	✓(3)	–	✓(4)	✓(2)	–	N(1/3)	✓(1)	–	✓(1)	–	–	–	✓(3)
MUIR	1996–1999	✓(3)	–	✓(4)	✓(2)	–	✓(3)	✓(1)	–	✓(1)	–	–	–	N(1/3)
PRIME322	2001–2004	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	11(1/3)	N(2/2)	11(1/1)	✓(2)	N(2/2)	–	–
RYESUN	1996–1997	✓(1)	–	✓(2)	–	–	✓(1)	–	–	–	–	–	–	–
SPEEDEE	2002–2004	✓(1)	✓(1)	✓(1)	✓(2)	5(1/1)	6(1/1)	7(1/1)	9(1/1)	7(1/1)	5(1/1)	9(1/1)	–	–
TAHARA	1996–1998	✓(2)	–	✓(3)	✓(1)	–	N(1/2)	–	–	–	–	–	–	N(1/2)
TICKIT	2001–2003	✓(1)	9(1/2)	✓(1)	✓(2)	8(1/1)	7(1/1)	N(1/1)	7(1/1)	N(1/1)	8(1/1)	7(1/1)	–	–
TOBRUK	2004–2011	✓(5)	✓(5)	✓(5)	✓(5)	✓(5)	N(2/5)	N(1/5)	N(1/5)	N(1/5)	✓(5)	N(1/5)	✓(1)	–
TREAT	2001–2003	N(1/1)	✓(2)	✓(1)	✓(2)	8(1/1)	8(1/1)	N(1/1)	N(1/1)	N(1/1)	8(1/1)	N(1/1)	–	–
YOWIE	2011–2012	✓(2)	8(1/2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	✓(1)	✓(1)	✓(1)	–	–
Rates (product/ha)		1.5 L	0.38 kg	1.5 L	2.0 L	5 g	750 ml	20–25 g	0.75 L	1.3L – 1.7 L	1.4–1.7 L	1.0 L	300 ml	2.0 L (375 g/L)
Crop stage at spraying		IBS	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	5-leaf	5-leaf	5-leaf	5-leaf	5-leaf	3-leaf

Table 28. Triticale variety response to herbicides Advanced Evaluation trials 1996–2011 (continued)

Herbicide		**Jaguar®** Diflufenican + Bromoxynil	**Lontrel®** Clopyralid	**Paragon®** Picolinafen + MCPA	Cadence® Dicamba	**Avadex Xtra® IBS** Trialliate	**Glean® IBS** Chlorsulfuron	**Boxer Gold® IBS** Prosulfocarb + S-Metolachlor	**Diuron + MCPA** Diuron + MCPA	**Sakura IBS** Pyroxasulfone	**Amicide® Advance 700** 2,4-D Amine	**Wildcat®** Fenoxaprop -p-ethyl	**Agtryne MA®** Terbutryn + MCPA	**Dual Gold®) PSPE** S-Metolachlor
Variety	**Years tested**	**1996**	**1996–1998**	**2001**	**1998–2000**	**2002–2009**	**2002–2004**	**2009**	**2009**	**2011**	**2011**	**2003–2004**	**2000–2004**	**2004**
ABACUS	1996–2005	✓(1)	✓(3)	✓(1)	11(1/4)	✓(2)	7(1/2)	–	–	–	–	10(1/1)	N(1/2)	–
BERKSHIRE	2008–2010	–	–	–	–	–	–	–	–	–	–	–	–	–
BREAKWELL	2003–2010	–	–	–	–	✓(2)	–	✓(1)	✓(1)	9(1/1)	✓(1)	–	–	–
CHOPPER	2012	–	–	–	–	–	–	–	–	–	–	–	–	–
CRACKERJACK	2008–2010	–	–	–	–	–	–	–	–	–	–	–	–	–
CREDIT	1998–2005	–	✓(1)	✓(1)	✓(4)	N(1/3)	7(1/3)	–	–	–	–	N(1/2)	N(1/3)	✓(1)
CURRENCY	1996–1998	✓(1)	✓(3)	–	✓(1)	–	–	–	–	–	–	–	–	–
DUVAL	2003–2005	–	–	–	–	–	–	–	–	–	–	–	–	–
ELEANOR	2001–2003	–	–	–	–	–	–	–	–	–	–	–	–	–
ENDEAVOUR	2004–2012	–	–	–	–	–	–	–	–	–	–	–	–	–
EVEREST	2000–2005	–	–	✓(1)	✓(2)	✓(3)	7(1/3)	–	–	–	–	6(1/2)	10(1/3)	✓(1)
FALCON	2005	–	–	–	–	–	–	–	–	–	–	–	–	–
FUSION	2012	–	–	–	–	–	–	–	–	–	–	–	–	–
GOANNA	2011–2012	–	–	–	–	–	–	–	–	–	–	–	–	–
HAWKEYE	2008–2010	–	–	–	–	–	–	–	–	–	–	–	–	–
HILLARY	2001	–	–	–	–	–	–	–	–	–	–	–	–	–
JACKIE	2001–2004	–	–	–	–	–	–	–	–	–	–	–	–	–
JAYWICK	2008–2010	–	–	–	–	–	–	–	–	–	–	–	–	–
KOSCIUSZKO	2003–2011	–	–	–	–	N(1/3)	✓(1)	✓(1)	8(1/1)	✓(1)	7(1/1)	✓(1)	9(1/1)	✓(1)
MAIDEN	1996–1999	✓(1)	11(1/3)	–	✓(2)	–	–	–	–	–	–	–	–	–
MUIR	1996–1999	✓(1)	✓(3)	–	✓(2)	–	–	–	–	–	–	–	–	–
PRIME322	2001–2004	–	–	–	–	–	–	–	–	–	–	–	–	–
RYESUN	1996–1997	–	–	–	–	–	–	–	–	–	–	–	–	–
SPEEDEE	2002–2004	–	–	–	–	–	–	–	–	–	–	–	–	–
TAHARA	1996–1998	✓(1)	✓(3)	–	✓(1)	–	–	–	–	–	–	–	–	–
TICKIT	2001–2003	–	–	–	–	–	–	–	–	–	–	–	–	–
TOBRUK	2004–2011	–	–	–	–	✓(2)	–	✓(1)	✓(1)	6(1/1)	6(1/1)	–	–	–
TREAT	2001–2003	–	–	–	–	–	–	–	–	–	–	–	–	–
YOWIE	2011–2012	–	–	–	–	–	–	–	–	–	–	–	–	–
Rates (product/ha)		**1.0 L**	**300 ml**	**375 ml**	**200 g**	**1.6 L**	**20 g**	**2.5 L**	**500 ml+350 ml**	**118 g**	**1.5 L**	**500 ml**	**1.0 L**	**500 ml**
Crop stage at spraying		**3-leaf**	**3-leaf**	**3-leaf**	**3-leaf**	**IBS**	**IBS**	**IBS**	**3-leaf**	**IBS**	**Z31**	**4-leaf**	**3-5 leaf**	**PSPE**

Table 29. Field pea variety response to herbicides Advanced Evaluation trials 1996–2012

Herbicide		Triflur® 480 IBS Trifluralin	Stomp® IBS Pendimethalin	Terbyne® IBS Terbyne	Sencor 750® PSPE Metribuzin	Spinnaker® PSPE Imazethapyr	Brodal® + MCPA Diflufenican + MCPA	Raptor® Imazamox	Broadstrike® Flumetsulam	Brodal® Options Diflufenican
Variety	Years tested	2001–2012	2002–2012	2010–2012	1998–2012	1996–2012	2005, 2008,2012	2001–2012	1996–2012	1997–2000
SW CELINE	2012	N(1/1)	✓(1)	9(1/1)	✓(1)	12(1/1)	✓(1)	N(1/1)	✓(1)	–
CRC WALANA	2012	✓(1)	✓(1)	✓(1)	✓(1)	12(1/1)	✓(1)	✓(1)	✓(1)	–
EXCELL	1997–2010	13–13(3/4)	9(1/4)	✓(1)	11–56(4/7)	N(2/10)	N(1/3)	N(3/6)	19(1/4)	✓(4)
KASPA	2004–2012	N(1/3)	14(1/4)	✓(4)	N(3/6)	13(1/4)	✓(3)	N(2/4)	N(2/3)	–
MAKI	2008	N(1/1)	✓(1)	–	✓(1)	N(1/1)	N(1/1)	N(1/1)	✓(1)	–
MORGAN	1996–2008	N(1/1)	✓(1)	–	✓(3)	N(1/5)	✓(2)	✓(1)	✓(5)	✓(3)
PARAFIELD	1999–2008	11–11(2/3)	N(2/4)	–	9–51(3/6)	N(2/7)	N(1/3)	8(1/4)	15(1/4)	✓(2)
PBA GUNYAH	2010–2012	✓(1)	✓(2)	✓(3)	✓(3)	N(1/3)	✓(1)	✓(1)	✓(1)	–
PBA OURA	2010–2012	✓(1)	N(1/2)	✓(3)	✓(3)	N(1/3)	✓(1)	✓(1)	✓(1)	–
PBA PEARL	2012	✓(1)	✓(1)	✓(1)	✓(1)	25(1/1)	✓(1)	✓(1)	✓(1)	–
PBA PERCY	2010–2012	✓(1)	✓(2)	30(1/3)	17(1/3)	14–29(2/3)	✓(1)	✓(1)	N(1/1)	–
STURT	2005–2012	✓(3)	✓(3)	✓(2)	N(2/3)	16(1/2)	N(1/3)	N(1/3)	✓(3)	–
TWLIGHT	2010–2012	✓(1)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(1)	✓(1)	✓(1)	–
YARRUM	2005–2012	N(1/3)	✓(3)	✓(2)	N(1/3)	N(2/4)	✓(3)	N(1/3)	✓(3)	–
Rates (product/ha)		1.5 L	3.0 L	1.4 kg	380 g	100 g	150 ml + 150 ml	45 g	25 g	200 ml
Crop stage at spraying		IBS	IBS	IBS	PSPE	PSPE	4 node	4 node	4 node	4 node

Table 29. Field pea variety response to herbicides Advanced Evaluation trials 1996–2012 (continued)

Herbicide		MCPA 250 MCPA	Select® Clethodim	Avadex® Xtra IBS Triallate	Bladex® Cyanazine	Igran® Terbutryn flowable	Diuron PSPE Furrows open Diuron	Diuron® 500 IBS Diuron 500 g/L	Sencor® 750 2 node Metribuzin	Terbyne® PSPE Terbyne	Bladex® 900, 2 node Cyanazine
Variety	Years tested	1997	1998–2008	2003–2010	2002,2010	2004+2009	2005	2009–2010	2009	2010	2010
SW CELINE	2012	–	–	–	–	–	–	–	–	–	–
CRC WALANA	2012	–	–	–	–	–	–	–	–	–	–
EXCELL	1997–2010	N(1/1)	✓(4)	✓(3)	✓(1)	14–35(3/4)	N(1/1)	✓(1)	N(1/1)	N(1/1)	✓(1)
KASPA	2004–2012	–	✓(2)	✓(2)	N(1/1)	8–20(3/4)	N(1/1)	22(1/2)	23(1/1)	✓(1)	✓(1)
MAKI	2008	–	–	–	–	–	–	–	–	–	–
MORGAN	1996–2008	✓(1)	✓(2)	–	–	–	–	–	–	–	–
PARAFIELD	1999–2008	–	✓(3)	12(1/2)	✓(1)	N(2/3)	✓(1)	–	–	–	–
PBA GUNYAH	2010–2012	–	✓(1)	–	N(1/1)	–	–	N(1/1)	–	–	–
PBA OURA	2010–2012	–	N(1/1)	–	✓(1)	–	–	N(1/1)	–	–	–
PBA PEARL	2012	–	–	–	–	–	–	–	–	–	–
PBA PERCY	2010–2012	–	N(1/1)	–	✓(1)	–	–	N(1/1)	–	–	–
STURT	2005–2012	–	–	✓(2)	–	N(1/1)	–	N(1/1)	17(1/1)	N(1/1)	N(1/1)
TWLIGHT	2010–2012	–	✓(1)	–	N(1/1)	–	–	N(1/1)	–	–	–
YARRUM	2005–2012	–	–	✓(2)	–	N(1/1)	–	N(1/1)	✓(1)	✓(1)	✓(1)
Rates (product/ha)		1.0 L	375 ml	1.6 L	2.0 kg	850 ml	1.21 L	1.50 L	380 g	1.0 kg	1.1 kg
Crop stage at spraying		6 node	4 node	IBS	PSPE	3 node	PSPE	IBS	2 node	PSPE	2 node

Table 30. Oat variety response to herbicides Advanced Evaluation trials 1996–2012

Herbicide		Agtryne MA® Terbutryn + MCPA	Bromoxynil Bromoxynil	Glean® Chlorsulfuron	Buttress® 2,4-DB	Banvel M® Dicamba + MCPA	Tigrex® MCPA + Diflufenican	Amicide 625® or Amicide 500 2,4-D Amine	Tordon 242® Picloram + MCPA
Variety	Years tested	2002–2012	1996–2012	2000–2012	2001–2012	1998–2012	1996–2012	1996–2012	1997–2012
BANNISTER	2012	✓(1)	N(1/1)	✓(1)	15(1/1)	N(1/1)	11(1/1)	17(1/1)	✓(1)
BARCOO	1999–2003	N(1/4)	✓(3)	✓(3)	N(1/1)	✓(1)	✓(4)	N(2/3)	16(1/2)
BRUSHER	2003–2011	N(2/5)	N(1/5)	✓(5)	✓(5)	N(4/5)	N(1/5)	N(3/5)	6(1/5)
COOLABAH	1996–1998	✓(1)	✓(2)	✓(3)	–	–	✓(2)	N(2/2)	✓(1)
DROVER	2005	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)
DUNNART	2011–2012	N(1/2)	9(1/2)	✓(2)	✓(2)	N(1/2)	14(1/2)	8(1/2)	✓(2)
EURABBIE	1999–2005	N(1/9)	N(1/3)	✓(9)	10(1/2)	9–37(3/6)	10(1/8)	9–56(4/8)	N(1/5)
EURO	1996–2003	8(1/2)	13(1/3)	✓(2)	✓(2)	72(1/2)	✓(3)	✓(3)	5(1/3)
FORESTER	2011	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)	✓(1)	N(1/1)	✓(1)
GWYDIR	1999–2003	12(1/4)	15(1/3)	N(1/3)	✓(2)	✓(2)	16(1/4)	N(2/3)	19(1/2)
MANNUS	2003–2011	N(1/5)	✓(5)	✓(5)	✓(5)	N(4/5)	N(1/5)	N(3/5)	7(1/2)
MITIKA	2004–2012	N(2/7)	8(1/7)	17(1/7)	10–12(2/7)	9–15(2/3)	N(3/7)	21(1/3)	9(1/3)
MORTLOCK	1996	–	✓(1)	✓(1)	–	–	–	N(1/1)	–
MULGARA	2008–2010	✓(3)	N(1/3)	✓(3)	✓(3)	N(2/3)	N(3/3)	N(2/3)	N(1/3)
POSSUM	2003–2010	22–22(2/4)	8(1/2)	21(1/7)	✓(5)	7–21(4/4)	11–11(2/4)	N(2/7)	N(1/5)
QUOLL	1998–2002	8(1/4)	N(1/3)	✓(4)	N(1/1)	47(1/1)	N(1/4)	N(1/4)	✓(1)
TAMMAR	2011–2012	N(1/2)	N(1/2)	✓(2)	✓(2)	✓(2)	N(2/2)	N(1/2)	✓(2)
TUNGOO	2008–2010	✓(3)	✓(3)	N(1/3)	✓(3)	N(2/3)	N(1/3)	N(2/3)	N(1/3)
WINTAROO	2003–2010	✓(5)	5(1/5)	✓(5)	✓(5)	N(3/5)	N(2/5)	N(2/5)	N(2/5)
WOMBAT	2011–2012	9–13(2/2)	10(1/2)	✓(2)	10–16(2/2)	16(1/2)	13(1/2)	19(1/2)	10(1/2)
YALLARA	2011–2012	✓(2)	N(1/2)	✓(2)	8(1/2)	N(1/2)	8–9(2/2)	19(1/2)	✓(2)
YARRAN	1996–2003	5–6(2/6)	5–6(2/4)	✓(8)	6(1/2)	4–32(3/5)	4–10(2/7)	5–20(2/7)	8(1/6)
YIDDAH	2001–2010	N(2/8)	8(1/6)	✓(8)	N(1/6)	60(1/5)	✓(8)	9–20(2/5)	30(1/3)
Rates (product/ha)		1.0 L	2.0 L	25 g	1.6 L	1.4–1.7 L	0.75 L	1.3 L–1.7 L	1.0 L
Crop stage at spraying		3–5 leaf	3-leaf	3-leaf	3-leaf	5-leaf	5-leaf	5-leaf	5-leaf

Table 30. Oat variety response to herbicides Advanced Evaluation trials 1996–2012 (continued)

Herbicide		MCPA amine MCPA amine	MCPA LVE MCPA LVE	2,4–D LVE 2,4–D LVE estercide 600g/kg	Buctril® MA Bromoxynil + MCPA	Dual Gold®) PSPE S-Metolachlor	Amicide® Advance700 2,4-D Amine	Diuron500 Diuron	Cadence® Dicamba	Lontrel® Clopyralid
Variety	Years tested	1998–2005	2002–2004	2003	2002–2005	2004	2011	2009	1996–1999	1998
BANNISTER	2012									
BARCOO	1999–2003	✓(1)	–	–	–	✓(1)	–	–	✓(2)	–
BRUSHER	2003–2011	–	–	–	–	–	6(1/1)	✓(1)	–	–
COOLABAH	1996–1998	✓(1)	–	–	–	–	–	–	✓(1)	✓(1)
DROVER	2005	–	–	–	–	–	–	–	–	–
DUNNART	2011–2012	–	–	–	–	–	–	–	–	–
EURABBIE	1999–2005	✓(5)	✓(3)	15(1/1)	✓(4)	✓(3)	–	–	✓(2)	–
EURO	1996–2003	–	–	–	–	–	–	–	–	–
FORESTER	2011	–	–	–	–	–	–	–	–	–
GWYDIR	1999–2003	✓(1)	–	–	–	✓(1)	–	–	✓(2)	–
MANNUS	2003–2011	–	–	–	–	–	✓(1)	✓(1)	–	–
MITIKA	2004–2012	–	–	–	–	–	7(1/1)	✓(1)	–	–
MORTLOCK	1996	–	–	–	–	–	–	–	–	–
MULGARA	2008–2010	–	–	–	–	–	–	N(1/1)	–	–
POSSUM	2003–2010	✓(2)	✓(2)	–	10–10(2/2)	✓(2)	–	✓(1)	–	–
QUOLL	1998–2002	N(1/2)	–	–	–	✓(1)	–	–	✓(3)	✓(1)
TAMMAR	2011–2012	–	–	–	–	–	–	–	–	–
TUNGOO	2008–2010	–	–	–	–	–	–	✓(1)	–	–
WINTAROO	2003–2010	–	–	–	–	–	–	N(1/1)	–	–
WOMBAT	2011–2012	–	–	–	–	–	–	–	–	–
YALLARA	2011–2012	–	–	–	–	–	–	–	–	–
YARRAN	1996–2003	✓(3)	✓(1)	7(1/1)	5–10(2/2)	–	–	–	N(1/1)	✓(1)
YIDDAH	2001–2010	✓(2)	✓(2)	–	✓(2)	✓(2)	–	✓(1)	–	–
Rates (product/ha)		2.0 L	1.6 L	500 ml	2.0 L	500 ml	1.5 L	900 ml	200 g	300 ml
Crop stage at spraying		5-leaf	5-leaf	5-leaf	3-leaf	PSPE	Z31	3-leaf	4-leaf	4-leaf

Table 31. Lupin variety response to herbicides

Herbicide		Triflur®480® IBS Trifluralin	Stomp® IBS Pendimethalin	Simazine 500 g/L Simazine	Brodal® 8–0 Leaf Diflufenican	Eclipse® 4 leaf Metosulam	Eclipse® 6–10 leaf Metosulam	Avadex®Xtra IBS Triallate	Terbyne® IBS Terbyne	Terbyne® PSPE Terbyne	Eclipse® + Brodal® 2–6 leaf Metosulam + Diflufenican
Variety	Years tested	2000–2012	1997–2012	1998–2012	1996–2012	1996–2012	1996–2008	2002–2010	2010–2012	2010	2009
COROMUP	2008	✓(1)	✓(1)	N(1/1)	✓(1)	N(1/1)	–	–	–	–	–
JENABILLUP	2010–2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	–	–	8(1/2)	–	–
JINDALEE	1997–2012	✓(8)	✓(8)	N(2/9)	N(1/6)	15(1/6)	N(1/6)	✓(2)	✓(1)	–	–
KALYA	1998–1999	–	–	✓(2)	11(1/1)	N(1/2)	✓(1)	–	–	–	–
KIEV MUTANT	1996–2008	✓(8)	✓(8)	N(5/9)	N(1/6)	✓(7)	✓(8)	✓(2)	–	–	–
LUXOR	2004–2012	✓(4)	✓(5)	N(2/4)	✓(4)	✓(3)	✓(1)	✓(2)	6(1/3)	12(1/1)	N(1/1)
MAGNA	1999	–	–	✓(1)	–	✓(1)	✓(1)	–	–	–	–
MANDELUP	2001–2012	✓(5)	✓(6)	N(2/5)	N(1/4)	N(1/3)	N(1/2)	8(1/3)	9(1/3)	N(1/1)	15(1/2)
MERRIT	1996–1999	–	✓(1)	✓(2)	✓(3)	13(1/4)	14(1/3)	–	–	–	–
MOONAH	2000–2002	✓(1)	–	N(1/1)	✓(1)	✓(3)	N(1/1)	–	–	–	–
MYALLIE	1996–1999	–	–	✓(2)	✓(2)	N(2/3)	19(1/2)	–	–	–	–
PBA GUNYIDI	2010–2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	–	–	✓(1)	–	–
QUILINOCK	2000–2005	✓(7)	✓(6)	N(1/7)	N(1/3)	✓(3)	N(2/5)	✓(2)	–	–	–
ROSETTA	2004–2012	✓(4)	✓(5)	N(1/4)	✓(4)	N(1/3)	✓(1)	✓(2)	N(1/3)	N(1/1)	✓(1)
TANJIL	1998	–	–	✓(1)	✓(1)	N(1/1)	–	–	–	–	–
WONGA	1996–2010	✓(7)	✓(9)	N(2/10)	N(2/7)	8(1/8)	14–24(2/7)	✓(4)	N(1/1)	N(1/1)	16(1/2)
Rates (product/ha)		1.5 L	3.0 L	3.0 L	200 ml	10 g	10 g	1.6 L	1.0 L	1.0 L	7 g + 100 ml
Crop stage at spraying		IBS	IBS	PSPE	8–10 leaf	2–6 leaf	6–10 leaf	IBS	IBS	PSPE	2–6 leaf

Table 31. Lupin variety response to herbicides (continued)

Herbicide		Simazine 4–6 leaf Simazine	Fusion® Fluazifop-p + Butroxydim	Simazine900 + Brodal® 4–6 leaf Simazine + Diflufenican	Simazine + Brodal® 6–10 leaf Simazine + Diflufenican	Targa® Quizalofop-P-ethyl	Eclipse® + Brodal® 4–8 leaf Metosulam + Diflufenican	Verdict®520 Haloxyfop-R	Sertin® Sethoxydim	Select® Clethodim	Simazine + Trifluralin IBS Simazine + Trifluralin
Variety	Years tested	2004	2004–2005	2005	1996	2002	2001	1998–2001	1998–2000	1999	1998
COROMUP	2008	–	–	–	–	–	–	–	–	–	–
JENABILLUP	2010–2012	–	–	–	–	–	–	–	–	–	–
JINDALEE	1997–2012	–	–	N(1/1)	–	✓(1)	✓(1)	✓(3)	✓(2)	–	✓(1)
KALYA	1998–1999	–	–	–	–	–	–	✓(1)	✓(1)	✓(1)	✓(1)
KIEV MUTANT	1996–2008	–	–	N(1/1)	N(1/1)	✓(1)	✓(1)	✓(2)	✓(1)	✓(1)	–
LUXOR	2004–2012	✓(1)	✓(1)	–	–	–	–	–	–	–	–
MAGNA	1999	–	–	–	–	–	–	–	–	✓(1)	–
MANDELUP	2001–2012	✓(1)	✓(1)	–	–	✓(1)	–	–	–	–	–
MERRIT	1996–1999	–	–	–	18(1/1)	–	–	✓(1)	✓(1)	✓(1)	✓(1)
MOONAH	2000–2002	–	–	–	–	–	–	✓(1)	✓(1)	–	–
MYALLIE	1996–1999	–	–	–	N(1/1)	–	–	✓(1)	✓(1)	✓(1)	✓(1)
PBA GUNYIDI	2010–2012	–	–	–	–	–	–	–	–	–	–
QUILINOCK	2000–2005	–	–	N(1/1)	–	✓(1)	✓(1)	✓(2)	✓(1)	–	–
ROSETTA	2004–2012	✓(1)	✓(1)	–	–	–	–	–	–	–	–
TANJIL	1998	–	–	–	–	–	–	✓(1)	✓(1)	–	✓(1)
WONGA	1996–2010	✓(1)	✓(1)	N(1/1)	22(1/1)	N(1/1)	✓(1)	✓(3)	✓(2)	✓(1)	✓(1)
Rates (product/ha)		1.5 L	280 ml–600 ml	1.0 L+150 ml	2.0 L + 200 ml	375 ml	5 g + 100 ml	100 ml	1.0 L	250 ml	1.5 L + 1.5 L
Crop stage at spraying		4–6 leaf	6–leaf	4–6 leaf	8–10 leaf	2–6 leaf	2–6 leaf	6–10 leaf	6 leaf	4 leaf	IBS

Table 32. Herbicide tolerance testing – Other crops

Species	Varieties tested	Years tested	Herbicides tested	Results/comments
Chickpea	Amythest, Bumper|Lassiter	1998	Broadstrike™, Sencor®, Sertin®, Simazine PSPE, Verdict™	Appeared safe for varieties tested
	Amythyst Howzat Jimbour	2002	Sencor®, Simazine PSPE, Stomp®, Triflur™ X, Avadex®, Bladex®	Appeared safe for varieties tested
			Broadstrike™	Yield loss Jimbour at normal rate
	Flipper Genesis 90 Genesis 509	2009 2010	Broadstrike™, Avadex®	Yield loss Genesis 509 at normal rate
			Sencor®	Yield loss Genesis 90 at normal rate
			Bladex®	Narrow safety margin Genesis 90
			Avadex®	Yield loss Flipper at normal rate (1 trial)
			Terbyne®	Appeared safe for varieties tested (1 trial)
Faba bean	Fiesta Barkool Icarus	1998 to 2000	Verdict™, Targa®, Sertin®	Appeared safe for varieties tested
			Sencor®	Narrow safety margin Fiesta, Barkool
			Spinnaker® + Simazine + Sencor®	Narrow for all varieties
			Simazine PSPE	Narrow safety margin Fiesta and Icarus
	Fiesta Manafest Fiord	2002 to 2003	Sencor®	Narrow safety margin all varieties
			Simazine PSPE	Narrow safety margin Fiesta
			Spinnaker® PSPE	Yield loss Fiord at normal rate (1 trial)
			Avadex® IBS	Appeared safe for varieties tested
	Farrah Fiesta Nura	2008 to 2010	Sencor®, Simazine PSPE, Bladex®	Narrow safety margin in 2008
			Avadex® IBS	Narrow margin on Fiesta ('08) and Farrah ('09)
			Terbyne® IBS	Yield loss in one trial only (2010)
Juncea	Dune	2009	Lontrel™ 750SG	Yield reduction at 1X and 2X rate
Lentils	Nugget Northfield	2001 2002 2004	Triflur™ X, Sertin®, Verdict™, Bladex®	Safe for varieties tested. Narrow margin with Bladex®
			Brodal®	Yield loss (1 trial) at normal rate Nugget, Narrow margin for Northfield
			Broadstrike™	Yield loss Northfield at normal rate (1 trial)
	Boomer Nipper Northfield	2008 2009 2010	Bladex®	Narrow safety margin all varieties
			Triflur™ X, Brodal®	Narrow safety margin Boomer
			Broadstrike™, Terbyne®	Narrow safety margin for Nipper and Northfield
Linseed	Glenelg	1993 1994	Trifluralin, Bromoxynil MA	Significant yield loss in one year
			Trifluralin	Reduced germination, seedling vigour and yield
			MCPA. Bromoxynil MA, Tordon™ 242	Reduced yield at recommended rate by 0–15%
			Hoegrass®, Fusilade®, Verdict™	Appeared safe at recommended rates
Lupin	Wonga Jindalee Quilinock Kiev Mutant	1998 1999 2000	Brodal®	Narrow margin Wonga, Kiev Mutant (1 trial)
			Eclipse®	Narrow margin Wonga (2 trials)
			Sertin®, Verdict™	Safe all varieties (2 trials)
			Simazine PSPE	Safe at normal rates, narrow margin for Kiev Mutant, Jindalee and Wonga
			Trifluralin PSI	Safe all varieties (1 trial)
	Jindalee Quilinock Wonga Kiev Mutant	2001 2002 2003	Eclipse®	Yield loss Wonga at normal rates (2 trials) Narrow margin Quilinock (1 trial)
			Simazine PSPE	Narrow margin Kiev Mutant (1 trial)
			Verdict™, Trifluralin IBS, Stomp®, Avadex®	Verdict™, Avadex® safe (1 trial), Sniper® (2 trials) trifluralin, Stomp® safe (3 trials) all varieties
			Targa®	Narrow margin for Wonga
	Jindalee Quilinock Wonga Mandelup Kiev Mutant Rosetta, Luxor	2004 2005 2008 2009 2010	Brodal®, Stomp®, Sniper®	Appeared safe in these years
			Eclipse®	Yield loss Wonga (1 trial) Narrow safety margin Mandelup, Rosetta
			Simazine PSPE	Yield loss Kiev Mutant (1 trial), narrow safety margin all varieties (1 trial) (Luxor 2 trials)
			Terbyne®	Yield loss in Luxor in 1 trial narrow margin for Mandelup, Rosetta, Wonga
			Avadex®	Yield loss Mandelup (1 trial) at normal rates
Safflower	S-317 Devexco, Sirothora, Sironaria	Pre 1998, 2008	Ally®, Triflur™ X, Stomp®	Narrow safety margin Stomp® on S-317 Devexco
			Hoegrass®, Avadex®	Only Sirothora and Sironaria tested, Both appeared safe

Table 33. Winter crop herbicide/insecticide compatibilities

This chart is a guide only. Read both product labels if using a mixture

FORMULATION	ACTIVE	PRODUCT	ACHIEVE®	ALLY®	ALPHA CYPERMETHERIN	AMICIDE® 625	ATLANTIS®	AVADEX®	AXIAL®	BASAGRAN	BIFENTHRIN	BLADEX®	BRAVO®	BROADSTRIKE™	BRODAL®	BROMICIDE® 200	BROMICIDE® MA	BUCTRIL® MA	BUTRESS®	CADENCE®	CHEETAH® GOLD	CHLORPYRIFOS	CONCLUDE™	CORRECT®	CRUSADER™	DECISION®	DELTAMETHRIN	DIMETHOATE	DITHANE™	DIURON
water dispersible granule	tralkoxydim	Achieve® Herbicide		N										C		C				N							C		
suspension concentrate	terbutryn + MCPA as K salt	Agtryne® MA	N	C																										
water dispersible granule	metsulfuron-methyl	Ally® Herbicide	N											C		C	C			C			C		C					C
soluble concentrate	2,4-D as dimethylamine and monomethylamine salts	Amicide® 700																												C
suspension concentrate	mesosulfuron-methyl + mefenpyr-diethyl	Atlantis® OD																C				N					C		
emulsifiable concentrates	tri-allate	Avadex® Xtra																												
emulsifiable concentrates	pinoxaden + cloquintocet-mexyl	Axial®																												
water dispersible granule	isoxaflutole	Balance® 750 Herbicide																												C
water dispersible granule	cyanazine	Bladex® 900 Herbicide																												
emulsifiable concentrates	prosulfocarb +S-metolachlor	Boxer Gold®		C	C	C				C												C					C		
suspension concentrate	chlorothalonil	Bravo® Fungicide																												
water dispersible granule	flumetsulam	Broadstrike™ Herbicide		C											C	C	C		C								C		C
suspension concentrate	diflufenican	Brodal® Options Herbicide	C											C		C											C		
emulsifiable concentrate	bromoxynil noe	Bromicide® 200 Herbicide		C										C	C								C		C		C		
emulsifiable concentrate	bromoxynil + MCPA noe	Bromicide® MA Herbicide	C	C										C									C	N	C		C		
soluble concentrate	2,4-DB dma (amine)**	Buttress®												C										N			C		C
water dispersible granule	dicamba as Na salt**	Cadence® Herbicide	N	C																			C		N				C
emulsifiable concentrates	diclofop-methyl + sethoxydim +fenoxaprop-P-ethyl + others	Cheetah® Gold												C				C											
suspension emulsion	florasulam + MCPA	Conclude™		C												C	C	C		C									
emulsifiable concentrate	propaquizafop	Correct®/Shogun® 100 Herbicide															N		N										
oil dispersible liquid	cloquintocet-mexyl + pyroxsulam	Crusader™		C												C	C			N		N							
emulsifiable concentrates	diclofop-methyl + sethoxydim + mefenpyr-diethyl	Decision®	N	N																										
emulsifiable concentrate	dimethoate	Dimethoate Insecticide	C											C	C	C	C		C										
wettable powder	mancozeb**	Dithane™ M-45® Fungicide																												
suspension concentrate	diuron*	Diuron Liquid Herbicide		C										C					C	C										
emulsifiable concentrates	S-metolachlor	Dual Gold®								C																				
emulsifiable concentrate	oryzalin + trifluralin	Duet® 250 Herbicide																												
water dispersible granule	metosulam	Eclipse® Herbicide	C	C											C	C	C			C	C									C
suspension concentrate	pyraflufen-ethyl	Ecopar®	N	C																										
emulsifiable concentrate	alpha-cypermethrin	Fastac Duo® Insecticide	C												C				C									C	C	
soluble concentrate	imazapic as ammonium	Flame®		C		C														N										
emulsifiable concentrate	picolinafen + bromoxynil + MCPA	Flight® EC		C												C														
emulsifiable concentrate	fluazifop*	Fusilade® Herbicide																												
emulsifiable concentrate	triclopyr	Garlon™ 600																												
suspension concentrate	atrazine*	Gesaprim® 600 Herbicide																		C										C
suspension concentrate	simazine*	Gesatop® 600 Herbicide												C	C															C
wettable powder	chlorsulfuron	Glean® Herbicide		N				C								C	C			C								C		C
emulsifiable concentrate	oxyfluorfen	Goal® Herbicide																												
soluble concentrate	paraquat	Gramoxone® 250 Herbicide						C						C																C
emulsifiable concentrate	triclopyr + picloram + aminopyralid	Grazon™ Extra Herbicide		C																										
emulsifiable concentrates	carfentrazone-ethyl	Hammer®				C																								
water dispersible granule	thifensulfuron-methyl + metsulfuron-methyl	Harmony® M Herbicide	N																											
emulsifiable concentrate	diclofop	Hoegrass® 500 Herbicide		N										C		C	C	C										C		
emulsifiable concentrates	aminopyralid as tipa +fluroxypyr as mhe	Hotshot™		C																					C					
water dispersable granules	iodosulfuron-methyl-Na +mefenpyr-diethyl	Hussar®		N			N							N			N	N				N								
suspension concentrate	terbutryn	Igran® 500 Herbicide		C										C						C				N						
emulsifiable concentrate	phosmet	Imidan® Insecticide	C																C											
soluble concentrate	imazamox as ammonium +imazapyr as ammonium	Intervix®																												
emulsifiable concentrate	bromoxynil octanoate	Jaguar® Herbicide		C		N	C							C					C	C				N				C		

C = Compatible. N = Not compatible. Where there is a blank compatibility is not known, contact the manufacturer. Compatibility is dependent upon use pattern (both crop and weeds), rate, surfactant/compatibility agent and temperature. Water quality also affects compatibility. Mixtures generally require greater agitation. Mixing more than two chemicals affects compatibility and is not recommended.
This chart only indicates which chemicals are compatible in mixtures at the time of compilation (9/05). Read the compatibility and crop safety sections of both labels before mixing. Mixing chemicals is at the user's own risk.
* WG formulations also available; check labels for compatibilities. ** Other formulations also available; check labels for compatibilities. *** **DO NOT** mix with selective grass herbicides.

PRODUCT	ECLIPSE®	FASTAC DUO®	FUSILADE®	TORDON™	GESAPRIM®	GESATOP®	GLEAN®	GOAL®	GRAMOXONE®	GRAZON™	HAMMER®	HARMONY®	HOEGRASS®	HOTSHOT™	HUSSAR® OD	IGRAN®	IMIDAN®	JAGUAR®	KAMBA® 500	KAMBA® M	KARATE®	LE-MAT®	LOGRAN®	LOGRAN® B-POWER	LONTREL™	LORSBAN™	LVE MCPA	MATAVEN®	MCPA 500	MONZA®	OMETHOATE	ONDUTY®	PARAGON®	PROMETRYN 900DF	RAPTOR®	ROUNDUP® CT	ROUNDUP® DRY	ROUNDUP POWERMAX™	SELECT®	SENCOR®	SERTIN®	SNIPER®	SPINNAKER®	SPRAYSEED®	STARANE™	STOMP®	SUPRACIDE®	SURPASS®	TALSTAR®	TARGA®	TERBYNE®	TIGREX®	TOPIK®	TORDON™ 242	TORDON™ 75D	TREFLAN™	TRISTAR® ADVANCE	VERDICT™ 520	WILDCAT®
Achieve® Herbicide	C	C										N					C		N	N					C		C		N																			N				C		N	N				
Agtryne® MA													N																																														
Ally® Herbicide	C						N			C			N	C		C		C	C	C		C			C	C	C	N	C				C			C	C	C						C	C			C				C	C	C	C		N		C
Amicide® 700							C												C																									C															
Atlantis® OD																		C				C			C		C																									C							
Avadex® Xtra																														C						C		C																					
Axial®																																																											
Balance® 750 Herbicide						C			C																															C				C	C											N			
Bladex® 900 Herbicide																																				C	C	C					C	C		C										C			
Boxer® Gold											C										C		C	C												C		C						C			C									C			
Bravo® Fungicide																										C																							C										
Broadstrike™ Herbicide						C			C				C			C		C				C			C	C	C		C												N		C		C	C			C				C	C		C	C	C	C
Brodal® Options Herbicide	C	C				C																C							C										N	C	C		C						C	C			C					N	
Bromicide® 200 Herbicide	C						C						C						C			C	C			C	C		C							C	C	C										C				C							
Bromicide® MA Herbicide	C						C						C						C			C			C	N			C												N																N	N	N
Buttress®		C															C	C				C			C																				C							C							
Cadence® Herbicide	C				C		C									C		C					C			N	C		C							C	C	C						C				C				C							
Cheetah® Gold	C																	C				C			C		C		N																							C							
Conclude™																				C					C		C		C		N														C														
Correct® 100 Herbicide																				N		C					N		N				N						C	N	C							N				N		N	N				
Crusader™														C		N			N	N					C	N	C		N																														
Decision®															N												C																									C							
Dimethoate Insecticide		C					C											C								C			C			C	C		C	C	C	C				C	C					C		C		C		C			C	C	
Dithane™ M-45® Fungicide		C																																															C									C	
Diuron Liquid Herbicide	C				C	C	C		C										C						C	C	C		C														C	C		C		C					N			C			
Dual Gold®					C																		C													C								C															
Duet® 250 Herbicide									C																											C	C	C						C															
Eclipse® Herbicide													C	C		C		C							C		C		C									C				C			C			C				C	C	C	C		C		C
Ecopar®													N										C						C																							N				N		N	
Fastac Duo® Insecticide						C			C									C	C							C	C		C			C	C		C	C	C	C	C			C	C	C				C				C							
Flame®				C	C				C										N																	C		C						C		C													
Flight® EC		C					C						C										C		C		C																										C				C		C
Fusilade® Herbicide																	C	C																					C		C											C							
Tordon™ 600 Herbicide					C																				C	C										C	C	C							C			C											
Gesaprim® 600 Herbicide				C					C										C							C										C	C	C						C	C	C		C							C			C	
Gesatop® 600 Herbicide		C							C									C																C	C	C	C	C				C	C			C		C				C				C		C	
Glean® Herbicide									C				N	C				C	C	C		C			C	C	C	C	C				C			C	C	C						C				C	C			C				C	N		N
Goal® Herbicide									C																											C		C						C															
Gramoxone® 250 Herbicide		C			C	C	C	C								C		C	C	C					C	C			C															C		C		C			C	C				C			
Grazon™ DS Herbicide																																				C									C			C											
Hammer®																							C													C		C						C		C										C			
Harmony® M Herbicide																												N																															C
Hoegrass® 500 Herbicide	C						N										C	C				C			C	C	C				C		C												C							C	C	C					C
Hotshot™	C						C																				C									C		C							C								C						
Hussar®	N						N									N							N	N	C		N			N		N													C							N							
Igran® 500 Herbicide	C																		C	C			C		C		C		C												N						C	C											
Imidan® Insecticide			C						C				C																C				C			C		C						C				C											
Intervix®		C																				C			C														C																				
Jaguar® Herbicide	C	C	C			C	C		C				C					N				C			C	C	C																					N	C	C			C				C	N	C

Herbicide compatibilities

Table 33. Winter crop herbicide/insecticide compatibilities (continued)

This chart is a guide only. Read both product labels if using a mixture

FORMULATION	ACTIVE	PRODUCT	ACHIEVE®	ALLY®	ALPHA CYPERMETHERIN	AMICIDE® ADVANCE 700	ATLANTIS® OD	AVADEX®	AXIAL®	BASAGRAN	BIFENTHRIN	BLADEX®	BRAVO®	BROADSTRIKE™	BRODAL®	BROMICIDE® 200	BROMICIDE® MA	BUCTRIL® MA	BUTRESS®	CADENCE®	CHEETAH® GOLD	CHLORPYRIFOS	CONCLUDE™	CORRECT®	CRUSADER™	DECISION®	DELTAMETHERIN	DIMETHOATE	DITHANE™	DIURON
soluble concentrate	dicamba dma	Kamba® 500 Herbicide	N	C												C	C						C		N					C
soluble concentrate	dicamba dma + MCPA dma	Kamba® M Herbicide	N	C																				N	N					
soluble concentrate	omethoate	Le-Mat® 290 Insecticide		C										C	C	C	C		C					C						
water dispersible granule	triasulfuron	Logran® 750 Herbicide		C				C								C				C										
water dispersable granules	butafenacil + triasulfuron	Logran® B Power																												
soluble concentrate	clopyralid**	Lontrel™ Herbicide	C	C										C		C	C						C		C					C
emulsifiable concentrate	chlorpyrifos*	Lorsban™ 300/500 Insecticide		C								C	C	C		C	N			N			C		N			C		C
emulsifiable concentrate	MCPA ioe (ester)**	LVE MCPA	C	C										C		C				C			C	N	C					C
emulsifiable concentrates	2,4-D as ehe	Estercide Xtra 680		C																										
emulsifiable concentrate	flamprop-M-methyl	Mataven® 90 Herbicide		N																										
soluble concentrate	MCPA dma (amine)**	MCPA 500 Herbicide	N	C										C	C	C	C			C			C	N	N			C		C
emulsifiable concentrates	MCPA + Imazapic + Imazapyr	Midas®																										C		
water dispersable granules	sulfosulfuron	Monza®	N					C												N								N		
emulsifiable concentrate	picolinafen + MCPA ehe (ester)	Paragon® Herbicide		C																				N				C		
emulsifiable concentrates	pyrasulfotole +MCPA as 2-ehe +mefenpyr-diethyl	Precept® 300	C	C		N	C		C												C				C	C		C		
water dispersible granule	prometryn	Prometryn 900DF																												
water dispersible granule	imazamox***	Raptor® Herbicide																										C		
soluble concentrate	glyphosate dual salt**	Weedmaster® DST® Herbicide		C	C	C		C		C												C						C		
water soluble granules	glyphosate mas**	Weedmaster® Argo®		C	C	C		C		C												C						C		
soluble concentrate	glyphosate as K salt**	Roundup Ultra® Max Herbicide		C	C			C		C												C						C		
water soluble granules	pyroxasulfone	Sakura®		C				C												C										C
emulsifiable concentrate	clethodim	Status® Herbicide													N									C						
suspension concentrate	metribuzin*	Sencor® 480 Herbicide													C									N						
water dispersible granule	picolinafen	Sniper® Herbicide																										C		
water dispersible granule	imazethapyr***	Spinnaker® 700 Herbicide										C		C	C													C		C
soluble concentrate	paraquat + diquat	Spray.Seed® 250 Herbicide		C				C												C										C
emulsifiable concentrate	fluroxypyr	Starane™ Herbicide		C										C					C				C							
emulsifiable concentrate	pendimethalin**	Stomp® 330 Herbicide						C						C																C
emulsifiable concentrate	methidathion	Supracide® 400 Insecticide																												
soluble concentrate	2,4-D ipa (amine)**	Surpass® 300 Herbicide	N	C												C				C				N				C		C
emulsifiable concentrate	bifenthrin**	Talstar® 100 Insecticide										C	C	C	C														C	
emulsifiable concentrate	quizalofop**	Targa® Herbicide													C													C		
water dispersible granule	terbuthylazine	Terbyne®																												
emulsifiable concentrate	diflufenican + MCPA ehe (ester)	Tigrex® Herbicide	C	C			C									C			C	C	C	C		N				C		
emulsifiable concentrate	clodinafop	Topik® 240 Herbicide		C										C	C									N						N
soluble concentrate	MCPA + picloram as K salts	Tordon™ 242 Herbicide	N	C										C										N				C		
soluble concentrate	2,4-D + picloram as tipa (amine)	Tordon™ 75D Herbicide	N	C										C										N						
suspension concentrate	clopyralid as mea + florasulam	Torpedo™		C												C	C	C												
emulsifiable concentrate	trifluralin	Treflan™ Herbicide						C				C		C																C
emulsifiable concentrate	diclofop + fenoxaprop	Tristar® Advance Herbicide		N										C														C		
water dispersible granule	flumioxazin	Valor®																												
emulsifiable concentrate	bromoxynil + pyrasulfotole	Velocity® ****		C			C		C												C					C				
emulsifiable concentrate	haloxyfop	Verdict™ 520 Herbicide												C			N											C	C	
emulsifiable concentrate	fenoxaprop + mefanpyr-diethyl	Wildcat® Herbicide		C										C			N	N												

C = Compatible. N = Not compatible. Where there is a blank compatibility is not known, contact the manufacturer. Compatibility is dependent upon use pattern (both crop and weeds), rate, surfactant/compatibility agent and temperature. Water quality also affects compatibility. Mixtures generally require greater agitation. Mixing more than two chemicals affects compatibility and is not recommended.
This chart only indicates which chemicals are compatible in mixtures at the time of compilation (4/13). Read the compatibility and crop safety sections of both labels before mixing. Mixing chemicals is at the user's own risk.
* WG formulations also available; check labels for compatibilities. ** Other formulations also available; check labels for compatibilities. *** DO NOT mix with selective grass herbicides.
**** Check label for compatible mixing rates and effect on weeds.

PRODUCT	ECLIPSE®	FASTAC DUO®	FUSILADE®	TORDON™	GESAPRIM®	GESATOP®	GLEAN®	GOAL®	GRAMOXONE®	GRAZON™	HAMMER®	HARMONY®	HOEGRASS®	HOTSHOT™	HUSSAR®	IGRAN®	IMIDAN®	JAGUAR®	KAMBA® 500	KAMBA® M	KARATE®	LE-MAT®	LOGRAN®	LOGRAN® B-POWER	LONTREL™	LORSBAN™	LVE MCPA	MATAVEN®	MCPA 500	MONZA®	OMETHOATE	ONDUTY®	PARAGON®	PROMETRYN 900DF	RAPTOR®	ROUNDUP® CT	ROUNDUP® DRY	ROUNDUP POWERMAX™	SELECT®	SENCOR®	SERTIN®	SNIPER®	SPINNAKER®	SPRAY.SEED	STARANE™	STOMP®	SUPRACIDE®	SURPASS®	TALSTAR®	TARGA®	TERBYNE®	TIGREX®	TOPIK®	TORDON™ 242	TORDON™ 75D	TREFLAN™	TRISTAR® ADVANCE	VERDICT™ 520	WILDCAT®
Kamba® 500 Herbicide		C			C		C		C							C										N	C		C							C	C	C						C				C											
Kamba® M Herbicide							C		C							C										N																		C															
Le-Mat® 290 Insecticide							C						C					C											C			C			C	C	C	C	C	C	C		C	C				C		C				C				C	
Logran® 750 Herbicide																C										C	C						C			C	C	C						C				C	C			C	N			C			
Logran® B Power																																				C		C						C															
Lontrel™ Herbicide	C			C			C		C				C			C		C									C		C				C			C	C	C			C			C	C			C		C		C		C			C	C	C
Lorsban™ 300/500 Insecticide		C		C	C		C		C				C					C	N	N			C				N		N				N			C	C	C						C	C		C	N				C		N	N	C		C	
LVE MCPA	C	C					C						C	C		C		C	C				C		C	N						C			C	C	C	C			N	C		C	C							C	C				N	C	C
LV Ester 600							C												C				C													C		C						C															
Mataven® 90 Herbicide							C					N																																															
MCPA 500 Herbicide	C	C					C			C						C	C		C			C	C			N									C						N			C	C							C	C	C	C			N	
Midas®		C																													C																												
Monza®													N			N			N			N			C		C									C		C						C								C							
Paragon® Herbicide		C					C						C										C		C	N															N												C				C		C
Precept® 300		C											C		C							C			C					C																		C					C				C		C
Prometryn 900DF						C																																								C										C			
Raptor® Herbicide		C				C											C					C					C		C																			C											
Weedmaster® DST® Herbicide					C	C	C				C								C		C	C	C	C	C	C	C			C															C	C		C								C			
Weedmaster® Argo®					C	C	C				C								C		C	C	C	C	C	C	C			C															C	C		C								C			
Roundup Ultra® Max Herbicide	C				C	C	C							C					C			C	C	C	C	C	C			C															C	C		C								C			
Sakura®		C					C	C	C			C										C	C	C						C					C		C							C			C									C			
Select® Herbicide		C	C																			C																			C	C								C								C	
Sencor® 480 Herbicide																						C																			N	C	C						C							C			
Sniper® Herbicide	C	C	C			C																C					C												C	C									C										
Spinnaker® 700 Herbicide		C				C																C														C	C	C		C				C		C			C							C			
Spray.Seed® 250 Herbicide		C			C		C	C	C								C		C			C	C		C	C	C		C														C			C		C	C		C					C			
Starane™ Herbicide	C			C	C					C			C	C									C		C	C	C		C							C		C										C					C	C	C			C	C
Stomp® 330 Herbicide					C	C			C														C											C		C	C	C					C	C					C										
Supracide® 400 Insecticide																C										C																											C						
Surpass® 300 Herbicide	C	C		C	C	C	C		C	C						C	C		C			C	C		C	N									C	C								C	C							C	N	C	C			N	
Talstar® 100 Insecticide							C											C					C																	C		C	C	C		C						C							
Targa® Herbicide																		C				C			C														C		C											C							
Terbyne®									C																											C	C	C						C												C			
Tigrex® Herbicide	C	C	C			C	C		C				C		N								C		C	C	C		C												N							C	C	C			C		C		C		C
Topik® 240 Herbicide	C												C	C				C					N										C												C		C	N				C		C	N				
Tordon™ 242 Herbicide	C												C									C			C	N	C		C												N				C			C					C						
Tordon™ 75D Herbicide	C				C																					N			C							C	C	C							C			C				C	N					N	
Torpedo™																											C		C																														
Treflan™ Herbicide						C	C		C														C			C								C						C			C	C							C								
Tristar® Advance Herbicide	C			N														C							C		N						C																			C							
Valor®																																				C		C						C															
Velocity® ****																									C		C																										C				C		C
Verdict™ 520 Herbicide					C	C																C			C	C	C		N										C		C				C			N							N				
Wildcat® Herbicide	C						N					C	C	N				C							C		C						C												C							C							

Herbicide compatibilities

Table 34. Fungicide/herbicide compatibility chart for wheat

Product	Fungicides							
Herbicides	Amistar® Xtra 200 g/L azoxystrobin, 80 g/L cyproconazole – Syngenta	Hornet® 430 g/L tebuconazole – Nufarm	Opera®, 85 g/L pyraclostrobin, 62.5 g/L epoxiconazole – Nufarm	Opus® 125, 125 g/L epoxiconazole – Nufarm	Prosaro®, 210 g/L prothioconazole, 210 g/L tebuconazole – Bayer CropScience	Throttle® 500, 500 g/L propiconazole – Nufarm	Tilt®, 250 g/L propiconazole – Syngenta	Tilt® Xtra, 250 g/L propiconazole, 80 g/L cyproconazole – Syngenta
2,4-D LV Estercide Xtra 680, 680 g/L 2,4-D (present as the ethylhexyl ester) – Nufarm	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible with Estercide® Xtra 680. No info on crop safety or efficacy available.	Physically compatible with Estercide® Xtra 680. No info on crop safety or efficacy available.	Physically compatible. May result in adverse crop effects including reduced growth and yield loss through phenoxy herbicide damage, if applied at the incorrect crop growth stage. The use of an adjuvant in the mix is likely to result in increased damage. If using an adjuvant limit Prosaro® rate to 150 mL/ha and adhere to all recommendations on the use of phenoxy herbicides for the crop. Note that generally adjuvants are not recommended with 2,4-D ester.	Physically compatible with Estercide® Xtra 680. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Achieve® WG, 400 g/kg tralkoxydim – CropCare	Physically compatible. No info on crop safety or efficacy available.	–	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible, very good crop safety, with no indication the addition of Prosaro® increased crop effects. Hasten™ was used as the adjuvant. Supercharge® is generally recommended for use with Achieve® but has not been evaluated with Prosaro®. Any adjuvant recommended for use with Prosaro® may be used. Contact Achieve® manufacturer to confirm suitability of alternative adjuvants to Supercharge®.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Agritone® 750 SL, 750 g/L MCPA (as dimethylamine salt) + Hasten™ 1% – Nufarm	Physically compatible with MCPA amine, ester LVE. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible, No info on crop safety or efficacy available. BS1000® @ 0.25% recommended adjuvant.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible with MCPA amine, ester LVE. No info on crop safety or efficacy available.	Physically compatible with MCPA amine, ester LVE. No info on crop safety or efficacy available.
Ally® 7 g/ha, 600 g/kg metsulfuron-methyl (+ BS1000®) – DuPont	–	–	Physically compatible with Associate®. Nufarm recommend including Chemwet® 1000. No info on crop safety or efficacy available.	Physically compatible with Associate®. Nufarm recommend including Chemwet® 1000. No info on crop safety or efficacy available.	Physically compatible. The addition of Prosaro® to Ally® increased crop effects although effects were generally transient and crops recovered. This was done with the addition of Hasten™ adjuvant. The use of a non-ionic surfactant should improve crop safety although the rate required (0.25%) is higher than usually recommended for use with Ally®.	Physically compatible with Associate®. No info on crop safety or efficacy available.	–	–
Amicide® Advance 700, 2,4-D (present as the dimethylamine and monomethylamine salts) – Nufarm	Physically compatible. No info on crop safety or efficacy available.	–	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. May result in adverse crop effects including reduced growth and yield loss through phenoxy herbicide damage, if applied at the incorrect crop growth stage . The use of an adjuvant in the mix is likely to result in increased damage. If using an adjuvant limit Prosaro® rate to 150 mL/ha and adhere to all recommendations on the use of phenoxy herbicides for the crop. Note that generally adjuvants are not recommended with Amicide® 625.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Atlantis® OD, 30 g/L mesosulfuron-methyl + 90 g/L mefenpyr-diethyl – Bayer CropScience	–	–	–	–	Physically compatible. May result in increased crop effects, limiting Prosaro® rate to 150 mL/ha should improve crop safety. BS1000® @ 0.25%,Hasten™ 1% or Rocket® 1% (chose adjuvant depending on weed target for Atlantis® OD.)	–	–	–
Axial® 100 EC, pinoxaden 100 g/L + cloquintocet-mexyl 25 g/L (+ Adigor® 0.5%)	Physically compatible. No info on crop safety or efficacy available.	–	–	–	Physically compatible. May result in adverse crop effects if used late in the season. Limiting Prosaro® rate to 150 mL/ha should improve crop safety. Adhere to the crop stage recommendations for Axial® application.Use Adigor® 0.5% (as required for Axial® use).	–	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Cadence® WG, 700 g/kg (dicamba present as sodium salt) – Syngenta	Not compatible.	–	–	–	Physically compatible. Good crop safety. Typical dicamba wilting effects on the crop are often observed within days of application, these effects have been transient in the trials conducted.	–	Not recommended.	Not recommended.
Hoegrass® 500, 500 g/L diclofop-methyl – Bayer CropScience	Physically compatible. No info on crop safety or efficacy available.	–	–	–	Physically compatible. May result in adverse crop effects if using hasten adjuvant. Limiting Prosaro® rate to 150 mL/ha should improve crop safety and only use non-ionic surfactant (BS1000® @ 0.25%) Adhere to the crop stage recommendations for Hoegrass® application.	–	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Logran® 750 WG, 750 g/kg trisulfuron – Syngenta	Physically compatible. No info on crop safety or efficacy available.	Physically compatible with Nugran®. No info on crop safety or efficacy available.	Physically compatible with Nugran®. No info on crop safety or efficacy available.	Physically compatible with Nugran®. No info on crop safety or efficacy available.	–	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.

Lontrel™ SL, 300 g/L clopyralid (present as triisopropanolamine salt) (+Hasten™) – Dow Agrosciences	–	–	–	–	Physically compatible, very good crop safety.	–	–	–
LVE Agritone®, 570 g/L MCPA (present as the 2-ethylhexyl ester) – Nufarm	Physically compatible with LVE. No info on crop safety or efficacy available.	–	–	–	Physically compatible with MCPA LVE 500 g/L ai. (+Hasten™). Very good crop safety. Any adjuvant recommended for use with Prosaro® may be used.	–	Physically compatible with LVE. No info on crop safety or efficacy available.	Physically compatible with LVE. No info on crop safety or efficacy available.
Mataven® 90, 90 g/L flamprop-M-methyl – Nufarm	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	–	–	Physically compatible. Very good crop safety, negligible increase in crop effects, Hasten™ used as adjuvant. Mataven® label indicates compatibility with Uptake™. This is the preferred adjuvant when mixing with Prosaro®.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Paragon® 500 g/L MCPA (present as the ethylhexyl ester) + 50 g/L picolinafen – Nufarm	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	–	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Tigrex® 250 g/L MCPA as ethylhexl ester + 25 g/L diflufenican – Bayer CropScience	Physically compatible. No info on crop safety or efficacy available.	–	–	–	Physically compatible. Crop safety with Tigrex® is very good even though Hasten™ was used in all trials, against the recommendation for use of Tigrex®. The use of a non ionic-surfactant rather than a crop oil should further improve crop safety.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Topik® 240 EC, 240 g/L clodinafop propargyl + cloquintocet-mexyl 125 mL/ha – Syngenta	Physically compatible. No info on crop safety or efficacy available.	–	–	–	Physically compatible. May result in adverse crop effects if used late in the season. Limiting Prosaro® rate to 150 mL/ha should improve crop safety. Adhere to the crop stage recommendations for Topik® application. Recommended adjuvant Uptake™ 0.5% or D-C-Trate 1%.	–	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Tordon™ 75-D, 300 g/L 2,4-D (as the triisopropanolamine salt) + 75 g/L picloram (as the triisopropanolamine salt) – Dow Agrosciences	–	–	–	–	Physically compatible. No information on crop safety of the mixture is available. The use of an adjuvant with Tordon™ 75-D is NOT recommended. This may compromise efficacy of Prosaro®.	–	–	–
Tristar® Advance, 250 g/L diclofop-methyl + 13 g/L fenoxaprop-P-ethyl + 7.4 g/L mefenpyr-diethyl – 1.5 L/ha – Bayer CropScience	–	–	–	–	Physically compatible. May result in adverse crop effects if using Hasten™ adjuvant. Limiting Prosaro® rate to 150 mL/ha should improve crop safety and only use non-ionic surfactant. Adhere to the crop stage recommendations for Tristar Advance® application. BS1000® 0.25% recommended adjuvant.	–	–	–
Velocity® bromoxynil (mixed heptanoic and octanoic acid esters) + 37.5 g/L pyrasulfotole + 9.4 g/L mefenpyr-diethyl	–	–	–	–	Physically compatible. Limited data but good crop safety indicated. Use Hasten™ 1% or an alternative crop oil that is recommended for use with both products.	–	–	–
Wildcat® 110 EC, 110 g/L fenoxaprop-P-ethyl, + 30 g/L mefenpyr-diethyl 500 mL/ha – Bayer CropScience	–	–	–	–	Physically compatible. Good crop safety. BS1000® @ 0.25%.	–	–	–

Where there is a blank compatibility is not known, contact the manufacturer. Compatibility is dependent upon use pattern, rates, surfactants, compatibility agents, temperature and water quality. Mixtures generally require constant agitation. Mixing more than two products is not recommended. This chart only indicates which chemicals are compatible in mixtures at the time of compilation March 2012. Read the compatibility and crop safety sections of all labels before mixing. Mixing chemicals is at the user's own risk. See tips for tank mixing page 19.

3 way mixes can cause compatibility problems in some instances. Important to read critical comments on technical sheets and labels as some rates can cause an adverse crop effect. Product compatibility is sourced from technical notes and labels of the fungicide maufacturer. Both products and companies should be consulted prior to undertaking a tank mix. This chart is for wheat, however individual wheat varieties will need to be checked for suitability for use with any particular herbicide or fungicide listed here.

In many cases it is useful to mix a herbicide and fungicide together to save on further application passes within a paddock. This has been more common in recent years with less varietal resistance to stripe rust. Mixing herbicides and fungicides whilst practical, can be risky. Many products may be Physically compatible, however interactions may occur between the herbicide and the fungicide which may reduce the efficacy of either or both products. Crop damage may also be greater when mixing herbicides and fungicides. An adjuvant recommended for one product in a tank mix may have an adverse effect on the other product. The same is true of water quality where solubility for one product might be quite different for the other.

Whilst this table provides the best available information regarding common herbicide and fungicide mixtures, always consult with your advisor and product manufacturers before tankmixing herbicides with fungicides, and check for any updated technical information on such mixes.

Table 35. Cereal foliar fungicides – 2014 currently registered products (NSW) – winter cereals

Various trade names sometimes available under these active ingredients and concentrations. See specific labels for details.

Active and Concentration	Examples of commercial trade names		WHP (weeks) W = wheat B = barley		Cost per Litre[1]	Adjuvant (as per label)	Diseases Controlled[2]									Registered for aerial application
	Product	Manu-facturer	Grazing	Harvest			Stripe Rust	Stem Rust	Leaf Rust	Crown (leaf) Rust	Septoria tritici blotch	Septoria nodorum blotch	Yellow Spot	Barley Scald	Net Blotch	Powdery Mildew	
Azoxystrobin 200 g/L + cyproconazole 80 g/L	Amistar® Xtra	Syngenta	3	6	$40.49	Not Required	400 mL–800 mL (wheat) $16.20–$32.39		200 mL–800 mL (wheat & barley [7]) $8.10–$32.39				400 mL–800 mL (wheat) $16.20–$32.39		200 mL–800 mL (barley) $8.10–$32.39	400 mL–800 mL (wheat & barley) $16.20–$32.39	Yes
Azoxystrobin 120 g/L + tebuconazole 200 g/L	Custodia®	Farmoz	3 +ESI	6	$55.00		315mL–630 mL (wheat) $17.33–$34.65	315mL–630 mL (wheat) $17.33–$34.65	315mL–630 mL (wheat & barley [7]) $17.33–$34.65		630 mL (wheat) $34.65	315mL–630 mL (wheat) $17.33–$34.65	315mL–630 mL (wheat) $17.33–$34.65	315 mL (barley) $17.33	315mL–630 mL (barley) $17.33–$34.65	315mL–630 mL (wheat & barley) $17.33–$34.65	Yes
Epoxiconazole 125 g/L	Opus® 125	Nufarm	6 + ESI	6	$27.39	200 mL/100 L Chemwet may assist in certain conditions	250 mL–500 mL (wheat) $6.85–$13.70		500 mL (wheat) 250 mL–500 mL (barley) $6.85–$13.70			250 mL–500 mL (wheat) $6.85–$13.70		250 mL (barley) $6.85	250 mL–500 mL (barley [6]) $6.85–$13.70	250 mL (wheat & barley) $6.85	Yes
Fenbuconazole 240 g/L	Indar®	Dow AgroSciences	2 + ESI	NR	$27.50	500 mL/100 L Uptake Spraying Oil	150–300 mL (wheat) $4.13–$8.25										No
Flutriafol 250 g/L	Intake® Combi	Crop Care	7-W 10-B	7-W 10-B	$16.06	200 mL/100 L BS1000®	250 mL–500 mL (wheat) $4.02–$8.03		250 mL–500 mL (wheat) $4.02–$8.03		250 mL–500 mL (wheat) $4.02–$8.03	250 mL–500 mL (wheat) $4.02–$8.03				250 mL–500 mL (barley) $4.02–$8.03	Yes
Propiconazole 250 g/L##	Tilt®	Syngenta	1	4	$14.30	Not Required	250 mL–500 mL (wheat)^^^ $3.58–$7.15	500 mL (wheat & oats) $7.15	150 mL–500 mL (wheat) $2.15–$7.15	250 mL–500 mL (oats) $3.58–$7.15	250 mL–500 mL (wheat & oats [4]) $3.58–$7.15	150 mL–500 mL (wheat) $2.15–$7.15	250 mL–500 mL (wheat) $3.58–$7.15	500 mL (barley) $7.15	250 mL–500 mL (barley) $3.58–$7.15	150 mL–500 mL (wheat & barley) $2.15–$7.15	Yes
Propiconazole 435 g/L	PropiMax®	Dow AgroSciences	1	4	$32.18	Not Required	145 mL or 285 mL (wheat) $4.67–$9.17	285 mL (wheat & oats) $9.17	85 mL–285 mL (wheat) $2.74–$9.17	145 mL–285 mL (oats) $4.67–$9.17	145 mL–285 mL (wheat & oats [4]) $4.67–$9.17	145 mL–285 mL (wheat) $4.67–$9.17	145 mL–285 mL (wheat) $4.67–$9.17	285 mL (barley) $9.17	285 mL (barley [5]) $8.75	85 mL–285 mL (wheat & barley) $2.74–$9.17	Yes
Propiconazole 500 g/L	Throttle®500	Nufarm	1	4	$32.59	Not Required	125 mL or 250 mL (wheat) $4.07–$8.15	250 mL (wheat & oats) $8.15	75 mL–250 mL (wheat) 125 mL–250 mL (barley) $2.44–$8.15	125 mL–250 mL (oats) $4.07–$8.15	125 mL–250 mL (wheat & oats [4]) $4.07–$8.15	75 mL–250 mL (wheat) $2.44–$8.15	125 mL–250 mL (wheat) $4.07–$8.15	250 mL (barley) $8.15	125 mL–250 mL (barley) $4.07–$8.15	75 mL–250 mL (wheat & barley) $2.44–$8.15	Yes
Propiconazole 250 g/L + cyproconazole 80 g/L	Tilt® Xtra	Syngenta	3 + ESI	6	$37.32	Not Required	250 mL–500 mL (wheat) $9.33–$18.66	500 mL (wheat) $18.66	150 mL–500 mL (wheat & barley [3]) $5.60–$18.66		250 mL–500 mL (wheat) $9.33–$18.66	150 mL–500 mL (wheat) $5.60–$18.66	250 mL–500 mL (wheat) $9.33–$18.66	500 mL (barley) $18.66	250 mL–500 mL (barley) $9.33–$18.66	150 mL–500 mL (wheat & barley) $5.60–$18.66	Yes
Propiconazole 250 g/L + Tebuconazole 250 g/L	Cogito™	Syngenta	2	5	$25.85		125 mL or 250 mL (wheat) $3.23–$6.46	125–250 mL (wheat) 250 mL (oats) $3.23–$6.46	125 mL–250 mL (wheat & barley) $3.23–$6.46	125 mL–250 mL (oats) $3.23–$6.46	125 mL–250 mL (wheat & oats [4]) $3.23–$6.46	125 mL–250 mL (wheat) $3.23–$6.46	125 mL–250 mL (wheat) $3.23–$6.46	250 mL (barley) $3.23–$6.46	125 mL–250 mL (barley) $3.23–$6.46	125 mL–250 mL (wheat & barley) $3.23–$6.46	Yes
Prothioconazole 210 g/L + tebuconazole 210 g/L	Prosaro® 420	Bayer CropScience	2	5	$77.01	Various(adjuvants required for some diseases) – As per label directions	150 mL–300 mL (wheat & triticale) $11.55–$23.10	150 mL–300 mL (wheat) 300 mL (oats) $11.55–$23.10	150 mL–300 mL (wheat & barley) $11.55–$23.10	300 mL (oats) $23.10		150 mL–300 mL (wheat) $11.55–$23.10	150 mL–300 mL (wheat) $11.55–$23.10	150 mL–300 mL (barley) $11.55–$23.10	150 mL–300 mL (barley) $11.55–$23.10	150 mL–300 mL (wheat & barley) $11.55–$23.10	Yes

Table 35. Cereal foliar fungicides – 2014 currently registered products (NSW) – winter cereals (continued)

Various trade names sometimes available under these active ingredients and concentrations. See specific labels for details.

Active and Concentration	Examples of commercial trade names		WHP (weeks) W = wheat B = barley		Cost per Litre[1]	Adjuvant (as per label)	Diseases Controlled[2]									Registered for aerial application
	Product	Manu-facturer	Grazing	Harvest			Stripe Rust	Stem Rust	Leaf Rust	Crown (leaf) Rust	Septoria tritici blotch	Septoria nodorum blotch	Yellow Spot	Barley Scald	Net Blotch	Powdery Mildew	
Tebuconazole 225 g/L + flutriafol 75 g/L	Impact Topguard®	Ospray	7-W 10-B	7-W 10-B	$13.06	2 L/100 L of Ospray 1000 or 1 L/100 L D-C-Trate	200 mL or 400 mL (wheat) $2.61–$5.22		200 mL or 400 mL (wheat) $2.61–$5.22		200 mL or 400 mL (wheat) $2.61–$5.22	200 mL or 400 mL (wheat) $2.61–$5.22				200 mL or 400 mL (barley) $2.61–$5.22	Yes
Tebuconazole 45 g/kg + sulfur 700 g/kg	Unicorn 745 WG	Sulphur Mills Aust. Limited	2	5	-		1..37 or 2.75 kg/ha	1..37 or 2.75 kg/ha	1..37 or 2.75 kg/ha	1..37 or 2.75 kg/ha		1..37 or 2.75 kg/ha	1..37 or 2.75 kg/ha	1..37 kg/ha		1..37 or 2.75 kg/ha	No
Triadimefon 125 g/L	Triadimefon 125 EC	Ospray	Not stated, see footnote $	4	$6.22	Not required	500 mL or 1,000 mL (wheat)^^^ $3.11–$6.22							1,000 mL (barley) $6.22		1,000 mL (barley) $6.22	Yes
Triadimefon 500 g/kg	Triadimefon 500WG	Ospray	Not stated, see footnote @	4	$17.36	Not required	125 g– 250 g (wheat) $2.17–$4.34		125 g– 250 g (wheat) $2.17–$4.34		125 g– 250 g (wheat) $2.17–$4.34					250 g (barley) 125 g–250 g (wheat) $2.17–$4.34	Yes

Notes:

1 Indicative costs only: significantly lower prices are often obtained for bulk purchases of commonly used products.

2 Body of table shows rate mL/ha, g/ha and associated cost $/ha for registered products.

3 Rate on barley is 250 mL–500 mL.

4 Propiconazole and propiconazole + tebuconazole is registered for suppression of Septoria leaf blotch in oats.

5 Spot form of net blotch.

6 Net form of net blotch only.

7 Rate on barley is 200 mL–800 mL.

8 Prosaro 420 is registered for the control of Fusarium head blight.

Various formulations and active ingredient concentrations of propiconazole and tebuconazle are available.

@ Do not mix leaves treated with this product with feed intended for animal consumption.

$ Feed treated with this product must not be used for animal consumption, poultry feed or mixed with animal feed.

+ ESI Export slaughter interval applies. Do not slaughter animals destined for export within 7 days of consumption of treated cereal forage or straw.

NR Not required when used as directed.

Growers applying a foliar fungicide to control rust or other diseases need to observe the withholding period (WHP). Fungicides applied late, closer to harvest, may produce an excessive, illegal residue if applied within the WHP. For most of the fungicides registered to control diseases in winter cereals, the maximum residue limit (MRL) is set very low, at the limit of detection. A residue above the MRL is illegal under the Pesticides Act and renders the offender liable to prosecution and a fine. Excessive residues also put Australia's export trade at risk. If it is necessary to apply a fungicide late, select a product with a short WHP.

^^^ Permit 12654 – Stripe rust control in triticale – use under permit, tebuconazole 430 g/L, tebuconazole 500 g/L, propiconazole 250 g/L, tridimefon 125 g/L based products, see permit for full use patterns

Table 36. Canola and pulse foliar fungicides – 2014

Foliar fungicides for canola, chickpea, field pea, faba bean and lupin

Example foliar fungicide trade name and manufacturer	Active ingredient	Harvest Withholding Period (WHP) – weeks/days		Rate to apply per hectare (L/ha or kg/ha)	Cost of product per Litre ($)	Size of pack (kg or L – range of pack sizes)	Canola	Chickpea	Field pea	Faba bean	Lupin
		Harvest	Grazing								
Bravo® Weather Stik – Syngenta Barrack® Betterstick – Crop Care	chlorothalonil (720 g/L)	7 days	Do not graze	1.4–2.3 L	15.00	1–1000 L				Chocolate spot Rust	
Barrack® 720 – Crop Care Unite® 720 – Nufarm	chlorothalonil (720 g/L)	14 days	14 days	1.4–2.3 L (faba beans) 1.0–2.0 L (chickpeas)	15.00	1–1000 L		Ascochyta blight		Chocolate spot Rust	
Echo® 900 Fungicide – Sipcam	chlorothalonil (900 g/kg)	7 days	Do not graze	1.2–1.9 kg	13.85	1–20 kg				Chocolate spot Rust	
Rovral® Liquid – Bayer CropScience Iprodione Liquid 250 – Ospray	iprodione (250 g/L)	42 days	42 days	2.0 L	17.75	2–1000 L	Sclerotinia stem rot				
Dithane® Rainshield Neo Tec Fungicide – Dow AgroSciences	mancozeb (750 g/kg)	28 days	14 days	1.0–2.2 kg	8.20	20 kg		Ascochyta blight Botrytis grey mould	Blackspot Ascochyta blight Botrytis grey mould Rust	Ascochyta blight Chocolate spot Cercospora Rust	Botrytis grey mould Anthracnose
Manzate® DF – Sipcam	mancozeb (750 g/kg)	28 days	14 days	1.0–2.2 kg	8.20	20 kg		Ascochyta blight Botrytis grey mould	Ascochyta blight Botrytis grey mould Blackspot Rust	Ascochyta blight Chocolate spot Botrytis grey mould Black spot Rust	Botrytis grey mould Anthracnose
Innova Mancozeb 750 Fungicide – Syngenta	mancozeb (750 g/kg)	28 days	14 days	1.0–2.2 kg	8.20	25 L		Ascochyta blight Botrytis grey mould	Ascochyta blight Botrytis grey mould Blackspot Rust	Ascochyta blight Chocolate spot Rust	Botrytis grey mould Anthracnose
Penncozeb® 420 SC – Nufarm	mancozeb (420 g/L)	28 days	14 days	1.8–3.95 L (chickpeas) 3.5 L (faba beans)	9.20	5–1000 L		Ascochyta blight		Chocolate spot	
Polyram® DF – Nufarm	metiram (700 g/kg)	6 weeks	21 days	1.1–2.2 kg	13.35	15 kg		Ascochyta blight Botrytis grey mould	Ascochyta blight Botrytis grey mould Blackspot Rust	Ascochyta blight Chocolate spot Cercospora Rust	
Fortress® 500 – Crop Care Sumisclex® Broadacre – Sumitomo	procymidone (500 g/L)	Canola not required Faba beans 9 days	9 weeks Not stated	1.0 L (canola) 0.5 L (faba bean)	50.55	1–10 L	Sclerotinia stem rot			Chocolate spot	
Prosaro® 420 SC – Bayer CropScience	prothioconazole (210 g/L) + tebuconazole (210 g/L)	Not required	14 days	375–450 mL/ha	77.00	10 L	Blackleg Sclerotinia stem rot				
Folicur® 430 SC – Bayer CropScience Hornet® – Nufarm	tebuconazole (430 g/L)	3 days	3 days	145 mL	16.80	1–1000 L			Powdery mildew	Cercospora (PER13752, expiry 30/06/16)	
Triad 125 – Farmoz	triadimefon (125 g/L)	14 days	Not stated	500 mL	6.20	5–1000 L			Powdery mildew		

Note: New labelling and rescheduling applies to all procymidone products. Health warnings are in place for pregnant women. Prices quoted are GST Inclusive at 10 February 2014 and approximate only. Prices will vary depending on pack size purchased.

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- You've come to trust Prosaro fungicide as the superior choice for broad spectrum foliar disease control in wheat, barley oats and triticale.
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ABN 87 000 226 022 Technical Enquiries 1800 804 479 Ph 03 9248 6888 Fax 03 9248 6800

Bayer CropScience

Table 37. Common retail prices of chemicals used on winter crops

Product name	Chemical name	Company	Price/L or kg (EX GST) ($)	Commonly used rate/ha	Cost ($/ha)
Achieve®	Tralkoxydim	Crop Care	55.90	0.4 kg	22.36
Agritone® 750	MCPA 750 g/L	Nufarm	8.77	0.46 L	4.03
Agtryne® MA	Terbutryn + MCPA	Crop Care	14.52	1.0 L	14.52
Alliance®	Paraquat + Amitrole	Crop Care	13.70	2.0 L	27.39
Ally®	Metsulfuron-methyl	DuPont	68.00	5 g	0.34
Amicide® Advance 700	2,4-D Amine	Nufarm	6.03	0.8	4.82
Atlantis® OD	Mesosulfuron-methyl	Bayer CropScience	80.02	0.33 L	26.41
Atrazine 900 WDG	Atrazine 900 g/kg	Titan	7.25	1.1 kg	7.98
Avadex® Xtra	Triallate	Nufarm/Farmoz	9.27	1.6 L	14.83
Axial®	Pinoxaden 100 g/L+ Cloquintocet-mexyl 25 g/L	Syngenta	139.02	0.2	27.80
Balance®	Isoxaflutole 750 g/kg	Bayer CropScience	368.00	100 g	36.80
Broadside®	Bromoxynil + MCPA + Dicamba	Nufarm	15.77	0.75 L	11.83
Boxer® Gold	Prosulfocarb 800 g/L + S-Metolachlor 120 g/L	Syngenta	14.27	2.5	35.68
Bladex®	Cyanazine	Agnova	50.00	1.5 L	75.00
Broadstrike®	Flumetsulam	Dow AgroSciences	617.00	25 g	15.43
Brodal® Options	Diflufenican	Bayer CropScience	44.02	0.15 L	6.60
Bromocide ® 200	Bromoxynil	Nufarm	12.27	1.4 L	17.18
Bromoxynil MA	Bromoxynil + MCPA	Various	12.85	1.4 L	17.98
Cadence®	Dicamba	Syngenta	41.90	115 g	4.82
Cheetah® Gold	Dichlofop-methyl 200 g/L + Sethoxydim 20 g/L + Fenoxaprop-P-Ethyl 13.6 g/L	Bayer CropScience	23.37	1	23.37
Conclude™	MCPA + Florasulam	Dow AgroSciences	14.85	0.7 L	10.39
Crusader™	Pyroxulam + Cloquintocet-mexyl	Dow AgroSciences	66.00	0.5 L	33.00
Decision®	Diclofop-methyl + Sethoxydim	Bayer CropScience	17.10	1 L	17.10
Diurex® WG	Diuron 900 g/kg	Crop Care	11.85	0.5 kg	5.93
Diuron Liquid	Diuron 500 g/L	Various	8.00	0.9 L	7.20
Dual Gold®	S-Metolachlor 960 g/L	Syngenta	13.87	0.2 L	2.77
Duet® 250 EC	Oryzalin + trifluralin	Farmoz	5.45	1.6 L	8.72
Eclipse® 100SC	Metosulam 100 g/L	Bayer CropScience	197.67	0.05 L	9.88
Ecopar®	Pyraflufen-ethyl 20 g/L	Sipcam	31.12	0.4 L	12.45
Express®	Tribenuron-methyl	DuPont	215.00	25 g	5.38
Flame®	Imazapic	Crop Care	50.98	0.175 L	8.92
Flight® EC	Picolinafen 35 g/L + Bromoxynil 210 g/L + MCPA 350 g/L	Nufarm	27.90	0.54	15.07
Fusilade® Forte	Fluazifop-P 212 g/L	Syngenta	60.25	0.41 L	24.70
Garlon™ 600	Triclopyr 600 g/L	Dow AgroSciences	18.12	0.12 L	2.17
Gesatop® 600 SC	Simazine 600 g/L	Syngenta	7.25	1.7 L	12.33
Glean®	Chlorsulfuron 750 g/kg	DuPont/Nufarm	65.00	20 g	1.30
Goal®	Oxyfluorfen 240 g/L	Dow AgroSciences/Nufarm	21.02	0.075 L	1.58
Gramoxone® 250	Paraquat 250 g/L	Syngenta	6.90	1.0 L	6.90
Grazon™ Extra	Triclopyr 300 g/L + Picloram 100 g/L+ Aminopyralid 8 g/L	Dow AgroSciences	32.13	0.3 L	9.64
Harmony® M	Thifensulfuron + Metsulfuron-methyl	DuPont	406.00	40 g	16.24
Hammer®	Carfentrazone-ethyl 240 g/L	Crop Care	175.00	0.050 L	8.75
Hoegrass® 500	Diclofop methyl 500 g/L	Bayer CropScience	18.95	1 L	18.95
Hotshot®	Aminopyralid + Fluroxypyr	Dow AgroSciences	20.95	0.5 L	10.48
Hussar® OD	Iodosulfuron-methyl-sodium 100 g/L	Bayer CropScience	270.02	100 mL	27.00
Igran®	Terbutryn	Syngenta	17.65	0.85 L	15.00
Intervix®	Imazamox 33 g/L + Imazapyr 15 g/L	Nufarm	42.00	0.3 L	12.60
Jaguar®	Bromoxynil + Diflufenican	Bayer CropScience	12.75	0.75 L	9.56
Kamba® 500	Dicamba 500 g/L	Nufarm	21.28	0.28 L	5.96
Logran®	Triasulfuron	Syngenta	58.50	35 g	2.05
Logran® B-power	Triasulfuron + Butafenacil	Syngenta	144.33	50 g	7.22
Lontrel™	Clopyralid 300 g/L	Dow AgroSciences	26.04	0.3 L	7.81
Lontrel Advanced	Clopyralid 600g/L	Dow AgroSciences	49.22	0.15 L	7.38
Lontrel™ 750 SG	Clopyralid 750 g/kg	Dow AgroSciences	67.25	120 g	8.07
LV Ester 680	2,4-D LV ester 680 g/L	Crop Care	8.45	0.8 L	6.76

Table 37. Common retail prices of chemicals used on winter crops (continued)

Product name	Chemical name	Company	Price/L or kg (EX GST) ($)	Commonly used rate/ha	Cost ($/ha)
Mataven® 90	Flamprop-M-methyl	Nufarm	16.30	2.5 L	40.75
MCPA LVE	MCPA LVE 570 g/L	Various	11.15	0.7 L	7.81
Midas®	MCPA + imazapyr + imazapic	Nufarm	22.15	0.9 L	19.94
Monza®	Sulfosulfuron	Nufarm	950.00	25 g	23.75
Paragon®	Picolinafen + MCPA	Nufarm	31.94	0.25 L	7.98
Pantera®	Quizalofop-P-tefuryl	Crompton	37.00	0.25 L	9.25
Precept® 300 EC	Pyrasulfotole 50 g/L + MCPA 125 g/L	Bayer CropScience	30.03	0.5 L	15.01
Pyresta®	Pyraflufen-Ethyl 2.1 g/L + 2,4-D LV Ester 421 g/L	Sipcam	14.95	0.5 L	7.48
Raptor®	Imazamox 700 g/kg	Crop Care	690.88	45 g	31.09
Reglone®	Diquat	Syngenta	16.25	2.0 L	32.50
Roundup® Attack™	Glyphosate 570 g/L	Nufarm	7.97	0.95	7.57
Glyphosate 450	Glyphosate 450 g/L	Various	5.32	1.0 L	5.32
Sakura® 850 WG	Pyroxasulfone 850 g/kg	Bayer CropScience	325.00	118 g	38.35
Sencor®750	Metribuzin 750 g/kg	Bayer CropScience	27.50	0.28 kg	7.70
Select®	Clethodim	Sumitomo Chemical	12.36	0.3 L	3.71
Sharpen	Saflufenacil	Nufarm	735.00	26g	191.10
Simazine 900	Simazine 900 g/kg	Various	7.10	1.1 kg	7.81
Simazine 500 F	Simazine 500 g/L	Various	5.79	2.0 L	11.58
Spray.seed® 250	Paraquat + Diquat	Syngenta	9.70	1.6 L	15.51
Spinnaker® 700 WDG	Imazethapyr 700 g/kg	Nufarm	147.50	70 g	10.33
Starane™ Advanced	Fluroxypyr 333 g/L	Dow AgroSciences	23.10	0.45 L	10.39
Stomp®	Pendimethalin 440 g/L	Nufarm	10.87	1.4 L	15.22
Targa®	Quizalofop-P-ethyl	Sipcam	17.52	0.25 L	4.38
Thistle-Killem® 750	MCPA amine 750 g/L	Crop Care	8.29	0.96 L	7.96
Tigrex®	MCPA + Diflufenican	Bayer CropScience	12.01	0.5 L	6.01
Topik® 240 EC	Clodinafop-propargyl	Syngenta	56.50	85 mL	4.80
Torpedo™	Clopyralid 300 g/L + Florasulam 50 g/L	Dow AgroSciences	76.21	75 mL	5.72
Triflur® X	Trifluralin 480 g/L	Nufarm	6.19	0.8 L	4.95
Buttress®	2,4-DB 500 g/L	Crop Care/Nufarm	16.91	2.1 L	35.52
Tristar® Advance	Diclofop + Fenoxaprop	Bayer CropScience	10.00	1.5 L	15.00
Tordon™ 242	Picloram + MCPA	Dow AgroSciences	8.04	1.0 L	8.04
Terbyne®	Terbuthylazine 750 g/kg	Sipcam	21.00	1	21.00
Tordon™ 75D	Picloram + 2,4-D	Dow AgroSciences	30.28	0.3 L	9.08
Triathlon®		Farmoz	11.75		0.00
Valor® 500 WG	Flumioxazin 500 g/kg	Sumitomo Chemical	183.33	0.03	5.50
Velocity®	Pyrasulfotole 37.5 g/L + Bromoxynil 210 g/L	Bayer CropScience	30.27	0.5 L	15.14
Verdict™ 520	Haloxyfop-R	Dow AgroSciences	51.02	0.05 L	2.55
Wildcat® 110	Fenoxaprop-P-ethyl 110 g/L	Bayer CropScience	12.76	0.4 L	5.10
2,4-D Amine	625 g/L	Various	5.30	1.2 L	6.35

Common retail prices of adjuvants used on winter crops

Agral 600®	Wetting agent	Syngenta	5.15	0.35 L/100 L	1.80
BS1000®	Wetting agent	Crop Care/Nufarm	6.20	0.2 L/100 L	1.24
Bonza®	Wetting/Spreading	Nufarm	7.04	1.0 L/100L	7.04
Caltex Sprayplus®	Crop oil	Caltex	2.00	2.0 L/100 L	4.00
D-C-Trate®	Petroleum Oil	Caltex	6.29	2.0 L/100 L	39.56
Hasten™	Crop Oil + surfactant	Vic Chemical Co	4.90	1.0 L/100 L	4.90
Liase®	Ammonium Sulfate	Nufarm	1.95	2.0 L/100 L	3.90
LI 700®	Surfactant/Penetrant	Nufarm	6.41	0.25 L/100 L	1.60
Uptake™ Spraying Oil	Crop Oil	Dow AgroSciences	6.72	0.4 L/100 L	2.69
Wetter TX®	Surfactant	Nufarm	11.52	0.2 L/100 L	2.30

Prices are average retail (excluding GST) and are only a guide. They will vary according to location, availability and quantity purchased.

Notes

Notes

Notes

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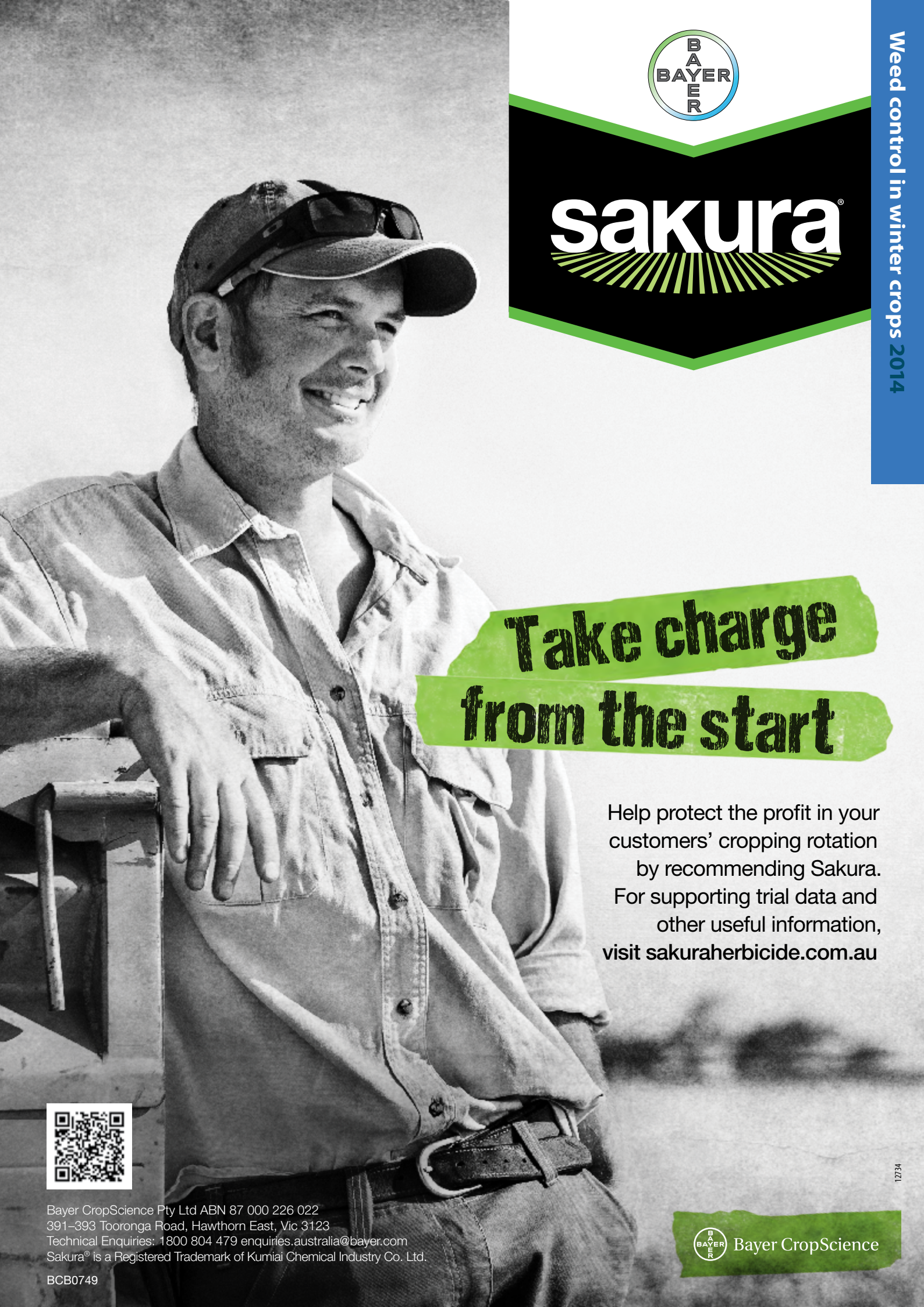
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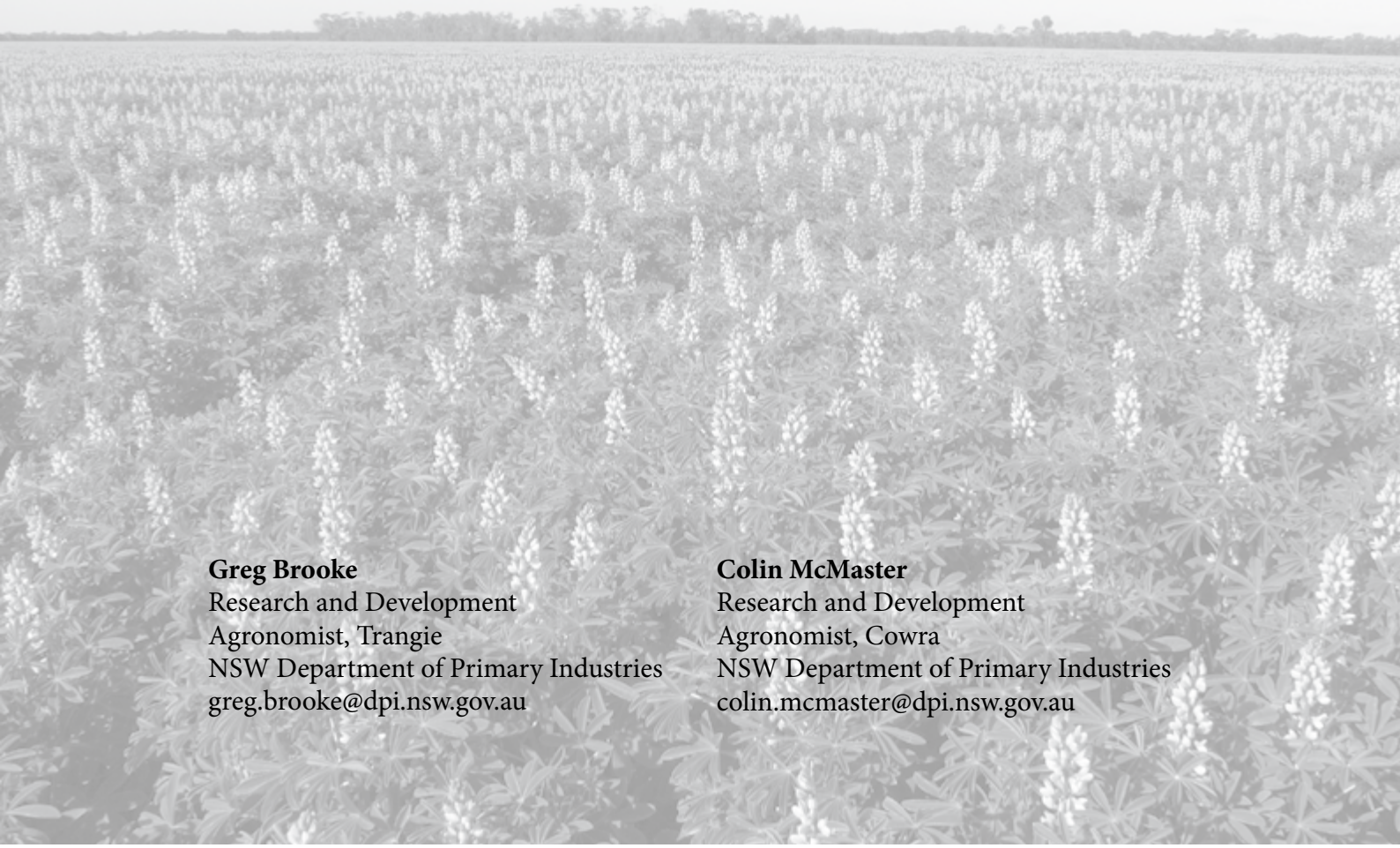
Department of Primary Industries

Weed control in winter crops 2014

NSW DPI MANAGEMENT GUIDE



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Disclaimer

The information contained in this publication is based on knowledge and understanding at the time of writing (March 2014). However, because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate officer of the Department of Trade and Investment, Regional Infrastructure and Services or the user's independent adviser.

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Always read the label

Users of agricultural chemical products must always read the label and any permit before using the product, and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from any compliance with the directions on the label or the conditions of the permit by reason of any statement made or omitted to be made in this publication.

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Small photos, from left: Wild radish seedlings emerging with wheat crop; Paterson's curse in oats, Dubbo NSW; Canola seedling crop, Wellington NSW; Sheep grazing dual purpose wheat, Wellington NSW. All pictures, Greg Brooke, NSW DPI, Trangie NSW.

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The Pulse crop growth stages diagrams are reproduced with the permission of Di Holding and Annabel Bowcher, formerly CRC for Australian Weed Management.

This publication is a companion to the following guides available in 2014 from your local NSW Department of Primary Industries office:

Winter Crop Variety Sowing Guide 2014 and *Insect and Mite Control in Field Crops 2013*.

What's new in 2014?

Axial® in wheat and barley now has a seed sterilization technique registration for selective spray topping of wild oats (black oats) (*Avena* spp.) (GS30-47) to reduce panicle numbers and/or weed seed viability. 200 mL/ha Axial® (Group A) plus 500 mL Adigor™/100 L water.

DO NOT apply later than the flag leaf fully emerged stage (GS39) of the crop. Application timing: Apply Axial® when the majority of wild oats are at the stem elongation stage, up to and including when the flag leaf sheath is just at opening stage (GS30-47). Applications during early stem elongation will provide good control and are most effective in reducing panicle numbers but are less effective in reducing the viability of any weed seed produced. Applications at and beyond the flag leaf fully emerged stage (GS39) will reduce weed seed viability and contribution of seed to the weed seed bank. Carefully monitor weed growth stage to ensure optimum timing of herbicide application and always consider the range in weed growth stages present at application. Late germinating weeds not present at application, will not be controlled.

Garlon™ Fallow Master (755 g/L triclopyr) (Group I) replaces Garlon™ 600.

Lontrel™ Advanced (600 g/L) (Group I) added to the Lontrel™ armoury of 300 g/L Liquid and Lontrel™ 750 SG. Extended label use patterns to cover volunteer pulses.

Outlook® (dimethenamid-P) (Group K). A new IBS herbicide for use in chickpeas and field peas for ryegrass resistance management.

Label requirements include only using in low weed populations and the use of knife point and presswheel systems only for incorporation.

Sharpen® WG (700 g/kg saflufenacil) (Group G) BASF has been released as a spike to glyphosate in pre-sowing situations (not canola) to give improved control of many weeds including fleabanes.

Amitrole T Herbicide (250 g/L amitrole, 220 g/L ammonium thiocyanate) (Group Q) has been registered for Optical Spot Spray technologies for weed cover between 0 and 30%. If percentage weed cover exceeds 30% use approved boom spray rates.

Stomp® 440 replaces Stomp® 330EC (Group D).

Diuron 900 DF Herbicide (Group C) has had an amended lucerne claim registered post the diuron review. Refer to label.

Terrain™ 500 WG (500 g/L flumioxazin) (Group G) has been released as a spike to glyphosate or paraquat/diquat herbicides for rapid knockdown and control of various grass and broadleafed weeds in pre-sowing situations (not canola).

Weedmaster® DST® (470 g/L glyphosate) (Group M) registration for pre-harvest cutting application in annual pasture for hay/silage production.

Targa® is no longer available and is replaced with Elantra® Xtreme® (200 g/L quizalofop-p-ethyl) (Group A).

SprayWise® Decisions is an innovative internet subscriber service that helps rural landholders and contractors to better plan and match the timing of chemical applications to prevailing local weather conditions. New functionality for Spraywise® Decisions includes:

- the ability to choose spray quality to assist with Spray Planning.
- sunrise and sunset times.
- localised forecasts when using smart devices.

Go to www.spraywisedecisions.com.au

The Cotton Field Awareness Map is an industry initiative which has been designed to highlight the location of cotton fields. The service is provided free of charge with the purpose of minimising off-target damage from downwind pesticide application, particularly during fallow spraying.

Farmers, farm managers, resellers, consultants, agronomists, applicators and contractors are encouraged to input their cotton field(s). Users can also access the Cotton Map to check the location of the paddock(s) they may be planning to spray to assess the proximity of the nearest cotton crop.

The map is a joint collaboration between Cotton Australia, Cotton Research and Development Corporation (CRDC), Grains Research and Development Corporation (GRDC) and Nufarm Australia Limited, developed to meet industry needs. Go to www.cottonmap.com.au

Infopest Free Online: Ag chemicals at your fingertips. Infopest (www.infopest.com.au) is a free online database managed by Growcom and updated weekly with new or updated products, permits and Material Safety Data Sheets that have been registered or approved by the Australian Pesticides and Veterinary Medicines Authority (APVMA). It's a great place to start to find a chemical solution for the pest/disease problem in your crop or animals. Please always consult the label.

Contents

Weed control management in winter crops

Good weed control management in winter crops is a vital part of successful and profitable crop production. Yield losses caused by weeds can vary enormously from being almost negligible to a complete loss.

Weeds lower crop yields by competing for soil moisture, nutrients, space and light and can carry diseases which attack crops. This competition reduces grain yield and quality, and can impede harvesting. Some weeds can restrict cropping options as herbicides for control are sometimes limited. Thoroughly investigate which weed species are likely to germinate in a paddock before sowing crops with limited herbicide control options.

Weed control is a numbers game. Growers should aim to reduce numbers and keep them low with an ongoing program. An integrated weed management system combining all the available methods is the key to successful control of weeds.

- **Crop rotation.** A well managed rotation in each paddock, which alternates pastures, broadleaf and cereal crops, is a very useful technique for controlling weeds. For example grass weeds are more easily and cheaply controlled chemically in broadleaf crops, whereas broadleaf weeds are much easier to control in cereal crops. In parts of northern NSW alternating summer and winter crops is a time honoured strategy for weed control. Good crop rotation management can substantially reduce the cost of controlling weeds with chemicals.
- **Haymaking or silage** making in crops and pastures is a very effective way of reducing weed burdens.
- **Pasture management** techniques such as pasture topping by mowing or using herbicides, spray grazing, strategic heavy grazing or burning can all have a role in weed control programs. Cleaning grasses out of legume pastures in winter is a common practice. This involves spraying grasses such as barley grass and vulpia out of pastures in winter to stop seed set, improve nitrogen build-up and reduce root diseases in following cereal crops.
- **Good agronomic practices** such as using weed-free seed (preferably registered or certified) and sowing on time with optimal plant populations and adequate nutrition all contribute to good weed control management. Be extremely vigilant with new weed incursions, not allowing them to set seed. Some crops and varieties are more competitive against weeds than others. All weeds growing in a field should be controlled before the crop emerges. Large weeds which have not been controlled prior to or by the sowing operation prove most difficult and often impossible to remedy with in-crop herbicides.
- **Timely cultivation** is a valuable method for killing weeds and preparing seedbeds. Some growers use varying combinations of mechanical and chemical weed control to manage their fallows or stubbles.
- **Harvest weed-seed management** is a tool now considered to be imperative in both delaying and dealing with herbicide resistant weed populations. See www.grdc.com.au and follow the links.
- **In-crop weed control.** A wide range of pre-emergent and early post-emergent herbicides are available for in-crop weed control. Weeds should be removed from crops as early as possible and certainly no later than 6 weeks after sowing if yield losses are to be minimised. Yield responses will depend on weed species, weed and crop density and seasonal conditions. The stage of growth of the weed and the crop are vital factors to consider when planning the successful use of post-emergent herbicides. Tolerance to herbicides varies between cereals and between the varieties of each cereal. Read herbicide labels carefully for these details and information on the best conditions for spraying.
- **Herbicide resistance** in weeds is a problem that continues to become more widespread through NSW which growers should be alerted to. It is one of the biggest agronomic threats to the sustainability of our cropping systems. However, this problem can be managed by having a good crop and pasture rotation, by rotating herbicide groups and by combining both chemical and non-chemical methods of weed control. Each table throughout this guide lists the mode of action group for each herbicide (See the section 'Herbicide resistance management' in this guide, page 56.)

Weed glossary (spp. = species)

amaranth ..... *Amaranthus* spp.
amsinckia ..... *Amsinckia* spp.
annual ground cherry ..... *Physalis angulata*
annual ryegrass ..... *Lolium rigidum*
barley grass ..... *Hordeum leporinum*
barnyard grass ..... *Echinochloa crus-galli*
Bathurst burr ..... *Xanthium spinosum*
bedstraw ..... *Galium tricornutum*
black bindweed ..... *Fallopia convolvulus*
blackberry nightshade ..... *Solanum nigrum*
bladder ketmia ..... *Hibiscus trionum*
Boggabri weed ..... *Amaranthus mitchelli*
brome grass ..... *Bromus* spp.
buchan weed ..... *Hirschfeldia incana*
button grass ..... *Dactyloctenium radulans*
caltrop (yellow vine) ..... *Tribulus terrestris*
canary grass ..... *Phalaris canariensis*
capeweed ..... *Arctotheca calendula*
charlock ..... *Sinapis arvensis*
cleavers ..... *Galium aparine*
clovers ..... *Trifolium* spp.
common barbgrass ..... *Monerma cylindrica*
corn gromwell ..... *Buglossoides arvense*
couch ..... *Cynodon dactylon*
crassula ..... *Crassula* spp.
cudweed ..... *Gnaphalium* spp.
datura (thornapple) ..... *Datura* spp.
deadnettle ..... *Lamium amplexicaule*
docks ..... *Rumex* spp.
fat hen ..... *Chenopodium album*
fleabane ..... *Conyza* spp.
fumitory ..... *Fumaria* spp.
heliotrope (white) ..... *Heliotropium europaeum*
Hexham scent ..... *Melilotus indicus*
hoary cress ..... *Cardaria draba*
hogweed ..... *Polygonum aviculare*
horehound ..... *Marrubium vulgare*
Johnson grass ..... *Sorghum halepense*
lesser swine cress ..... *Coronopus didymus*
liverseed grass ..... *Urochloa panicoides*
melon camel/afghan ..... *Citrullus lanatus*
melon paddy/prickly ..... *Cucumis myriocarpus*
mexican poppy ..... *Argemone ochroleuca*
mintweed ..... *Salvia reflexa*
mustards ..... *Sisymbrium* spp.
New Zealand spinach ..... *Tetragonia tetragonoides*
noogoora burr ..... *Xanthium occidentale*
nut grass ..... *Cyperus rotundus*
oxalis ..... *Oxalis* spp.
paradoxa grass ..... *Phalaris paradoxa*
Paterson's curse ..... *Echium plantagineum*
peachvine ..... *Ipomea lonchophylla*
peppercress ..... *Lepidium* spp.
phalaris annual ..... *Phalaris minor*
phalaris annual ..... *Phalaris paradoxa*
phalaris perennial ..... *Phalaris aquatica*
pigweed ..... *Portulacca oleracea*
plantain ..... *Plantago* spp.
potato weed ..... *Solanum* spp.
rough poppy ..... *Papaver hybridum*
saffron thistle ..... *Carthamus lanatus*
scotch thistle ..... *Onopordum acanthium*
Shepherd's purse ..... *Capsella bursa-pastoris*
skeleton weed ..... *Chondrilla juncea*
slender thistle ..... *Carduus pycnocephalus*
sorrel ..... *Rumex acetosella*
soursob ..... *Oxalis pes-caprae*
sowthistle ..... *Sonchus* spp.
spear/black thistle ..... *Cirsium vulgare*
spiny emex ..... *Emex australis*
spurge ..... *Euphorbia* spp.
St Barnaby thistle ..... *Centaurea solstitialis*
star thistle ..... *Centaurea calcitrapa*
stinging nettle ..... *Urtica* spp.
stink grass ..... *Eragrostis cilianensis*
stinking goosefoot ..... *Chenopodium* spp.
storksbill ..... *erodium* spp.
sweet summer grass ..... *Digitaria* spp.
toad rush ..... *Juncus bufonius*
turnip weed ..... *Rapistrum rugosum*
variegated thistle ..... *Silybum marianum*
vetch ..... *Vicia* spp.
vulpia ..... *Vulpia bromoides, Vulpia myuros*
wild/prickly lettuce ..... *Lactuca* spp.
wild oat ..... *Avena fatua, Avena ludoviciana*
wild radish ..... *Raphanus raphanistrum*
wild turnip ..... *Brassica tournefortii*
Wimmera ryegrass ..... *Lolium rigidum*
winter grass ..... *Poa annua*
wireweed ..... *Polygonum aviculare*

Cereal growth stages – the Zadoks Scale

A decimal scale describing cereal crop growth stages is now widely used.

This scale, called the Zadoks decimal code, describes the principal growth stages, labelled 0 to 9:

0 Germination	2 Tillering	5 Ear emergence	8 Dough development
1 Seedling growth	3 Stem elongation	6 Flowering	9 Ripening
	4 Booting	7 Milk development	

Each primary growth stage is further subdivided into secondary stages extending the scale from 00 to 99.

The first number represents the growth stage and the following number indicates the numbers of plant parts, e.g. Z12 indicates a young plant with only two leaves fully unfolded, commonly referred to as 2-leaf stage. See the first diagram in 'Growth stages of cereal crops'.

A series of pairs of numbers can be used to further describe the growth stage. For example Z14/21 indicates the main tiller with 4 fully unfolded leaves, commonly referred to as the 4-leaf stage, but this plant has 1 more tiller. Note that additional tillers are counted separately to the main tiller. See the first diagram in 'Growth stages of cereal crops'.

The main stages of interest to cereal producers applying herbicides are:

1 Seedling growth	2 Tillering	3 Stem elongation	4 Booting

Zadoks scale is based on the individual plant, not the general appearance of a crop. Therefore, to use the scale, a representative selection of plants should be examined from a paddock.

Growth terms used elsewhere in this guide, extracted from registered labels, and their Zadoks equivalents are:

3-leaf 3 fully unfolded leaves on main shoot only. Zadoks 13.

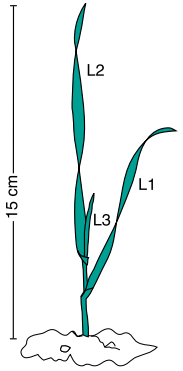
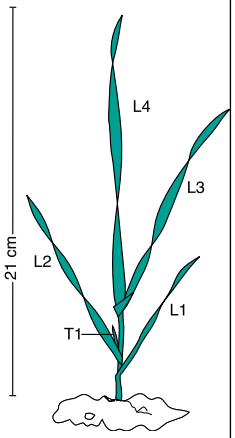
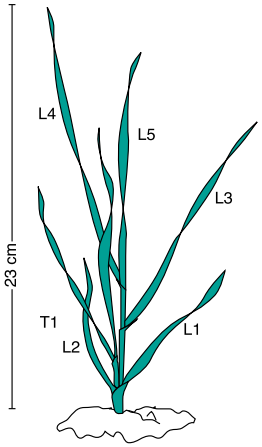
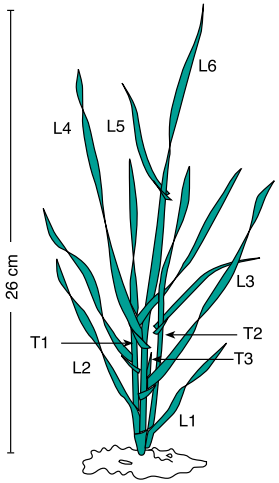
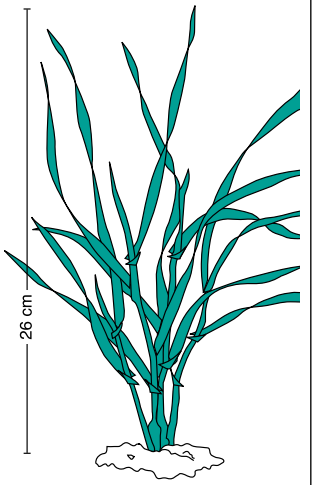
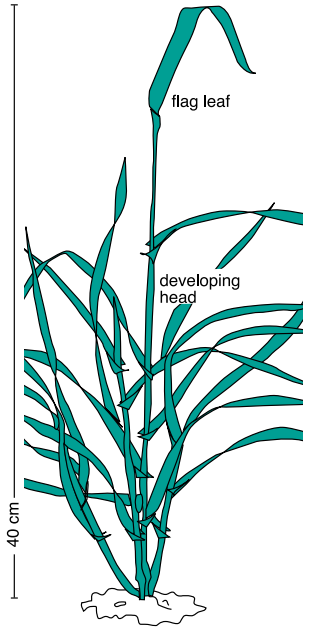
5-leaf 5 fully unfolded leaves on main shoot only. Zadoks 15.

Tillering Tiller formation period. Plants past seedling stage and before stem elongation. Zadoks 21 to 29. See the diagrams in 'Growth stages of cereal crops'.

Jointing Crop becoming erect or booting up to the stage when the flag leaf is just visible. Zadoks 31 to 39. See the fifth diagram in 'Growth stages of cereal crops'.

Boot Head plainly felt in stem before head emergence. Zadoks 35 to 45. See the sixth diagram in 'Growth stages of cereal crops'.

Growth stages of cereal crops

						
Crop growth stage	***2-leaf stage*** Two leaves (L) have unfolded; third leaf present, yet to fully expand.	***Start of tillering*** First tiller (T1) appears from between a lower leaf and the main shoot. Usually 3 or 4 leaves are on the main tiller.	***Tillering stage*** Tillers come from the base where leaves join the stem and continue forming, usually until there are 5 leaves on the main shoot. Secondary roots developing.	***Fully tillered stage*** Usually no more tillers form after the very young head starts forming in the main tiller. Tillering completed when first node detected at base of main stem.	***Start of jointing*** Jointing or node formation starts at the end of tillering. Small swellings – joints – form at the bottom of the main tiller. Heads continue developing and can be seen by dissecting a stem.	**Early boot stage** The last leaf to form – the flag leaf – appears on top of the extended stem. The developing head can be felt as a swelling in the stem.
Zadoks decimal code	2 leaves unfolded (Z12).	4 leaves unfolded (Z14). Main shoot and 1 tiller (Z21).	5 leaves on main shoot or stem (Z15). Main shoot and 1 tiller (Z21).	6 leaves on the main shoot or stem (Z16). Main shoot and three tillers and onwards (Z23–Z30).	First node formed at base of main tiller (Z31).	Z35–Z45.
Herbicide spraying stage	Suitable stage for spraying many herbicides, but too early for 3-leaf stage.	Suitable stage for spraying at the 3–4-leaf stage. Too early for the 5-leaf stage of application.	Suitable for spraying many herbicides at the 5-leaf tillering stage.	Many herbicides can be sprayed up to the end of tillering.	Suitable for 2,4-D spraying.	No herbicide should be applied at this stage. Too late for 2,4-D application.

- There is no difference between spring wheat varieties sown on the same day in the rate of appearance of new leaves.
- At the early boot stage, the last flowering part – the pollen – is being formed. This occurs earlier in barley than in wheat or triticale.

Using the growth stages of cereal crops to time herbicide applications

The recommended timing for application of each herbicide is indicated in the chemical control tables in this guide.

Barley, oats and winter wheat sown in early autumn for grazing develops much more quickly to the tillering stage than cereals sown in May–June. Given adequate moisture and warm weather, early development can be relatively quick.

The terms 'early tillering' and 'late or fully tillered' are not definitive and are commonly used in a very general sense. The number of fully emerged main shoot or stem leaves, together with the number of tillers when there is more than one, is the only accurate definitive description of the growth stage of a cereal plant. See the diagrams in 'Cereal crop growth stages', and 'Cereal growth stages – Zadoks' in this guide.

In many cereal crops:

- 3-leaf (on main stem) stage is before tillering.
- 5-leaf (on main stem) stage coincides with early tillering.
- 6–7-leaf (on main stem) stage coincides with mid to fully tillered stage.
- Jointing or node formation indicates the start of the reproductive phase in the crop, and tillering can be said to be complete.

Product	Chemical	Cereal growth stage							
		2-leaf	3-leaf	4-leaf	5-leaf –Early Till	Mid Till	Late Till	Full Till–Jointing	Booting
	Zadoks Cereal code	12	13	14	15–21	25	29	3	4
Monza® (post-em)	Sulfosulfuron			wheat and triticale only, 1–3-leaf stage					
Glean® (post-em)	Chlorsulfuron								
Achieve®/Pentagon®	Tralkoxydim								
Hoegrass® 500	Diclofop-methyl							wheat	
Wildcat®	Fenoxaprop-p-ethyl							not barley	
Topik®	Clodinafop-propargyl							wheat only	
Axial®	Pinoxaden + Cloquintocet-mexyl								Up to Z49
Tristar® Advance	Diclofop-methyl + Fenoxaprop-p-ethyl							wheat & barley	
Decision®	Diclofop-methyl + Sethoxydim								
Cheetah® Gold	Diclofop-methyl + Sethoxydim + Fenoxaprop-p-ethyl								
Velocity®	Pyrasulfotole + Bromoxynil								
Eclipse® 100 SC	Metosulam							1st node	
Jaguar®	Bromoxynil + Diflufenican								
Intervix®	Imazamox + Imazapyr		Clearfield plus wheat only + barley						
Mataven® 90	Flamprop-m-methyl							wheat	
Agtryne® MA	Terbutryn + MCPA								
Ally®	Metsulfuron-methyl								
Broadside®	Bromoxynil + MCPA + Dicamba								
Bromicide®	Bromoxynil		low rate only at 3–5-leaf stage						
Bromicide® MA	Bromoxynil + MCPA								
Broadstrike™	Flumetsulam								
Diuron ◆	Diuron ◆								
Diuron ◆ + MCPA	280 g + 0.5 L								
Harmony® M	Thifensulfuron + Metsulfuron-methyl								
Atlantis® OD	Mesosulfuron-methyl		wheat only						
Hussar® OD	Iodosulfuron-methyl-sodium								
Crusader™	Pyroxsulam + Cloquintocet-mexyl						wheat only	1st node	
Midas®	Imazapic + Imazapyr + MCPA			Clearfied wheat only				Flag leaf	
Igran®	Terbutryn								
Tigrex®	MCPA + Diflufenican								
Precept® 300 EC	MCPA + Pyrasulfotole		wheat only	wheat only					
Cadence®	Dicamba								
Hotshot™	Aminopyralid + Fluroxypyr							1st node	
Starane™, Starane™ Advanced	Fluroxypyr								
Paragon®	MCPA + Picolinafen								
Flight® EC	MCPA + Picolinafen + Bromoxynil								
Conclude™	MCPA + Florasulam								
Torpedo™	Clopyralid + Florasulam							1st node	
MCPA LVE	MCPA 0.5 L								
	MCPA 0.5 L–2.1 L								
Hoegrass® 500	Diclofop-methyl					barley			
Lontrel™ Advanced	Clopyralid								
Tordon™ 242	Picloram + MCPA								
MCPA amine	MCPA 0.7 L								
	MCPA 0.7–2.1 L								
2,4-DB									
Kamba®	Dicamba								
Kamba® M	MCPA + Dicamba								
FallowBoss™ Tordon™	Picloram + 2,4-D + aminopyralid								
Amicide® Advance 700	2,4-D amine								
2,4-D ester	2,4-D LV ester								
Mataven® 90	Selective spraytopping							wheat only	
Logran®	Triasulfuron							before flowering	

Recommended and preferred timing Less preferred timing ◆ See *What's new in 2014* on page 3.

The recommended timing of application has been determined after significant research by the marketing company, with the aim of minimising crop damage and maximising yield. Pay attention to two vital stages of crop development; at 3–5-leaf stage or commencement of tillering; and at the start of jointing.

Using herbicides successfully

Successful results from herbicide application depend heavily on numerous interacting factors. Many of the biological factors involved are not fully understood, and are out of your control so give careful attention to the factors that you can control.

Annual weeds compete with cereals and broadleaf crops mainly when the crops are in their earlier stages of growth e.g. tillering in cereals. Weeds should be removed no later than 6 weeks after sowing to minimise losses. However, only rarely are selective herbicides completely non-toxic to the crop. See the 'Winter Crop Variety Sensitivity to Herbicides' section of this guide. Early post-emergence control nearly always results in higher yields than treatments applied after tillering of cereals, or branching in broadleaf crops.

Points to remember for the successful use of herbicides:

- Plan the operation. Check paddock sizes, tank capacities, water availability and supply.
- Carefully check crop and weed growth stages before deciding upon a specific post-emergent herbicide. Use the diagrams in *Growth stages of cereal crops* page 8 and *Pulse crop growth stages* on page 70.
- Read the label. Check to make sure the chemical will do the job. Note any mixing instructions, especially when tank mixing two chemicals. This booklet is a guide only; it cannot tell you all the information you need to know.
- Follow the recommendations on the label.
- Conditions inhibiting plant cell growth, like stress from drought, waterlogging, poor nutrition, high or low temperatures, low light intensity and disease or insect attack are not conducive to good herbicide uptake and movement.
- Use good quality water, preferably from a rainwater tank. Water quality is very important. Bore, hard, dirty or muddy water needs special additives or conditioners to improve results with certain herbicides. See *Water quality for herbicide application*, page 16.
- Use good equipment checked frequently for performance and output – see *Boomspray calibration* on page 21.
- Check boom height with spray pattern operation for full coverage of the target.
- Check accuracy of boom width marking equipment.
- Check wind speed. A light breeze helps herbicide penetration into crops. Do not spray when wind is strong.
- Do not spray if rain is imminent or when heavy dew or frost is present. See Table 3 for 'Rainfast Periods', page 14.
- Calculate the amount of herbicide required for each paddock and tank load. Add surfactant where recommended. See *Boomspray calibration* on page 21.
- Select the appropriate nozzle type for the application, see 'Nozzle selection' on page 27. Beware of compromising nozzle-types when tank mixing herbicides with fungicides or insecticides.
- Be aware of spraying conditions to avoid potential spray drift onto sensitive crops and pastures, roadways, dams, trees, watercourses or public places. Note: All chemicals can drift – See *Reducing herbicide spray drift*, page 26.
- Keep a record of each spray operation page 25.

Poison warnings on herbicide labels

The poison schedule

Herbicides are classified into four categories in the Poison Schedule based on the acute health hazard to the user of the herbicide. Each schedule has a corresponding signal heading which appears in large contrasting lettering on the label of the herbicide product.

The Safety Directions specify what personal protective equipment should be worn, and what safety precautions should be taken, e.g. do not inhale spray mist. The First Aid instructions specify what action should be taken in the event of a poisoning. Safety Directions and First Aid Instructions may be different for different formulations of the same pesticide.

Before opening and using any farm chemical, consult the label and Safety Data Sheet (SDS) for specific Safety Directions. The hazardous chemicals section of the Work Health and Safety Regulation requires resellers to provide end users with an SDS.

If you suspect a poisoning, contact the Poisons Information Centre emergency phone (24 hour) 131 126.

Unscheduled: Very low toxicity	(No heading) e.g. Ally®, Brodal®, Diuron, Flame®, Logran®, Simazine, Broadstrike™.
Schedule 5: Slightly toxic	Caution e.g. Achieve®, Agtryne® MA, Atlantis® OD, Avadex® Xtra, Balance®, Kamba® M, Correct®, Dicamba, Dual Gold®, Glean®, Glyphosate, Goal®, Harmony® M, Hotshot™, Hussar® OD, Igran®, Lontrel™ Advanced, Mataven® 90, MCPA, Precept®, Prometryn 900 DF, Raptor®, Weedmaster® DST®, Select®, Sertin®, Sharpen® WG, Sickle®, Spinnaker®, Starane™ Advanced, Stomp® 330 EC, Striker®, Elantra® Xtreme®, Tigrex®, Tordon™ 242, FallowBoss™ Tordon™, Torpedo™, Touchdown® HiTech, Trifluralin, 2,4-DB, Wildcat®.
Schedule 6: Moderately toxic	Poison e.g. Bladex®, Broadside®, Bromoxynil, Bromoxynil + MCPA, Buctril® MA, Cheetah® Gold, Conclude™, Crusader™, Decision®, Eclipse® 100 SC, Flight® EC, Fusilade® Forte, Garlon™ FallowMaster™, Grazon™, Hoegrass®, Jaguar®, Midas®, Paragon®, Reglone®, Sakura®, Sencor®, Sniper®, Terbyne®, Topik®, Tordon™, Tristar® Advance, Valor®, Velocity®, Verdict™ , 2,4-D amine and LV Ester (Note 2,4-D Amine and Ester formulations have now changed to S6 from S5 when active ingredient>200 g/L. Older labels may not reflect this).
Schedule 7: Highly toxic	Dangerous Poison e.g. Gramoxone® 250, Nuquat®, Shirquat®, Spray·Seed® 250.

Table 1. Guidelines for crop rotations – Fallow commencement/maintenance and presowing seedbed weed control

The following plant back periods are a guide only based on label recommendations. The time indicated between application and safe crop rotation intervals may depend on a range of factors including rainfall (amount and intensity), soil type (pH, soil biological activity and organic carbon), soil type variability within a paddock, temperature and herbicide rate. Some crops are more sensitive to various herbicide groups than others. Always take a conservative approach to plant back periods, especially with sensitive or high input crops.

	Ally®[A]	Amicide® Advance (700g/L)[B]			Baton® Low (800 g/kg amine)[B]			Cadence®[B]			Eclipse® 100 SC	LV Ester 680 (680 g/L)[B]			Express®	Flame®	Garlon™	Goal®	Grazon™ Extra[D]					Hotshot™[D]		Kamba® 500[B]			Lontrel™ Advanced 600 g/L[E]			Pyresta®[B]		Starane™ Advanced[F]			Sharpen® WG	Terrain™ 500 WG	Weedmaster® Argo®
Herbicide Group	B	I	I	I	I	I	I	I	I	I	B	I	I	I	B	B	I	G	I	I	I	I	I	I	I	I	I	I	I	I	I	GI	GI	I	I	I	G	G	M
Specific details	pH 5.6–8.5[H]	<0.5 L/ha	0.5–0.98 L/ha	0.98–1.5 L/ha	<0.4 kg/ha	0.4–0.9 kg/ha	0.9–1.3 kg/ha	140 g/ha	200 g/ha	400 g/ha		<0.51 L/ha	0.51–1.0 L/ha	1.0–1.6 L/ha					NNSW 0.2 L/ha	NNSW 0.3 L/ha	NNSW 0.4 L/ha	NNSW 0.6 L/ha	SNSW <0.5 L/ha	NNSW <750 mL/ha	SNSW <500 mL/ha	0.20 L/ha	0.28 L/ha	0.56 L/ha	NNSW <0.0375 L/ha	NNSW 0.0375–0.15 L/ha	NNSW >0.15 L/ha	SNSW <0.15 L/ha	SNSW <0.15–0.25 L/ha	SNSW >0.25 L/ha	250–500 mL/ha	900 mL/ha	0.225 L/ha	0.45 L/ha	0.9 L/ha	9–26 g/ha	30 g/ha	
Crop																																								
Barley	6w	1d	1d	3d	1d	1d	3d	1d	7d	14d		1d	1d	3d	3d		7d		2mo	2mo	4mo	4mo	9mo	4mo	9mo	1d	7d	14d	7d	7d		7d	7d	7d	1d	1d	7d	7d	7d	1hr	1hr	
Canola	9mo	14d	21d	28d	14d	21d	28d	7d	10d	14d		14d	21d	28d	–		–		2mo	4mo	4mo	4mo	9mo	4mo	9mo	7d[G]	10d[G]	14d[G]	7d	7d		7d	7d	7d	14d	21d				16w		
Canola (Clearfield)	10d																																							
Cereal Rye	6w							1d	7d	14d																1d	7d	14d													
Chickpea	9mo	7d	14d	21d	7d	14d	21d	–	21d	28d		7d	14d	21d			7d		4mo	6mo	6mo	6mo	24mo	6mo	20mo	–	21d	28d	3mo	6mo		9mo	12mo	24mo	7d	14d	7d	7d	7d	1hr	1hr	
Cotton		10d	14d	21d	10d	14d	21d	7d	7d	14d		10d	14d	21d			14d							9mo		7d	7d	14d	3mo	6mo					10d	14d	14d	14d	28d	6w	1hr	
Faba Bean	9mo	7d	7d	10d	7d	7d	10d					7d	7d	10d					4mo	4mo	6mo	6mo	24mo	6mo	20mo							9mo	12mo	24mo	7d	7d				1hr	1hr	
Field Pea	9mo	7d	14d	14d	7d	14d	14d	–	14d	21d		7d	14d	14d									24mo		20mo	–	14d	21d				9mo	12mo	24mo	7d	14d				1hr	1hr	
Lentils	9mo	7d	7d	10d	7d	7d	10d					7d	7d	10d																		9mo	12mo	24mo	7d	7d				1hr	1hr	
Linseed	9mo	7d	7d	14d	7d	7d	14d					7d	7d	14d																					7d	7d						
Lucerne	9mo	7d	7d	10d	7d	7d	10d					7d	7d	10d					6mo	9mo	9mo	9mo	24mo	6mo	20mo				9mo	9mo					7d	7d						
Lupins	9mo	7d	14d	21d	7d	14d	21d	7d	14d	21d		7d	14d	21d									24mo		20mo	7d	14d	21d				9mo	12mo	24mo	7d	14d				1hr	1hr	
Maize	14mo							1d	3d	7d					7/21d[C]		7d									1d	3d	7d	7d	14d						7d	7d	7d		1hr	
Medic	9mo	7d	7d	10d	7d	7d	10d	7d	14d	21d		7d	7d	10d									24mo		20mo	7d	14d	21d				9mo	12mo	24mo	7d	7d						
Millet								1d	3d	7d																1d	3d	7d													
Millet (Japanese)	14mo																																							
Millet (Panorama)	14mo																																							
Millet (White French)	14mo																																							
Mungbean								5d	5d	10d					7/21d[C]									5mo		5d	5d	10d												1hr	
Navy Bean		10d	10d	14d	10d	10d	14d					10d	10d	14d																					10d	10d						
Oats	9mo	3d	3d	7d	3d	3d	7d	1d	7d	14d		3d	3d	7d	3d											1d	7d	14d	7d	7d		7d	7d	7d	3d	3d				1hr	1hr	
Pigeon Pea								5d	5d	10d																5d	5d	10d													
Safflower	9mo	7d	14d	21d	7d	14d	21d	14d	21d	28d		7d	14d	21d												14d	21d	28d							7d	14d						
Sorghum	14mo	3d	7d	10d	3d	7d	10d	1d	3d	7d		3d	7d	10d	7/21d[C]		7d							3mo		1d	3d	7d	7d	14d					3d	7d	7d	7d	7d	1d	1hr	
Soybean	14mo	14d	14d	21d	14d	14d	21d	5d	5d	10d		14d	14d	21d	7/21d[C]		7d							5mo		5d	5d	10d	3mo	6mo					14d	14d	7d	7d	14d	1d	1hr	
Sub Clover	9mo	7d	7d	10d	7d	7d	10d	7d	14d	21d		7d	7d	10d									24mo		20mo	7d	14d	21d				9mo	12mo	24mo	7d	7d				1hr		
Sunflower	14mo	7d	10d	14d	7d	10d	14d	1d	7d	14d		7d	10d	14d	7/21d[C]		7d							5mo		1d	7d	14d	3mo	6mo					7d	10d	7d	7d	7d	16w	1hr	
Triticale	6w	1d	3d	7d	1d	3d	7d	1d	7d	14d		1d	3d	7d												1d	7d	14d							1d	3d						
Vetch		7d	7d	10d	7d	7d	10d					7d	7d	10d																		9mo	12mo	24mo	7d	7d						
Wheat	10d	1d	3d	7d	1d	3d	7d	1d	7d	14d		1d	3d	7d	3d		7d		2mo	2mo	4mo	4mo	9mo	4mo	9mo	1d	7d	14d	7d	7d		7d	7d	7d	1d	3d	7d	7d	7d	1hr	1hr	

Do not plant susceptible crops until 9 months after application of Eclipse®. Susceptible crops include canola or other brassica crops, field peas, beans, medics, lucerne and sub-clover.

Minimum recropping periods are influenced by numerous factors. See label for further information.

Goal® herbicide at up to 75 mL/ha may be safely applied 1 day prior to planting wheat, barley, oats, triticale, canola, lupins, fababeans, field peas, lucerne, clover, medics, ryegrass, phalaris and cocksfoot and 7 days minimum prior to planting cotton or soybeans, provided minimal tillage planting equipment is used with minimal soil disturbance.

Susceptible crops should not be sown for at least 2 years when Lontrel™ Advanced at more than 0.15 L/ha has been used in northern Australia.

Do not disturb weeds by cultivation, sowing or grazing for 6 hours of daylight following treatment of annual weeds and 7 days for perennial weeds.

KEY: hr = hours, d = days, w = weeks, mo = months

A For pH 8.6 and above tolerance of crops (grown through to maturity) should be determined on a small scale, in the previous season, before sowing into larger areas.

B When applied to dry soils at least 15 mm of rain must fall prior to the commencement of the plantback period.

C Express® is broken down in soil, primarily by chemical hydrolysis, but to a lesser degree by microbial degredation. Breakdown is fastest in warm, wet acid soils and slower in cold alkaline soils. For these summer crops, if minimum soil temperatures at planting depth are less than or equal to 15°C for three consecutive days, then plantback intervals should be extended to 21 days.

D Black cracking clays. During drought conditions the plantback period may be significantly longer.

E Additional rainfall requirements need to be observed – see label.

F Do not plant susceptible crops, including cotton, pigeon peas and other pulse crops, into irrigated fields with soils containing less than 25% clay content, within 12 months of treatment with Starane™ Advanced.

G Plantback refers to rapeseed not canola.

H Soil pH determined by 1:5 soil:water suspension method.

Table 2. Guidelines for crop rotations – In crop herbicides

Herbicide	Ally®[A]	Amicide® Advance (7 00 g/L)[B]	Atlantis® OD[D]	Atrazine	Balance® (NNSW)[F]	Baton® Low (800g/kg amine)[B]	Boxer® Gold	Broadstrike™[K]		Cadence®[B]	Eclipse® 100 SC
Herbicide group	B	I	B	C	C	I	J&K	B		I	B
Soil pH 1:5 soil:water suspension method	pH 5.6–8.5										
Specific details								(NNSW)	(SNSW)		
Crop											
Barley	6w	See Table 1 (Guidelines for crop rotations – Fallow & presowing seedbed weed control)	9mo	To avoid triazine carryover maximum rates are stated (based on soil pH) – see label for further information.	10w[G]	See Table 1 (Guidelines for crop rotations – Fallow & presowing seedbed weed control)	No plantback restrictions except in the case of a failed crop.	3[L]–6[M]mo	3[L]–9[M]mo	See Table 1 (Guidelines for crop rotations–Fallow & presowing seedbed weed control)	Do not plant susceptible crops until 9 months after application of Eclipse®. Susceptible crops include canola or other brassica crops, field peas, beans, medics, lucerne and sub-clover.
Canola	9mo		9mo		9mo[I]			6[L]–9[M]mo	9[L]–12[M]mo		
Canola (Clearfield)	10d										
Cereal Rye	6w							0d	0d		
Chickpea	9mo		9mo					3[L]–6[M]mo	3[L]–9[M]mo		
Cotton			12mo		7mo[I]			6[L]–9[M]mo	–		
Faba Bean	9mo		11mo		9mo[H]			6[L]–9[M]mo	9[L]–12[M]mo		
Field Pea	9mo		9mo		9mo[H]			3[L]–6[M]mo	3[L]–9[M]mo		
Lentils	9mo		11mo		21mo[J]			6[L]–9[M]mo	9[L]–12[M]mo		
Linseed	9mo										
Lucerne	9mo		9–21mo[E]		9mo[I]			3[L]–6[M]mo	3[L]–9[M]mo		
Lupins	9mo		9mo					6[L]–9[M]mo	9[L]–12[M]mo		
Maize	14mo		12mo		10w[G]			0d	0d		
Medic	9mo		21mo		21mo[J]			0d	0d		
Millet											
Millet (Japanese)	14mo										
Millet (Panorama)	14mo										
Millet (White French)	14mo										
Mungbean			12mo		7mo[H]						
Navy Bean											
Oats	9mo		9mo		10w[G]			3[L]–6[M]mo	3[L]–9[M]mo		
Pigeon Pea											
Safflower	9mo										
Sorghum	14mo		12mo		7mo[H]			6[L]–9[M]mo	–		
Soybean	14mo		12mo		7mo[H]			0d	0d		
Sub Clover	9mo		9–21mo[E]		21mo[J]			3[L]–6[M]mo	3[L]–9[M]mo		
Sunflower	14mo		12mo		7mo[H]			6[L]–9[M]mo	–		
Triticale	6w		9mo					0d	0d		
Vetch			9mo		9mo[H]			6[L]–9[M]mo	9[L]–12[M]mo		
Wheat (Clearfield)											
Wheat	10d		1d		10w[G]			0d	0d		

Herbicide	Glean®[N]			Harmony® M[OP]			Hotshot™	Hussar® OD	Intervix®	Kamba® 500[B]	Logran®[CS]			
Herbicide group	B			B			I	B	B	I	B			
Soil pH 1:5 soil:water suspension method	< pH 6.5	pH 6.6–7.5	pH 7.6–8.5	pH <7.8	pH 7.9–8.2	pH 8.3–8.5					pH <6.5	pH 6.6–7.5	pH 7.6–8.5	pH >8.6
Crop														
Barley	9mo	9mo	18mo	9mo	9mo	9mo	See Table 1 (Guidelines for crop rotations – Fallow & presowing seedbed weed control)	9mo	10mo[R]	See Table 1 (Guidelines for crop rotations – Fallow & presowing seedbed weed control)				
Canola	12mo	22mo		9mo[V]	9mo[V]	9mo[V]		9mo	34mo		12mo	12mo	12mo	24mo
Canola (Clearfield)	3mo	3mo	3mo						0d					
Cereal Rye	3mo	3mo	18mo	3mo	3mo	3mo			34mo					
Chickpea				9mo	9mo	9mo		9mo	10mo		12mo	12mo	12mo	24mo
Cotton								12mo	34mo		15mo	15mo	18mo	24mo
Faba Bean	12mo	22mo		9mo	9mo	9mo		9mo	10mo		12mo			24mo
Field Pea	12mo	22mo		9mo	9mo	9mo		9mo	10mo		12mo			24mo
Lentils								21mo	34mo					
Linseed	12mo	22mo		9mo	9mo	9mo			34mo		12mo			24mo
Lucerne	12mo	22mo		9mo	9mo	9mo		9mo	10mo		12mo			24mo
Lupins	12mo	22mo		9mo	9mo	9mo		9mo	10mo		12mo			24mo
Maize	18mo	26mo		6mo	6mo	14mo			34mo		15mo	15mo	18mo	24mo
Medic	12mo	22mo		9mo	9mo	9mo		21mo	10mo[W]		12mo			24mo
Millet									34mo					
Millet (Japanese)				4mo	6mo	14mo			34mo					
Millet (Panorama)				14mo	14mo	14mo			34mo					
Millet (White French)				14mo	14mo	14mo			34mo					
Mungbean				4mo	14mo	14mo		12mo	34mo		15mo	15mo	18mo	
Navy Bean									34mo					
Oats	6mo	9mo	18mo	9mo	9mo	9mo		9mo	10mo[R]					
Pigeon Pea									34mo					
Safflower	12mo	22mo		9mo	9mo	9mo			34mo					
Sorghum	18mo	26mo		4mo	6mo	14mo		12mo	34mo		15mo	15mo	18mo	24mo
Soybean	18mo	26mo		4mo	14mo	14mo		12mo	34mo		15mo	15mo	18mo	24mo
Sub Clover	12mo	22mo		9mo	9mo	9mo		9mo	10mo[W]		12mo			24mo
Sunflower	18mo	26mo		4mo	14mo	14mo		12mo	34mo		18mo	18mo		
Triticale	0mo	0mo	0mo	3mo	3mo	3mo		9mo	10mo[R]					
Vetch								9mo	10mo					
Wheat (Clearfield)									0d					
Wheat	0mo	0mo	0mo	3mo	3mo	3mo		1d	10mo[R]					

Herbicide	Lontrel™ Advanced (600 g/L)	LV Ester 680 (680 g/L)[B]	Midas®	Monza®[C]		On Duty®		Precept® 300 EC			
Herbicide group	I	I	B	B		B		I+H			
Soil pH 1:5 soil:water suspension method				pH <6.5	pH 6.5–8.5			All soils	All soils	pH < 6.0	pH 7.0–8.4
Specific details						20 g/ha	40 g/ha	0.5 L/ha 250 mm[U]	1.0 L/ha 250 mm[U]	1.0 L/ha 250 mm[U]	1.0 L/ha 500 mm
Crop											
Barley	See Table 1 (Guidelines for crop rotations – Fallow & presowing seedbed weed control)	See Table 1 (Guidelines for crop rotations – Fallow & presowing seedbed weed control)	10mo[R]	12mo	22mo	8mo[R]	8mo[R]	3 w	3 w	3 w	3 w
Canola			34mo	10mo	22mo	34mo	34mo	9 mo	9 mo	9 mo	
Canola (Clearfield)			0d			0d	0d	9 mo	9 mo	9 mo	
Cereal Rye			34mo		10mo	34mo	34mo				
Chickpea			10mo	10mo	22mo	8mo	8mo	9 mo		9 mo	
Cotton			34mo			34mo	34mo	14 mo		14 mo	
Faba Bean			10mo	12mo	22mo	8mo	8mo	9 mo		9 mo	
Field Pea			10mo	10mo	22mo	8mo	8mo	9 mo	9 mo	9 mo	
Lentils			34mo	10mo	22mo	34mo	34mo	9 mo		9 mo	21 mo
Linseed			34mo			34mo	34mo				
Lucerne			10mo			8mo	8mo	9 mo	9 mo	9 mo	
Lupins			10mo	10mo		8mo	8mo	9 mo	9 mo	9 mo	
Maize			34mo			34mo	34mo		8 w		
Medic			10mo[W]		22mo	8mo[W]	8mo[W]			9 mo	21 mo
Millet			34mo			34mo	34mo				
Millet (Japanese)			34mo			34mo	34mo				
Millet (Panorama)			34mo			34mo	34mo				
Millet (White French)			34mo			34mo	34mo				
Mungbean			34mo			34mo	34mo		14 mo		
Navy Bean			34mo			34mo	34mo				
Oats			10mo	10mo	22mo	8mo[R]	8mo[R]	3 w	3 w	3 w	3 w
Pigeon Pea			34mo			34mo	34mo				
Safflower			22mo			22mo	22mo				
Sorghum			34mo			34mo	34mo		8 w		
Soybean			34mo			34mo	34mo	14 mo		14 mo	
Sub Clover			10mo[W]	10mo		8mo[W]	8mo[W]				
Sunflower			34mo			34mo	34mo	14 mo		14 mo	
Triticale			10mo[R]			8mo[R]	8mo[R]	3 w	3 w	3 w	3 w
Vetch			10mo		22mo	8mo	8mo	9 mo	9 mo	9 mo	
Wheat (Clearfield)			0d			0d	0d	3 w	3 w	3 w	3 w
Wheat			10mo[R]			8mo[R]	8mo[R]	3 w	3 w	3 w	3 w

Herbicide	Prometryn 900 DF	Raptor®	Sakura® 850 WG[C]	Simazine	Spinnaker®	Starane™ Advanced	Terbyne®	Tordon™ 75-D	Velocity®			
Herbicide group	C	B	K	C	B	I	C	I	H+C			
Soil pH 1:5 soil:water suspension method									All soils	pH < 7.0	pH < 6.0	pH 7.0–8.4
Specific details									0.67 L/ha 250 mm[U]	1.0 L/ha 250 mm[U]	1.0 L/ha 250 mm[U]	1.0 L/ha 500 mm
Crop												
Barley	Do not plant crops other than celery, chickpeas, peanuts, sunflowers or carrots in areas within 6 months following application of the product at rates above 1.2 kg/ha.	Plantback varies depending on what situation chemical was used in – see label.	9mo	To avoid triazine carryover maximum rates are stated (based on soil pH) – see label for further information.	Plantback varies depending on what situation chemical was used in – see label.	See Table 1 (Guidelines for crop rotations – Fallow & presowing seedbed weed control)	Do not plant crops other than those recommended on this label for at least 6 months following treatments at rates up to 1.4 kg/ha.	Do not plant susceptible crops within 12 months of applying winter or summer cereal use rates of this product. Cereal crops and grasses can be sown safely after using Tordon 75-D.	Minimum recropping period, influenced by several factors – see label.			
Canola			9mo									
Canola (Clearfield)												
Cereal Rye												
Chickpea			9mo									
Cotton			5mo									
Faba Bean			9mo									
Field Pea			9mo									
Lentils			9mo									
Linseed												
Lucerne			21mo									
Lupins			9mo									
Maize			5mo									
Medic			21mo									
Millet												
Millet (Japanese)												
Millet (Panorama)												
Millet (White French)												
Mungbean			5mo									
Navy Bean												
Oats			21mo									
Pigeon Pea												
Safflower												
Sorghum			5mo									
Soybean			5mo									
Sub Clover			9mo									
Sunflower			5mo									
Triticale			0d									
Vetch			9mo									
Wheat (Clearfield)												
Wheat			0–21mo[T]									

KEY: d = days, w = weeks, mo = months

A For pH 8.6 and above tolerance of crops (grown through to maturity) should be determined on a small scale, in the previous season, before sowing into larger areas.
B When applied to dry soils at least 15 mm of rain must fall prior to the commencement of the plantback period.
C Additional rainfall/soil moisture requirements need to be observed – see label.
D Rainfall of less than 250 mm following Atlantis® OD use will result in extended re-cropping intervals for winter crops sown the following season. Patchy rain with extended dry periods may also extend this period. Rainfall of less than 500 mm may result in extended re-cropping periods for summer crops in the following year.
Rainfall of less than 500 mm may result in extended re-cropping periods for summer crops in the following year. Use in soil above pH 8.5 is not recommnded.
E pH < 8.0 (under conditions of good seasonal rainfall) = 9 months, pH > 8.0 = 21 months.
F Prolonged dry periods or cold conditions may result in extended re-cropping intervals, even if rainfall exceeds the required amount. Use on soils with pH less than 7.0 may result in extend recropping intervals. Cultivation is recommended prior to recropping.
G 100 mm minimum rainfall total between herbicide application and planting of subsequent crop.
H 250 mm minimum rainfall total between herbicide application and planting of subsequent crop.
I 350 mm minimum rainfall total between herbicide application and planting of subsequent crop.
J 500 mm minimum rainfall total between herbicide application and planting of subsequent crop.
K For SNSW a minimum of 25 mm (preferably 50 mm) and NNSW a minimum of 50 mm (preferably 100 mm) must fall over the warmer months of the year. On shallow, duplex, low O.M. soils of less than 30 cm, do not plant until 2 years after application.
L 25 g/ha.
M 50 g/ha.
N Glean® is not recommended on soils of pH 8.6 and above.
O For soils with less than 1.7% organic matter and/or pH 8.6 and above tolerance of crops (grown to maturity)should be detrmined on a small scale, in the previous season.
P 400 mm minimum rainfall total between herbicide application and planting of subsequent crop.
Q Rainfall of less than 250 mm or 500 mm may result in extended recropping periods for winter and summer crops respectively. Patchy rain or extended dry periods will also extend the recropping period. Use on soils with pH 8.5 or above is not recommnded.
R Additional requirements need to be met for certain non clearfield cereals – see label.
S Where Logran® is applied at lower rates with trifluralin or post-emergent additional requirements need to be considered – see label.
T Wheat (0 months), durum wheat (21 months).
U Minimum of 300 mm for summer crops. Minimum 500 mm for Cotton, Soybean and Sunflower where Precept® 300 rate up to 1.0 L/ha. See Precept® label.
V Plantback refers to rapeseed.
W Plantback refers to pasture legumes.

Harvest aid or salvage spraying of winter crops

Salvage spraying or pre-harvest desiccation is required in some years to desiccate weeds and assist timely harvesting of winter crops. Situations do arise due to late establishing weeds combined with wet and prolonged springs or harvest periods, where salvage spraying may be necessary.

Weeds such as skeleton weed, bindweed, melons, sowthistle, prickly lettuce, fat hen and New Zealand spinach can interfere with harvesting whilst weed seeds such as saffron thistle, rough poppy, Mexican poppy and black/field bindweed can contaminate grain.

Chemical	2,4-D LV Ester 680 g/L	2,4-D Amine 700 g/L	Glyphosate 540 g/L	Glyphosate 540 g/L	Glyphosate 540 g/L	Glyphosate 470 g/L	Metsulfuron-methyl 600 g/kg + Glyphosate 540 g/L	Diquat 200 g/L	Diquat 200 g/L	Paraquat 250 g/L
Herbicide product	LV Ester 680	Amicide® Advance 700	Weedmaster® Argo®	Weedmaster® Argo®	Weedmaster® Argo®	Weedmaster® DST®	Ally® + Weedmaster Argo	Reglone®	Reglone®	Gramoxone®
Registered/Permit	Registered	Registered	Registered	Registered	Registered	Registered	Registered	Registered	Registered	Registered
Use	Harvest aid/ Salvage spray	Harvest aid/ Salvage spray	Harvest aid/ Weed control	Harvest aid/Weed control (in-crop spraytopping)	Desiccation/ Weed control	Preharvest cutting application	Desiccation	Pre-harvest crop desiccation	Pre-harvest weed control	In-crop spraytopping
Crop	Winter cereals	Winter cereals	Wheat	Field pea, faba bean	Field pea, faba bean, chickpea, lentil	Hay/silage	Chickpea	Canola, linseed, peas, faba bean, lentil, chickpea, lupin	Wheat	Field pea, lupin, chickpea, faba bean, lentil and vetch
Rate	1.7 L/ha	1.1–1.5 L/ha	1.0–2.1 L/ha	0.365–0.78 L/ha	0.78–2.1 L/ha	1.4–4.1 L/ha	5 g/ha Ally® + 0.58–1.2 L/ha Weedmaster Argo	Canola 1.5–3 L/ha; linseed, peas, faba bean, lentil, chickpea, lupin 2–3 L/ha	1, 2 or 3 L/ha	400 or 800 mL/ha
Weeds	Desiccate broadleaf weeds	Desiccate broadleaf weeds	Annual weeds	Annual ryegrass	Annual weeds	Not applicable	Registered	Not applicable	Not stated	Annual ryegrass
Spraying timing	After the dough stage	After the dough stage	Late dough onwards	At or after crop maturity	At or after crop maturity	Refer to label	At or after crop maturity	Refer to label	Refer to label	When ryegrass is at the optimum timing. Refer to label.
Harvest WHP	Nil when used as directed	Nil when used as directed	7 days	7 days	7 days	Refer to label	7 days	Canola 4 days; peas, lupin, linseed not stated; lentil, chickpea, faba bean 2 days	Nil	7 days
Application	Ground/Aerial	Ground/Aerial	Ground	Ground	Ground/Aerial	Ground/Aerial	Not stated	Ground/Aerial	Ground/ Aerial	Ground
Comments	Beware of sensitive crops nearby	Beware of sensitive crops nearby	Do not use on crops intended for seed or sprouting	Do not use on crops intended for seed or sprouting	Do not use on crops intended for seed or sprouting	–	Not to be applied on crops to be used for seed or sprouting	–	–	Reduction in crop yield may occur if the crop is less advanced relative to the ryegrass

WARNING — When spraying use extreme caution and carefully consider the possibility of spray drift onto susceptible plants – e.g. cotton, canola, lucerne, grapevines, horticultural crops, belah and kurrajong trees.

IMPORTANT NOTE: Before using these products for this use check registration.

Table 3. Rainfastness – stock withholding periods – harvest withholding periods

This table lists:

- **Rainfastness.** The time interval required between herbicide application and rainfall. Avoid applying herbicide when rain is imminent. However, certain herbicides may not be affected by some rain during or after spraying. The table suggests the time needed between spraying and rainfall for each herbicide to be effective.
- **Stock grazing or fodder production withholding periods.** This is the number of days you must wait after spraying before allowing stock to graze the area, to ensure the animal produce is free of pesticide residues. Check latest MRL data with individual companies for produce to be sold on export market.
- **Harvest withholding periods.** This is the number of days you must wait after spraying before harvesting grain, to ensure that grain is free of pesticide residues.

Herbicide	Rainfastness – hours	Stock withholding period – days	Harvest withholding period – days
Achieve®	0.5	14	Not stated.
Agtryne®	6	7	Not stated.
Alliance®	Nil – see label	1, horses 7 – see label	Not required when used as directed.
Ally®	2	Nil	Not required when used as directed.
Atlantis® OD	8	28	56
Atrazine	Rain required after application for best results.	canola (pre-emergent) 105 canola (post-emergent) 42	Not required when used as directed.
Avadex® Xtra	Light rain during or after spraying will not affect results.	11 weeks	Not required when used as directed.
Axial®	0.5	21	Not required when used as directed.
Balance® 750 WG	Light rain during or after spraying will not affect results.	28	Not required when used as directed.
Bladex®	8	Don't graze treated immature crops or cut for stockfood.	Not required when used as directed.
Boxer® Gold	Rain during or after application assists incorporation and activation.	Do not graze or cut for stock feed for 10 weeks.	Not required when used as directed.
Broadside®	3	14	Not required when used as directed.
Broadstrike™	4	Cereals, field pea, vetch, chickpea and lentil 28 days	Field pea, chickpea and lentil not required when used as directed; cereals 28
Brodal® Options	4	14	Not required when used as directed.
Bromicide® 200	3	8 weeks	Not required when used as directed.
Bromicide® MA	4	8 weeks	Not required when used as directed.
Cadence® (dicamba)	4	7	7
Cheetah® Gold	4	7 weeks	Not required when used as directed.
Conclude™	4	7	Not required when used as directed.
Crusader™	6	6 weeks	Not required when used as directed.
Decision®	2	49	Not required when used as directed.
Diuron ◆	6	Not required when used as directed.	Not required when used as directed.
Dual® Gold	Do not apply if heavy rains or storms that are likely to cause run-off are forecast within 2 days of application.	Canola 70; cereals 56	Not required when used as directed.
Duet® 250EC	Light rain following application will not affect results.	Not required when used as directed.	Not stated.
Eclipse® 100 SC®	2	Cereals 14; lupin 28	Not required when used as directed.
Elantra® Xtreme®	3	4 weeks	Canola, field pea 63; Chickpea, faba bean, lentil 84; Lupin 42.
Factor®	0.5	Grazing 14	Not required when used as directed.
Flame®	Rain assists soil incorporation and activation.	28	Not stated.
Flight® EC	4	42	Not required when used as directed.
Fusilade® Forte	1	Linseed, canola 21; lupin, faba bean, field pea, chickpea 49	Canola, lupin, linseed 119; faba bean 35; fieldpea, chickpea 49
Garlon™ FallowMaster™	1	Not required when used as directed.	Not required when used as directed.
Glean®	4 Rain assists soil incorporation and activation.	Nil	Not required when used as directed.
Gramoxone® 250	Light rain during or after spraying will not affect results.	Horses 7; all other stock 1	7 for pulse crops
Grazon™ Extra	1	Not required when used as directed.	Not required when used as directed.
Hammer®	1	14	Not required when used as directed.
Harmony® M	Not stated.	14	56
Hoegrass®	2	49	Not required when used as directed.
Hotshot™	1	7	Not required when used as directed.
Hussar® OD	8	28	Not required when used as directed.
Gramoxone® 250	Light rain during or after spraying will not affect results.	Horses 7; all other stock 1	7 for pulse crops
Grazon™ Extra	1	Not required when used as directed.	Not required when used as directed.

Table 3. Rainfastness – stock withholding periods – harvest withholding periods (continued)

Herbicide	Rainfastness – hours	Stock withholding period – days	Harvest withholding period – days
Hammer®	1	14	Not required when used as directed.
Harmony® M	Not stated.	14	56
Hoegrass®	2	49	Not required when used as directed.
Hotshot™	1	7	Not required when used as directed.
Hussar® OD	8	28	Not required when used as directed.
Igran®	6	7 cereals	7 cereals
Intervix®	2	5 weeks	Not required when used as directed.
Jaguar®	4	14	Not required when used as directed.
Kamba® M	4	7	Not stated.
Logran®/Logran® B-power	Not stated.	pre-emergent 49; post-emergent 14	Not required when used as directed.
Lontrel™ Advanced	3	cereals, canola 7	Cereals 70; canola, not required when used as directed.
Mataven® 90	4	42	Not stated.
MCPA	6	7	Not required when used as directed.
Midas®	6	28	Not required when used as directed.
Monza® (Post)	Immediate rainfall may affect results.	Not required when used as directed.	Not required when used as directed.
Motsa™	1	56	Not required when used as directed on chickpea, faba bean, field pea, lentil and lupin; canola
OnDuty®	2	wheat 28, canola 42	Not required when used as directed.
Paragon®	4	42	Not required when used as directed.
Precept®	2	wheat, oats, triticale, cereal rye 14; barley 28	Not required when used as directed.
Prometryn 900 DF	–	9 weeks	Not required when used as directed.
Pyresta®	6	grazing 7	Not required when used as directed.
Raptor®	2	field pea 42	Not required when used as directed.
Reglone®	Light rain during or after spraying will not affect results.	Horses 7; all other stock 1	Canola 4; lentil, chickpea 2; faba bean, field pea not required.
Weedmaster® DST®	6	Not required when used as directed.	Not required when used as directed.
Weedmaster® Argo®	1	Not required when used as directed.	7 wheat and pulses, other uses not required when used as directed.
Sakura®	2	42	Not required when used as directed.
Shogun®	1	Vetch 3	Faba bean 49; safflower 140; chickpea, field pea, lentil 84; lupin 105; canola, linseed 112
Status®	1	56	Canola; chickpea, faba bean,field pea, lentil, lupin not required when used as directed
Sencor®	6	14	Not required when used as directed.
Sharpen®	1	Do not allow livestock to graze treated weeds.	Not required when used as directed. Refer also to tankmix products.
Simazine	On firm seedbeds light rain after use usually enhances activity.	Chickpea 63; faba bean 56; canola 105	Faba bean 161
Sniper®	4	narrow-leafed lupin 42; fieldpea 28	Not required when used as directed.
Spinnaker® 700 WDG	2	14	Not required when used as directed.
Spray·Seed® 250	Light rain during or after spraying will not affect results.	Horses 7; all other stock 1	Not stated.
Starane™ Advanced	1	7	Not stated.
Stomp® 440	Light rain after application does not generally affect results.	Not required when used as directed.	Not required when used as directed.
Terbyne®	–	6 weeks	Not required when used as directed.
Tigrex®	4	7 refer to label for grazing precautions.	Not required when used as directed.
Topik®	2	28	Not required when used as directed.
Tordon™ 242	4	7	Not required when used as directed.
FallowMaster™ Tordon™	4	7	Cereal 70; canola 84
Torpedo™	3	7	Not required when used as directed.
Touchdown® Hi Tech	2	Cereals and pulses 7; nil other uses	Cereals and pulses 7; nil other uses
Triflur® X	Light rain after incorporation will not affect results.	Not required when used as directed.	Not stated.
Trifolamine®	4	7	Not stated.
Tristar® Advance	4	cereals 49	Not required when used as directed.
Valor®	Not stated	42	Not required when used as directed.
Velocity®	2	5 weeks	Not required when used as directed.
Verdict™ 520	1	Medic, clover 7; lucerne 21; vetch, canola lupin, chickpea, faba bean, field pea 28	Not required when used as directed.
Wildcat® 110 EC	4	21	wheat, triticale and cereal rye 70
2,4-D amine /2,4-D ester	6	7	Not required when used as directed.
2,4-DB	24	7	Not stated.

N/A = Not applicable, as it is a pre-emergent treatment. ◆ See *What's new in 2014* on page 3.

Water quality for herbicide application

Good quality water is important when mixing and spraying herbicides. It should be clean and of good irrigation quality. Poor quality water can reduce the effectiveness of some herbicides and damage spray equipment. Some poor results with herbicides could possibly be due to water quality problems.

Effects of water quality

Water quality depends on the source of the water (rain-fed tank, dam, river, bore or aquifer) and the season (e.g. heavy rain, drought). There are several characteristics of water quality which affect chemical performance.

Dirt: Dirty water has very small soil particles (clay and silt) suspended in it. These soil particles can absorb and bind the chemical's active ingredient and reduce its effectiveness. This applies especially to **glyphosate, paraquat** and **diquat.**

Dirt can also block nozzles, lines and filters and reduce the sprayer's overall performance and life. As a guide, water is considered dirty when it is difficult to see a 10¢ coin in the bottom of a household bucket of water.

Water hardness: Water is termed hard when it has a high percentage of calcium and magnesium. Hard water won't lather with soap and can cause some chemicals to precipitate. Susceptible chemicals often have agents added to overcome this problem.

Formulations of 2,4-DB are particularly sensitive to hard water (> 400 ppm $CaCO_3$ equivalent). Other herbicides such as glyphosate, 2,4-D amine and MCPA amine, Lontrel™ Advanced and Tigrex® can also be affected.

Hard water can also affect the balance of the surfactant system and affect properties such as wetting, emulsification and dispersion. Very hard water can also reduce the efficiency of agents used to clear dirty water.

Water pH: pH is a measure of acidity and alkalinity scaled on a range between 1 and 14. A pH of 7 is neutral, less than 7 acid and more than 7 alkaline. Most natural waters have a pH between 6.5 and 8.

In highly alkaline water (pH>8) many chemicals undergo a process called alkaline hydrolysis. This process causes the breakdown of the active ingredient into other compounds which can reduce the effectiveness of the pesticide over time. This is one reason why spray mixes should not be left in spray tanks overnight.

Very acid water can also affect the stability and physical properties of some chemical formulations.

Dissolved salts: The total amount of mineral salts dissolved in water is usually measured by the electrical conductivity (EC) of the water.

The EC of bores and dams depends largely on the salt levels in the rock and soil that surrounds them. During a drought the salinity of water increases.

Very salty water can cause blockages in equipment and is more resistant to pH changes.

Organic matter: Water containing a lot of organic matter, such as leaves or algae can block nozzles, lines and filters. Algae can also react with some chemicals, reducing their effectiveness.

Temperature: Very hot or cold water can affect the performance of some chemicals.

Improving water quality

Water needs to be tested to see whether it will affect chemical performance. There are commercial products available to reduce pH (e.g. Primabuff® BB5 and LI 700 and Hotup®), soften hard water and clear dirty water. To reduce the effects of very salty water, you may need to mix water from several sources.

Acknowledgement: Extracts from SPRAY SENSE Bulletin No.12 T. Burfitt, S. Hardy and T. Somers (1996).

The following table summarises the effect of water quality on some herbicides:–

Herbicide tolerances to water qualities:

Herbicide	Water Quality				
	Muddy	Saline	Hard	Alkaline (> pH 8)	Acidic (< pH 5)
2,4-DB			X	NR	
2,4-D or MCPA amine	✓	✓	X	NR	
2,4-D or MCPA ester	✓	Test	Test	✓	✓
Ally®	✓	✓	✓	Marginal	X
Brodal®		✓	✓	X	
Dicamba	✓	✓	NR	NR	
Diuron ◆	✓	Test	✓	✓	
Diuron ◆ + 2,4-D amine	✓	Test	X	NR	
Diuron ◆ + MCPA amine	✓	Test	X	NR	
Fusilade® Forte	✓	✓	✓	NR	X
Glean®	✓	✓	✓	Marginal	X
Glyphosate	X	✓	X		✓
Gramoxone®	X	✓	✓	✓	✓
Hoegrass®	✓	✓	✓	NR	✓
Logran®	✓	✓	✓	Marginal	X
Lontrel™ Advanced	✓	✓	X	X	
Simazine	✓	X	✓	NR	
Spray·Seed®	X	✓	✓	✓	✓
Elantra® Xtreme®	✓	✓	✓	✓	✓
Tigrex®	✓	X	X	NR	
Trifluralin		✓	✓	✓	✓
Verdict™	✓	✓	✓	NR	✓

Key:
✓ = OK.
X = Do not use.
NR = Not recommended but use quickly if there is no alternative.
Test = Mix herbicides and water in proportion and observe any instability.
Marginal = Not ideal, but acceptible.
◆ See *What's new in 2014* on page 3.

Using adjuvants, surfactants and oils with herbicides

Herbicides often need help to spread across the leaf and penetrate the leaf surface of weed targets to give best results.

Some herbicides have sufficient adjuvant and require no additional surfactants to perform well. However some do and this is usually detailed on the herbicide label. **Always read the herbicide label before opening the container and heed the information printed there.**

An **adjuvant** is any additive to a herbicide which is intended to improve the effectiveness of the herbicide. There are many products which have been developed to assist herbicides to contact the weed target, then remain and penetrate the weed leaf.

The APVMA classes adjuvants into two categories:

- adjuvants which enhance product efficacy; and
- adjuvants which improve the ease of application.

Adjuvants which enhance product efficacy

Wetters/Spreaders (enhance adhesion to and spreading of spray droplets on target surfaces by reducing the surface tension of the pesticide formulation and improving coverage) such as;

- Non-ionic surfactants – non-reactive, i.e. they do not have a negative charge or a positive charge; they remain on the leaf once dry and allow rewetting after rain, permitting additional pesticide uptake.
- Anionic surfactants – negative charge
- Cationic surfactants – positive charge
- Amphoteric surfactants
- Organo-silicate surfactants
- Acidified surfactants

Stickers (increase adhesion of pesticides to target surfaces) such as;

- Latex-based
- Terpene/pinolene
- Pyrrolidone-based

Penetrants (improve the transfer of active ingredients from the target surface to interior tissues) which may include:

- Mineral oil
- Vegetable oil
- Esterified vegetable oil
- Organo-silicate surfactants
- Acidified surfactants

Extenders (enhance the amount of time the active ingredient remains toxic by increasing resistance to environmental degradation) which may include;

- Ammonium sulphate
- Menthene-based

Humectants (increases the density/drying time of an aqueous spray deposit)

- Glycerol
- Propylene glycol
- Diethyl glycol

Adjuvants which improve ease of application

Acidifying/Buffering agents (adjusts the pH of alkaline or acidic water and minimizes decomposition of the pesticide through alkaline hydrolysis).

Anti-foaming/De-foaming agents (reduces or suppresses the formation of foam in the spray tank preventing foam overflow):

- Dimethopolysiloxane

Compatibility agents (permit the mixing of different agrochemicals by preventing antagonism between different ingredients in the spray solution) such as:

- Ammonium sulphate

Drift control agents (alter the viscoelastic properties of the spray solution yielding a coarser spray with greater mean droplet sizes):

- Polyacrylamides
- Polysaccharides

Dyes (commonly used for spot or boom spraying herbicides to detect missed spots or avoid spraying a plant or area twice).

Water conditioners (prevents reaction between hard water ions in spray solutions and suppresses formation of precipitates or salts)

- Ammonium sulphate

Factors affecting adjuvant use include:

1. **Crop safety** – addition of an adjuvant can reduce herbicide selectivity and thereby increase crop damage. This is not an issue for fallow and pre-emergent herbicides.
2. **Effectiveness or activity** – adjuvants are usually added to increase the effectiveness of herbicides. However, use of the wrong type or rate can reduce effectiveness, such as decreasing herbicide retention on leaves.
3. **Water hardness** – hard water can lead to poor mixing of the chemical with water. This particularly occurs with emulsifiable concentrates. High levels of calcium and magnesium ions bind with amine formulations causing them to be less soluble and therefore less effective.
4. **Water temperature** – low water temperature can lead to gelling in the tank. High concentration herbicides might not mix and surfactants may perform poorly.

The table on page 18 lists some of the available adjuvants.

A good reference for further information is a book called Adjuvants (Oils, Surfactants and Other Additives for Farm Chemicals), (Revised 2012 edition) available from GRDC, www.grdc.com.au/bookshop. Phone 1800 110 044.

Some adjuvants in common use

Trade name	Constituent	Company	Claim
Spray oil			
Banjo®	725 g/L methyl esters of canola oil	Nufarm	Wetting/spreading/penetrating agent for use with certain post-emergent herbicides.
Adigor™	440 g/L methyl esters of canola oil, fatty acids solvent, 222 g/L liquid hydrocarbons	Syngenta	Adjuvant for use with Axial® and other selective and non-selective herbicides as per label directions.
Uptake™ Spraying Oil	582 g/L paraffinic oil + 208 g/L non-ionic surfactants	Dow AgroSciences	Spreading/wetting agent for many selective herbicides e.g. Topik®, Verdict™ 520.
Hotwire® Spraying Oil	598 g/L paraffinic oil + 210 g/L non-ionic surfactants	Farmoz	Spreading/wetting agent for many selective herbicides.
Bonza®	471 g/L paraffin oil	Nufarm	Spreading/wetting agent for certain herbicides.
Caltex Broadcoat®	861 g/L petroleum oil	Caltex	Adjuvant/wetting agent. Used with certain non-selective herbicides.
Kwickin™/Impel™	704 g/L methyl and ethyl canolate and 196 g/L blend of surfactants, sorbitan esters and vegetable oil ethoxylate	GullfAg/ Nufarm	Improves penetration. Used with certain post-emergent herbicides.
Hasten™	704 g/L fatty acid esters of canola oil + surfactant >15%	Victorian Chemical Co.	Wetting/spreading/penetrating agent for certain post-emergent herbicides.
Activoil®	704 g/L fatty acid esters of canola oil.	SST Products	Improves penetration. Used with certain post-emergent herbicides.
Intac® Ag Oil	820 g/L canola oil	Nipro Products	Improves droplet deposition, uptake. Used with non and selective herbicides.
Supa Stik® Oil	840 g/L canola oil	Agrichem	Improves droplet deposition, uptake. Used with non and selective herbicides.
Protec® Plus	700 g/L canola oil extract	Grevillia Ag	Improves droplet deposition, uptake. Used with non and selective herbicides.
Codacide® Organic	860 g/L vegetable oil	Microcide	Suitable for use with certain non-selective herbicides.
Synertrol® Broadacre	780 g/L emulsified vegetable oil	Organic Crop Protectants	Wetter, spreader and penetrant compatible with most herbicides.
Ad-Here™	970 g/L mineral oil	Victorian Chemical Co.	Adjuvant for Select®, Verdict™, Sertin® 186 EC, Express®.
Supercharge®	471 g/L paraffin oil	Crop Care	Designed for use with Achieve® WG, Falcon® WG
Amplify®	432 g/L mineral oil	Farmoz	Designed for use with Farmoz Pentagon® herbicide.
D-C-Trate®	763 g/L petroleum oil	Caltex	Anti-evaporant/wetting agent used with certain herbicides.
DC Tron™	991 g/L petroleum oil	Caltex	See label.
Surfactant			
Agral® 600	600 g/L non-ionic surfactant	Crop Care	Wetting/spreading agent, for most selective and non selective herbicides.
Wetter TX®	1040 g/L non-ionic surfactant	Nufarm	Used with Roundup® when treating certain grasses.
BS1000®/Deltawet® 1000	1000 g/L alkoxylated alcohol	Crop Care/Tasman Chemicals	Wetting/spreading agent, for most non and selective herbicides.
Hot-up®	340 g/L non-ionic + 190 g/L mineral oil + 140 g/L ammonium sulfate	Victorian Chemical Co	Wetting, penetrating, reduce antagonism of non-selective herbicides.
Activator®	900 g/L non-ionic surfactant	Nufarm	Wetting agent. Used with most non and selective herbicides.
Wetter 1000	1003 g/L non-ionic ethoxylates	Chemag	Wetting/spreading agent, for most non and selective herbicides.
Wetspray® 600	600 g/L non-ionic surfactant	Farmoz	Wetting/spreading agent, for most non and selective herbicides.
Wetspray® 1000	1000 g/L non-ionic surfactant	Farmoz	Wetting spreading agent, for most non and selective herbicides.
Chemwet® 1000	1000 g/L non-ionic ethoxylates	Nufarm	Wetting/spreading agent, for most non and selective herbicides.
Agri-Wett® 77	377 g/L nonylphenol ethylene	Agrichem	Wetting/spreading agent, for most non and selective herbicides.
Bond® Adjuvant	450 g/L synthetic latex + 100 g/L non-ionic surfactant	Nufarm	Used when the addition of a sticker, spreader and deposit agent is required.
Compatability agent			
Liase®/Liquid Assist	417 g/L ammonium sulfate	Nufarm/Rutec	Minimise antagonism. For use with glyphosate herbicides.
Response®/Enhanzar®	425 g/L ammonium sulfate	Landmark/Western Stock Distributors	Minimise antagonism. For use with glyphosate herbicides.
Alltask Benefit®	425 g/L ammonium sulfate	Landmark	Minimise antagonism. For use with glyphosate herbicides.
Liquid Boost®	417 g/L ammonium sulfate	GullfAg	Minimise antagonism. For use with glyphosate herbicides.
Bonus®	250 g/L ammonium sulfate + 188.5 g/L alkylethoxyphosphate	Nufarm	Designed for use with Nufarm Credit® broadhectare only.
Acidifying/buffering agents			
LI 700®/Delta Lipro® 700	350 g/L soyal phospholipids + 350 g/L propionic acid	Nufarm/Tasman Chemicals	Wetter, spreader, acidifier, compatible with most herbicides except sulfonylureas.
Primabuff®	266.2 g/L nonoxinol-9 375.1 g/L phosphoric acid derivatives	Crop Care	Penetrant, buffering, acidifying, compatibility aid, used with certain non-selectives.
Agri-Buffa®	430 g/L phosphate esters, 100 g/L polyalkylene oxide	Agrichem	Wetter, spreader, acidifier, compatible with most herbicides.

Tips for tankmixing herbicides

Tankmixing herbicides is a common practice to improve weed control and broaden the weed spectrum. There may also be some advantages in helping avoid herbicide resistance problems.

Many tankmixes are included on registered herbicide labels.

Generally provided herbicides are registered for a particular use, they may be tankmixed provided they are compatible and label mixing instructions are followed.

Note that some herbicides although being physically compatible can be antagonistic to weed control.

This information is usually outlined on herbicide labels under compatability. Ratios for tank-mixing, crop safety, herbicide efficacy and special use of adjuvants, need to be considered also.

The order that herbicides are mixed is also important and the following mixing sequence is usually followed:

1. Water conditioning agents (if required – e.g. LI 700, Liase® or Primabuff®).
2. Water dispersable granules (WG)/dry flowable products (including those in water-soluble bags first).
3. Wettable powders (WP).
4. Flowables or suspension concentrates (e.g. atrazine-simazine liquids).
5. Emulsifiable concentrates (EC) (e.g. Trifluralin, Topik®, Kamba®, Bromoxynil).
6. Water-soluble concentrates (e.g. glyphosate, Amicide® Advance 700, Spray·Seed® 250, Gramoxone® 250).
7. Surfactants and oils (e.g. BS1000®, Hasten™, D-C-Trate®).
8. Soluble fertilisers.

Directory of herbicide manufacturers/distributors

Distributor/Manufacturer	Contact	Contact Person
Bayer CropScience Pty Ltd	391–393 Tooronga Road, Hawthorn East, Vic 3123. Ph: (03) 9248 6888 Fax: (03) 9248 6800. Web: www.bayercropscience.com.au	Technical Enquiries 1800 804 479
Crop Care Australasia Pty Ltd	PO Box 84, Morningside Qld 4170. Ph: 1800 111 454 Fax: (07) 3909 2010. Web: www.cropcare.com.au	Customer Service 1800 111 454
Dow AgroSciences	Locked Bag 502, Frenchs Forest NSW 2086. Ph: (02) 9776 3400 Fax: (02) 9776 3435. Web: www.dowagrosciences.com.au	Customer Service 1800 700 096
DuPont Australia	PO Box 960, 168 Walker Street, North Sydney NSW 2059. Web: www.dupont.com.au	Ag Products Hotline 1800 257 169
Farmoz Pty Ltd	Level 4 Building B, 207 Pacific Highway, St Leonards, Sydney NSW 2065. Ph: (02) 9431 7800 Fax: (02) 9431 7700. Web: www.farmoz.com.au	Peter Chalmers peter.chalmers@farmoz.com.au
Nufarm Australia Ltd	103–105 Pipe Road, Laverton North, Vic 3026. Ph: (03) 9282 1000 Fax: (03) 9282 1022. Web: www.nufarm.com.au	Technical Enquiries 1800 639 899
Sinochem	Level 8/606 St Kilda Road, Melbourne, Vic 3004 Ph: (03) 9520 8888 Web: www.sinochem.com.au	Customer Service 1800 334 096
Sumitomo Chemical Aust Pty Ltd	501 Victoria Ave, Chatswood NSW 2067. Ph: (02) 9904 6499 Fax: (02) 9904 7499. Web: www.sumitomo-chem.com.au	Chris van der Hoven chris.vanderhoven@sumitomo-chem.com.au
Syngenta Crop Protection Pty Ltd	Level 1, 2–4 Lyon Park Road, North Ryde NSW 2113. Ph: 1800 067 108 Fax: 1800 805 871. Web: www.syngenta.com.au	Syngenta Product Technical Advice Line 1800 067 108

Cleaning and decontaminating boomsprays

Cleaning and decontaminating spray equipment for the application of herbicides is essential. Many crops and pastures have been severely damaged or destroyed by the failure to ensure that spray equipment was thoroughly cleaned before use.

With the advent of crops such as canola and pulse crops in the rotation, and with more emphasis on legume-based pastures, decontamination of spray units must be carried out to ensure that there is no possibility of crop or pasture damage.

Product labels usually detail decontamination and cleaning procedures for each product.

Herbicide	Rate of agent/100 L water	Instructions for Cleaning and Decontamination
Weedmaster® DST®, Weedmaster® Argo®, Glyphosate, Raptor®, Flame®, Spinnaker®, Sniper®, Wipe Out® Plus, Sickle® 520, Precept®, Velocity®, Intervix®.	Clean Water (*Nufarm Tank and Equipment Cleaner), Absolute Boomer®	Rinse thoroughly several times with clean water before use.
Phenoxy type, salt or amine formulations (2,4-D amine, MCPA amine, 2,4-DB, dicamba).	2 L household ammonia (*Nufarm Tank and Equipment Cleaner)	Thoroughly agitate and flush a small amount of solution through the system and let stand in sprayer overnight. Flush and rinse with clean water several times before use.
Phenoxy type, ester formulations 2,4-D ester, MCPA ester, Paragon®, Midas®, Flight® EC, Tigrex®.	125 g powdered detergent (*Nufarm Tank and Equipment Cleaner)	Rinse the inside and outside of the tank and flush a small amount through the system for 15–20 minutes. Let stand for at least two hours or preferably overnight. Flush and rinse before use.
Atrazine, simazine.	125 g powdered detergent (*Nufarm Tank and Equipment Cleaner), Absolute Boomer®	Rinse with clean water before and after using the solution.
Sulfonylurea herbicides Glean®, Logran®, Ally®, Logran® B-power, Hussar® OD, Atlantis® OD.	300 mL fresh household chlorine bleach containing 4% chlorine or 300 mL BC-45 Spray Equipment Cleaning Agent (*Nufarm Tank and Equipment Cleaner) per 100 L water with agitation. Absolute Boomer® or CC49®	1. Drain and flush the tank, hoses and boom with clean water for 10 minutes. 2. Fill the tank with clean water and add the chlorine bleach. Flush the boom and allow to stand for 15 minutes, then drain. 3. Repeat Step 2. 4. Nozzles, screens and filters should be removed and cleaned separately.
Broadstrike™, Eclipse® 100 SC, Lontrel™ Advanced, Grazon™ Extra, Conclude™, Crusader™, Torpedo™.	500 mL liquid detergent DynamoMatic®, or 500 g of the powder equivalent such as Surf®, Omo®, 1 L Absolute Boomer®	Flush the system, then quarter-fill the tank with water and add the detergent. Start the pump and circulate for at least 15 minutes. Drain the whole system. Remove and clean the filters, screens and nozzles with clean water and allow to drain.
Herbicides for grass control in broadleaf crops and pastures such as Verdict™ (520 g/L).	500 mL liquid alkali liquid detergent such as Surf®, Omo®, DynamoMatic®, or 500 g of the powder equivalent. 1 L Absolute Boomer®	If broadleaf herbicides, particularly sulfonylureas (such as Glean®, Logran®), have been used in the spray equipment at any time prior to grass herbicides such as Verdict™, particular care should be taken to follow the directions for cleaning and decontamination on the label of the relevant broadleaf herbicide. Before spraying cereals, maize, sorghum or other sensitive crops, wash the tank and rinse after use. Completely drain the tank and wash filters, screens and nozzles. Drain and repeat the procedure twice. To decontaminate, wash and rinse the system as above, quarter-fill the tank, add the detergent and circulate through the system for at least 15 minutes. Drain the whole system. Remove filters, screens and nozzles and clean separately. Finally, flush the system with clean water and allow to drain.

WARNING: Grass control herbicides such as Verdict™, Fusilade® Forte, Correct®, Select®, Elantra® Xtreme® and Sertin® can be extremely damaging to winter and summer cereals. Likewise spraytank contamination of small quantities of sulfonylurea herbicides such as Glean® and Logran® can be extremely damaging to crops like canola, pulse crops and legume pastures.

***Nufarm Tank and Equipment Cleaner can also be used to decontaminate spraying equipment.**

NOTE: Rinse water should be discharged into a designated disposal area, or if this is unavailable, onto unused land away from surface water, water bodies, gardens, shelter belts and other environmentally sensitive areas.

Boomspray calibration

Boomsprays need to be calibrated regularly to work efficiently and economically.

Regular calibration ensures the right amount of chemical will be applied to the target without costly wastage.

The following template will enable you to calculate how much chemical and water to use.

In the template, enter the information asked for such as spray tank capacity, chemical rate and ground speed in the space provided in the right hand column. You will need this information to perform the calculations. The numbers in the black 'golfballs' tell you which figures you need to perform the calculations. For example, to work out your water application rate, you need to know your total spray output, your effective spray width and your actual ground speed. The 'golfball' numbers in the formula show you where to get these figures.

General Information

Item of equipment to be calibrated.	
Spray tank capacity (litres).	L ❺
Area to be sprayed (hectares).	ha ❼
Chemical used.	

Recording

What is the minimum water application rate – if any (from the chemical label)?	L/ha
Select the correct chemical application rate from the label.	L/ha ❹
Select an appropriate ground speed.	gear rpm
Record spray operation pressure.	bar or kPa
Record nozzle type and size in the spray unit. Check the rated 'water output' using the manufacturer's nozzle charts. Rated output	type size ..... mL/min
Record minimum boom height above target for these nozzles.	cm

Measuring

Record the output from every nozzle for 1 minute. 1..... 2..... 3..... 4..... 5..... 6..... 7..... 8..... 9..... 10..... 11..... 12..... 13..... 14..... 15..... 16..... 17..... 18..... 19..... 20..... 21..... 22..... 23..... 24..... Replace any nozzles that vary 10% or more from the manufacturer's correct nozzle output. (Nozzles with both higher and lower outputs must be replaced.)	Total spray output (add all nozzles) L/min ❶
Record actual effective spray width in metres by measuring the distance across the outside nozzles and adding the distance between two adjacent nozzles.	m ❷

Calculating

Actual Ground Speed*	$\frac{\text{Distance covered (m)} \times 3.6}{\text{Time taken (seconds)}}$	$\frac{(\quad) \times 3.6}{(\quad)}$	= ..... km/hr ❸

'3.6' in the calculation is a conversion factor to convert metres to kilometres (metres ÷ 1000) and seconds to hours (seconds ÷ 3600): D/1000 ÷ S/3600 = D/1000 × 3600/S = D/S × 3600/100 = D/S × 3.6.

* To calculate your actual ground speed:

- Measure a set distance, for example 100 metres.
- Make sure that the spraying conditions are like those in the area that you will be spraying.
- Record how long it takes using the appropriate gears and revs.

Now you can calculate the water application rate, how much chemical you will need to mix in each tank and how many tank loads you will need to do the whole job. Follow the steps below:

1. Copy the answers you worked out on the previous page into the boxes below. You will need these numbers to do the calculations on this page. (The numbers in black circles (e.g. ❷) tell you the step where the answer is on the previous page.

Total Spray Output	Effective Spray Width	Actual Ground Speed
..... litres/minute ❶	..... metres ❷	..... km/hr ❸

2. Work out the water application rate by using the numbers you have recorded above. Put these numbers in the correct place in the calculation below.

Water Application Rate	$\frac{❶ \times 600}{❷ \times ❸}$	$\frac{(\quad) \times 600}{(\quad) \times (\quad)}$	$= \frac{(\quad)}{(\quad)}$	❻ ..... litres/ha

'600' in the calculation is a conversion factor to convert litres per minute to litres per hour (minutes × 60), and kilometres to metres (km × 1000), then square metres (m × km × 1000 = m^2) to hectares (m^2 ÷ 10000):
60 ÷ 1000/10000 = 60 ÷ 1/10 = 60 × 10 = 600.

Does this water application rate meet the chemical label requirements? (See Part B above)	Yes	No
If not, how could you change this rate to meet this requirement?		

3. Now that you know the water application rate you can calculate how much chemical you need to mix in each tank.

Chemical Application Rate		Spray Tank Capacity
..... litres/ha ❹		..... litres ❺

How much chemical to mix in each tank?	$\frac{❹ \text{ (L/ha)} \times ❺ \text{ (L)}}{❻ \text{ (L/ha)}}$	$\frac{(\quad) \times (\quad)}{(\quad)}$ = ... litres

4. Finally, you can now work out how many tank loads you will need to do the job.

Spray mix needed for the job	❼ (ha) × ❻ (L/ha) ( ) × ( )	= ..... litres ❽
Number of tanks needed	$\frac{❽ \text{ (L)}}{❺ \text{ (L)}}$ $\frac{(\quad)}{(\quad)}$	= ..... tanks

(To crosscheck your calculations: *Number of tanks × Volume of chemical per tank = Area to be sprayed × Chemical rate)*

Source: SMARTtrain Calibration and Records Supplement 2010.

Managing your legal responsibilities in applying pesticides

Pesticides Act

The Pesticides Act 1999 is the primary legislative instrument controlling the use of pesticides in NSW and is administered by the Environment Protection Authority (EPA). **The underlying principle of the Pesticides Act is that pesticides must only be used for the purpose described on the product label and all the instructions on the label must be followed. Consequently, all label directions must be read by or explained to the user prior to each use of the pesticide.**

All pesticide users should take reasonable care to protect their own health and the health of others when using a pesticide. They should also make every reasonable attempt to prevent damage occurring from the use of a pesticide, such as off-target drift onto sensitive areas or harm to endangered and protected species.

A Regulation was gazetted in 2009 renewing the requirement for all commercial pesticide users, i.e. all farmers and spray contractors, to keep records of their pesticide application.

While no set form has to be used, records must include the following:

- full product name,
- description of the crop or situation,
- rate of application and quantity applied,
- description of the equipment used,
- address of the property, identification of the area treated and order of paddocks treated,
- date and time of the application (including start and finish),
- name, address, and contact details of the applicator and of the employer or owner if an employee or contractor is the applicator,
- estimated wind speed and direction (including any significant changes during application),
- other weather conditions specified on label as being relevant (e.g. temperature, rainfall, relative humidity).

A form that captures all the information required by the Regulation, together with notes on how to fill it in, is included in this guide. The form and notes can also be downloaded from the Department's website. A self-carboning record book is available from Murrumbidgee Rural Studies Centre, Yanco.

Records must be made within 24 hours of application, be made in legible English, and kept for 3 years.

The 2009 Regulation requires all commercial pesticide users to be trained in pesticide application.

The training of aerial applicators, pest control operators and fumigators is recognised as satisfying the requirements of the Regulation. Apart from these groups, all commercial users must have a prescribed qualification. Only domestic use, such as home gardens, is excluded, provided the pesticide is a specific domestic/home garden product. Covered by the Regulation is pest control by/on:

- public authorities, e.g. State Rail,
- golf courses, sporting fields and bowling greens,
- agricultural, horticultural, aquacultural and forestry operations,
- businesses, educational institutions, and hospitals.

The minimum prescribed training qualification is the AQF2 unit of competency, 'Apply chemicals under supervision', although owner-applicators are encouraged to train and be assessed in the two higher AQF3 competencies, 'Prepare and apply chemicals' and 'Transport, handle and store chemicals'.

Growers are recommended to undertake the SMARTtrain course, Chemical Application, or the standard ChemCert course, both of which cover the higher AQF3 competencies. For growers with literacy and/or numeracy problems, the lower level AQF2 competency will provide a minimum qualification that satisfies the Regulation.

Hazardous Chemicals legislation

Many registered pesticides are classified as hazardous chemicals even those that are not, pose some risk to the health of those who use them or are exposed to them.

The *Work Health and Safety Act 2011* (WHS), and the Hazardous Chemical section of the *Work Health and Safety Regulation 2011*, detail legal requirements of suppliers, workers and persons conducting businesses or undertakings in the workplace for hazardous chemicals management. The Act and accompanying Regulation are intended to protect workers from both the short and long term health effects of exposure to hazardous chemicals and to improve current health and safety practices by:

- provision of health and safety information to workers (including a list or register of all hazardous chemicals and an SDS (Safety Data Sheet) for each hazardous chemical),
- consultation with workers,
- training of workers,
- minimising the risks arising from hazardous chemicals exposure, and
- health surveillance (if warranted by the risk assessment in respect of organophosphates).

Both storage and use are covered by the WHS legislation.

Storage limits have changed. Premises storing large quantities require placarding of both the storage shed and the entrances to the premises. If very large quantities are stored – which would be rare on-farm, a manifest, site plan and written emergency plan are required. Consult your local WorkCover office for advice.

WorkCover NSW's *Code of practice for the safe use and storage of chemicals (including pesticides and herbicides) in agriculture* is an approved industry code of practice and provides practical guidance for farm chemical users to comply with the legislation mentioned here.

How to fill out your Pesticide Application Record Sheet

(This form includes more than the Records Regulation requires, so compulsory information is in *Italics*.)

Property/holding:

Attach a detailed property map (e.g. line drawing), showing adjoining sensitive areas, with paddocks and other features clearly identified.
Fill in the residential address.

Applicator details:

The applicator, or person applying the pesticide, must fill in their contact details. If the applicator is not the owner, e.g. a contractor or employee, then the owner's details also have to be filled in. In the case of a contractor, one copy of the record should be kept by the applicator and another given to the owner.

Sensitive area identification:

If there are sensitive areas, either on the property or on land adjoining, these should be identified in advance, and marked on the sensitive areas diagram, together with any precautions or special instructions. When using a contractor or giving the job to an employee, this section should be filled in and given to the person doing the application BEFORE the job starts. The property map with sensitive areas marked should be shown to them, and job fully discussed.

Paddock identification:

Identify the paddocks/blocks and order of treatment (if there is more than one) in the 'paddock' row of the form. This should be filled in prior to the start of application, along with the residential address. If using contractor or employee, this information should also be given to them BEFORE they start the job. Applicators using GPS systems could include a GPS reading in addition to the paddock number/name.

Crop/animal identification:

The left hand side of the Host/Pest section of the table is for crops, pastures and plants (non-crop, e.g. bushland and fallow), the right hand side for animals. *As a minimum, identify the host (crop/situation) and the weed.* It would be helpful to provide as much detail about the weed as possible, e.g. 4-leaf. Addition of details such as crop variety and growth stage are often important for QA schemes, but may also be necessary to positively identify the area treated as required by the regulation.

Product details:

The product name and rate/dose should be transcribed from the label. For tank mixes, include all products in the mixture.

If the use pattern is on permit, include the permit number and expiry date as well as the label details. The permit rate/dose may vary from that on the label. Don't forget to include the label product name.

The water rate may come from the label, or from your standard practice or as a result of your calibration. If additives or wetters are included in the mixture, it is helpful to note these.

The total L or kg can be calculated when the application is finished.

If the label has a WHP (withholding period), note this down. To calculate the date treated produce is suitable for sale, add the WHP to the date of application, e.g. if you applied a pesticide with a WHP of 7 days on the 7th December, you could harvest or graze the host 7 days later – 15th December.

Equipment details:

As a minimum, you have to fill in what equipment you used. Positive identification can be assisted by specifying the settings used for the application, e.g. nozzle type and angle, pressure. The nozzle type will usually include the angle. With pressure, the reading should be as close to the nozzle as possible. Other details are useful as a reminder for future use, or as a check on your set-up should you have a treatment failure, e.g. date of calibration and water quality. Water quality is important for herbicide efficacy. At the most basic level, water quality can be described in terms of its source, e.g. rainwater, dam water, bore water.

Weather:

As a minimum, you have to record wind speed and direction. This is better measured with instruments than estimated. Record any changes during application.

You must also record the time of day when you started, and the time when you finished.

Weather records have to be made for all equipment that distributes pesticide through the air.

Rainfall should be recorded for the 24 hours before and the 24 hours after application, unless a different figure is given in the restraints or critical comments sections of the label. Rainfall before or after application can affect efficacy.

Temperature and relative humidity should also be recorded, particularly if either or both are referred to in the restraints or critical comments sections of the label. Temperature and relative humidity can affect efficacy, increase the risk of off-target drift or may damage the host (e.g. phytotoxicity) or a combination of all three.

Spray record forms are downloadable from the NSW Department of Primary Industries website, www.dpi.nsw.gov.au/__data/assets/pdf_file/0011/188687/pesticide-application-form.pdf
At this site, there are instructions on how to fill in the form and examples of completed forms.

Spray record books containing the record forms on the website are available by ringing 1800 138 351. These spray record books contain 50 numbered, self-carboning forms and cost $12.00 each. Sequentially numbered forms are required for those producers in QA schemes where spray records are mandatory. The forms in the spray record book can be used for livestock and vertebrate pests, as well as crops and pastures.

Pesticide Application Record

Property holding (residential address):					Date:
Applicator's full name:			Owner (if not applicant):		
Address:			Address		
Phone: Mobile:	Fax:	Email:	Phone: Mobile:	Fax:	Email:
Sensitive areas (incl distances and buffers): N W E S			Comments (incl risk controls for sensitive areas):		
Paddock no/name:	Paddock area:		Order paddocks sprayed:		
Crop/situation:			Type of animals:		
Crop/pasture/variety:			Age/growth stage:		
Growth stage:			Mob/paddock/shed:		
Pest/weed/disease:			No animals treated:		
Pest density/incidence: Heavy ☐		Medium ☐		Light ☐	
Full product name:			Rate/dose:	Water rate (L/ha):	
Permit no:	Expiry date:		Adjuvants:	Total ha:	
Total L or kg:	WHP:		ESI:	Date suitable sale:	
Equipment type:	Release height:		Speed:	Nozzle type*:	Pressure:
Date last calibrated:	Water quality (pH and/or description):				
Showers ☐	Overcast ☐		Light cloud ☐	Clear sky ☐	
Rainfall (24 hours before and after)					
Before mm	During mm		After mm		
Time	Temperature	RH %	Wind speed	Direction	Variability
Start:					
Finish:					
Comments:					

* Include brand and capacity, e.g. TeeJet AI 11002.

Reducing herbicide spray drift

When applying pesticides the aim is to maximise the amount reaching the target and to minimise the amount reaching off-target areas. This results in:

1. Maximum pesticide effectiveness
2. Reduced damage and/or contamination of off-target crops and areas

In areas where a range of agricultural enterprises co-exist, conflicts can arise, particularly from the use of pesticides. **All** pesticides are capable of drift.

People have a moral and legal responsibility to prevent pesticides from drifting and contaminating or damaging neighbours' crops and sensitive areas.

Some labels now carry spray drift management instructions including buffer zones. Read and follow all label instructions.

How to minimise spray drift problems

Before spraying

- Always check for susceptible crops in the area, e.g. broad leaf crops such as grape vines, cotton, pulse crops, if using a broadleaf herbicide, and sensitive areas such as houses, schools, riparian areas
- Notify neighbours of your spraying intentions

Under the Records Regulation of the Pesticides Act it is essential that weather and relevant spray details are recorded. Forms are available from www.dpi.nsw.gov.au/agriculture/farm/chemicals/general/records

During spraying

- Always monitor meteorological conditions carefully and understand their effect on 'drift hazard'.
- Do not spray if conditions are not suitable, and stop spraying if conditions change and become unsuitable.
- Record weather conditions (especially temperature and relative humidity), wind speed and direction, herbicide and water rates, and operating details for each paddock.
- Supervise all spraying, even when a contractor is employed. Provide a map marking the areas to be sprayed, buffers to be observed, sensitive crops and areas.
- Spray when temperatures are less than 28°C.
- Minimise spray release height. (Lowest possible boom height).
- Use the largest droplets which will give adequate spray coverage. Where droplet size is mentioned on the label, follow the label instructions.
- Always use the least-volatile formulation of herbicide available.
- Maintain a down-wind buffer which may be in-crop e.g. keep a boom width from the downwind edge of the field. Where buffer zones are mentioned on the label, follow label instructions.
- If sensitive crops are in the area, use a herbicide which is the least damaging.

How many types of drift are there?

Sprayed herbicides can drift as *droplets*, as *vapours* or as *particles*.

Droplet drift is the easiest to control because under good spraying conditions, droplets are carried down by air turbulence and gravity, to collect on plant surfaces. Droplet drift is the most common cause of off-target damage caused by herbicide application. For example, spraying fallows with glyphosate under the wrong conditions often leads to severe damage to near-by establishing crops.

Particle drift occurs when water and other herbicide carriers evaporate quickly from the droplet leaving tiny particles of concentrated herbicide. This can occur with herbicide formulations other than esters. Instances of this form of drift have damaged susceptible crops up to 30 km from the source.

Vapour drift is confined to volatile herbicides such as 2,4-D ester. Vapours may arise directly from the spray or evaporation of herbicide from sprayed surfaces. Use of 2,4-D ester in summer can lead to vapour drift damage of highly susceptible crops such as tomatoes, sunflowers, soybeans, cotton and grapes. This may occur hours after the herbicide has been applied.

Vapours and minute particles float in the airstream and are poorly collected on catching surfaces. They may be carried for many kilometres in thermal updraughts before being deposited.

Sensitive crops may be up to 10,000 times more sensitive than the crop being sprayed. Even small quantities of drifting herbicide can cause severe damage to highly sensitive plants.

What factors affect the risk of herbicide spray drift?

Any herbicide can drift. The drift hazard, or off-target potential of a herbicide in a particular situation depends on the following factors:

- Volatility of the formulation applied. Volatility refers to the likelihood that the herbicide will evaporate and become a gas. Esters volatilise (evaporate) more readily than amine formulations.
- Closeness of crops susceptible to the particular herbicide being applied, and their growth stage. For example cotton is most sensitive to Group I herbicides in the seedling stage.
- Method of application and equipment used. Aerial application releases spray at ~3 m above the target and uses relatively low application volumes, while ground rigs have lower release heights and generally higher application volumes, and a range of nozzle types. Misters produce large numbers of very fine droplets that use wind to carry them to their target.
- Amount of active ingredient (herbicide) applied – the more herbicide applied per hectare the greater amount available to drift or volatilise.
- Efficiency of droplet capture – bare soil does not have anything to catch drifting droplets compared with crops, erect pasture species and standing stubbles.
- Weather conditions during and shortly after application.

Use a low volatile formulation

Many ester formulations are highly volatile when compared with the non-volatile amine, sodium salt and acid formulations. Some low volatile ester formulations may have a proportion

of high volatile esters present, so caution should be exercised when using these products.

The compromise between minimising drift and achieving ideal coverage

A significant part of minimising spray drift is the selection of equipment to reduce the number of small droplets produced. However, this in turn may affect coverage of the target, and therefore the possible effectiveness of the pesticide application.

This aspect of spraying needs to be carefully considered when planning to spray.

As the number of smaller droplets decreases, so does the coverage of the spray. Water rate may need to be increased to compensate for coverage.

Reduce spray release height

- Operate the boom at the minimum practical height. Drift hazard doubles as nozzle height doubles. If possible, angle nozzles forward 30° to allow lower boom height with double overlap. Lower heights however, can lead to more striping, as the boom sways and dips below the optimum height.
- 110° nozzles produce a higher percentage of fine droplets than 80° nozzles, however they allow a lower boom height while maintaining the required double overlap.
- Operate within the pressure range recommended by the nozzle manufacturer. Production of driftable fine droplets increases as the operating pressure is increased. Lower volumes such as 30 to 40 L/ ha produce a higher percentage of fine droplets than higher spray volumes at the same pressure and nozzle design.

Aircraft application has an inherently greater risk than ground rig application. This is due to a number of factors, including lower volume application, small droplet sizes, height of application, and turning and wing-tip vortices. An aircraft should not be used to apply herbicide in areas where highly susceptible crops are growing nearby.

Size of the area treated

When large areas are treated relatively large amounts of active herbicide is applied and the risk of off-target effects increases due to the length of time taken to apply the herbicide. Conditions such as temperature, humidity and wind direction may change during spraying.

Applying volatile formulations to large areas increases the chances of vapour drift damage to susceptible crops and pastures.

What is your 'capture surface'?

Targets vary in their ability to collect or capture spray droplets. Well grown, leafy crops are efficient collectors of droplets. Turbulent airflow normally carries spray droplets down into the crop within a very short distance.

Fallow paddocks or seedling crops are poor catching surfaces. Drift hazard is far greater when applying herbicide in these situations or adjacent to these poor capture surfaces.

The type of catching surface between the sprayed area and susceptible crops should always be considered in conjunction with the characteristics of the target area when assessing drift hazard.

Nozzle selection for post-emergent herbicides and fungicides

Overview

Nozzle selection for application of post-emergent herbicides and fungicides to cereals should primarily focus on reducing the risk of spray drift without compromising efficacy. Drift, or loss is a significant issue facing the industry and spray applicators not only have a moral but a legal obligation to adopt drift management best practise.

Late season application of fungicides and herbicides requires consideration for coverage and penetration issues that are usually not required for pre-emergent or summer/fallow applications.

Fungi typically target specific plant parts such as stems, leaves, and heads or pods. These locations must be adequately covered by droplets for the fungicide to work, and this requires special approaches regarding what nozzle to use. Likewise some weeds may need to be selectively targeted within the crop canopy, potentially a far trickier proposition than knockdown applications.

For many years the standard maxim was to spray these products with fine droplets because they were assumed to give the best coverage. But after many years of spray application research around the world, the current recommendation is to avoid fine droplets in preference to a coarse, directed spray applied at higher water volumes than what might be considered 'normal' application rates.

The problem with fine drops

In principle fine drops should mean greater coverage, that is if they actually land on the target and don't blow away or evaporate. However, small droplets travel slowly and have little inertia/momentum so are easily displaced by wind and turbulence.

Incidentally, the logic of increasing the spray pressure to force fine drops into the canopy is wrong. The acceleration of small droplets lasts only milliseconds and has no impact on the overall travel time of the droplet to the target. Spraying at high pressure not only increases the wear rate of nozzles, it also produces finer sprays with a corresponding increase in drift potential.

Coarse droplets are the go

Coarser sprays provide just as much coverage as long as water volume is sufficient (>80 L/ha). In terms of coverage, the droplet density (or number of drops/cm) is more important than droplet size, and adequate densities (efficacy) can be achieved with nozzles that produce coarse spray qualities.

Coarser droplets also maintain their original direction of travel for a longer period of time, and in the case on TwinJets (or double outlet nozzles), can cover the forward and backward sides of the target more effectively.

What nozzle?

At TeeJet, we recommend 110° TwinJets (or dual pattern nozzles) for both post-emergent herbicides and fungicides. Choices include the Turbo TwinJet (TTJ), the Air Induction Turbo TwinJet (AITTJ) or the Air Induction Dual Pattern AI3070, a new nozzle specifically designed for fungicide application in cereal crops. Double outlet nozzle bodies and caps are also available for growers who might want to mount two conventional nozzles on the one nozzle body.

Turbo TwinJet (TTJ60)

- Front flat spray 30° from vertical
- Rear flat spray 30° from vertical
- Medium – Coarse
- 1.5–6 bar
- Ideal pressure 2-4 bar
- 02 to 04 capacities
- Drift control – Good

Air Induction Turbo TwinJet (AITTJ60)

- Front flat spray 30° from vertical
- Rear flat spray 30° from vertical
- Coarse –Very Coarse
- 2–6 bar
- Ideal pressure 3–4 bar
- 02 to 04 capacities
- Drift control – Excellent

Air Induction Dual Flat Spray (AI3070)

- Front flat spray 30° from vertical
- Rear flat spray 70° from vertical
- Medium –Very Coarse
- 1.5–6 bar
- Ideal Pressure 2–4 bar
- 015 to 05 capacities
- Drift control – Excellent

Double outlet nozzle body or cap

- If using Turbo TeeJets (TT), 60°, 90° or 120° included angle
- Drift Control, drop size, pressure range – varies

The final choice will depend on the product being applied, travel speeds (or application volume), crop density and the applicators pre-spray drift risk assessment (weather conditions, location of susceptible crops etc).

Conclusions

- Use high application volumes unless the label specifically recommends against it. Higher volumes improve both coverage and penetration of the spray, and this is the single most important variable for post-emergent herbicides and fungicides.
- Avoid very fine sprays as they can lead to excessive spray drift and evaporation.
- Use TwinJets that produce coarser droplets that maintain their original direction of travel for a longer period of time, and therefore cover the leading and trailing sides of the target more effectively.
- Always try to select and operate a nozzle around its mid pressure range (e.g. AITTJ60 at 3–4 bar)

As always, any application requirements on the product label must be adhered to.

Source: Peter Alexander, TeeJet Australasia Pty Ltd.

Weather conditions to watch out for

Midday turbulence

- Updraughts during the heat of the day cause rapidly shifting wind directions. Spraying should usually stop by 11.00 am during the summer months.

High temperatures

- Avoid spraying when temperatures exceed 28°C.

Humidity

- Avoid spraying under low relative humidity conditions i.e. when Delta T (the difference between wet and dry thermometers) exceeds 10°C. Spraying when Delta T is between 8–10° is considered high risk.
- High humidity extends droplet life and can greatly increase the drift hazard of fine droplets under inversion conditions. This results from the increased life of droplets smaller than 100 microns.

Wind

- Avoid spraying under calm conditions.
- Ideal safe wind speed is 7–10 km an hour.
  Leaves and twigs are in constant motion – a light breeze.
- 11–14 kph (moderate breeze) is suitable for spraying if using low drift nozzles or higher volumes application (80–120 L/ha).
  Small branches move, dust is raised and loose paper moving – a moderate breeze.

Surface inversions

What are surface inversions?

Surface inversions are layers of the atmosphere at the earth's surface in which temperature increases with height. This is the inverse of the normal temperature decrease with height.

Hazards of surface inversions

Surface inversions strongly suppress the dispersion of airborne pesticides and the like. Surface inversions can cause airborne pesticides to:

- remain at high concentrations for long periods over and close to the target,
- travel close to the surface for many kilometres in light breezes,
- move downslope and concentrate into low lying regions, and
- be transported often in unpredictable directions.

Radiation inversions – the most hazardous

Surface inversions usually begin to occur near sunset after the ground cools rapidly by losing heat energy through infrared radiation upward into space. That radiation passes through clear air with little effect. As the ground cools, the air in contact with the ground begins to cool directly by conduction leading to the lowest layer of air being cooler than higher layers. This is referred to as radiation cooling.

Inversions caused by radiation cooling – called radiation inversions – are the most hazardous to pesticide applications because they are the most likely to severely restrict dispersion and promote transport at high concentrations of the airborne pesticides.

Radiation inversions occur most nights. Only when winds are strong enough to completely mix the lowest layers of the atmosphere and/or cloud cover severely restricts surface heating and cooling is there a chance that surface radiation inversions won't form overnight.

Radiation inversions also form over sloping terrain when air in contact with the ground is cooled by terrestrial radiation. The cooled layer remains quite shallow over the slope and is typically only 2 m to 10 m deep because gravity continually pulls it downward; causing drainage winds. Drainage-wind advection of cool air away from the slope and over or into lower lying regions may initiate a drainage inversion or intensify an existing radiation inversion. Drainage inversions, once formed, have similar attributes to radiation inversions. Airborne pesticides can be transported long distances downhill, over flat terrain toward the lowest lying regions and into valleys by drainage winds.

Radiation and drainage inversions have caused substantial damage in the northern river valleys to cotton crops and to vineyards in the Murray Valley.

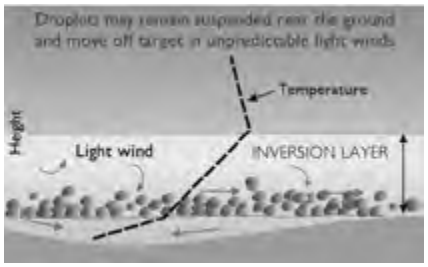
Radiation and drainage inversions typically begin in the evening at about sunset as the ground surface cools and the air in contact with the surface loses sufficient heat by conduction to become colder than the air immediately above. With continued overnight cooling, inversions usually intensify and deepen up to the time of the overnight minimum temperature.

How to anticipate and recognise radiation inversions

The potential for inversions to occur and to adversely hold high concentrations of airborne pesticides near the surface should always be anticipated between sunset and up to an hour or two after sunrise; unless one or more of the following conditions occur:

- There is continuous overcast, low and heavy cloud.
- There is continuous rain.
- Wind speed remains above 11 km/hr for the whole period between sunset and sunrise. Be mindful that established inversions can sometimes still occur when winds are in excess of 11 km/hr.

Source: APVMA 'Surface Inversions for Australian Agricultural Regions', www.apvma.gov.au



Source: Bureau of Meteology.

Where to find helpful meteorological information

Real time data needs to be collected in the paddock at the time of spraying. This can be done with:

- Handheld units which measure temperature, Delta T and wind speed.
- On-farm weather stations. Some can now be accessed by mobile phone.

Hourly data

Hourly data from the Bureau of Meteorology (BOM) weather stations including temperature, Delta T, wind speed and direction is available for the previous 72 hours from: www.bom.gov.au/weather/nsw/nsw-observations-map.shtml – click on the relevant town.

This data can help in planning spray activities and is useful for developing an understanding of the current daily patterns of meteorological conditions.

Meteograms™

Meteograms™ provide 7 day forecasts of: • temperature • relative humidity • Delta T • rainfall • wind speed • wind direction.

Meteograms™ are very helpful in planning spray programs for periods of lowest drift risk and highest pesticide efficacy.

Meteograms are available either free or by subscription. Some examples can be found at email address sent from weatherzone, www.spraywisedecisions.com.au or www.syngenta.com.au (you need to log in for free.

Night spraying

Spraying during the night and early morning is common, especially during the warmer summer months where controlling fallow weeds is an important agronomic practice. The popularity of spraying at night has also lifted with the introduction of GPS guidance. The main reason for night spraying is because in many cases Delta T conditions less than 8–10 are more common at night or in the early part of the morning, and the risk of physical drift by high wind is lower.

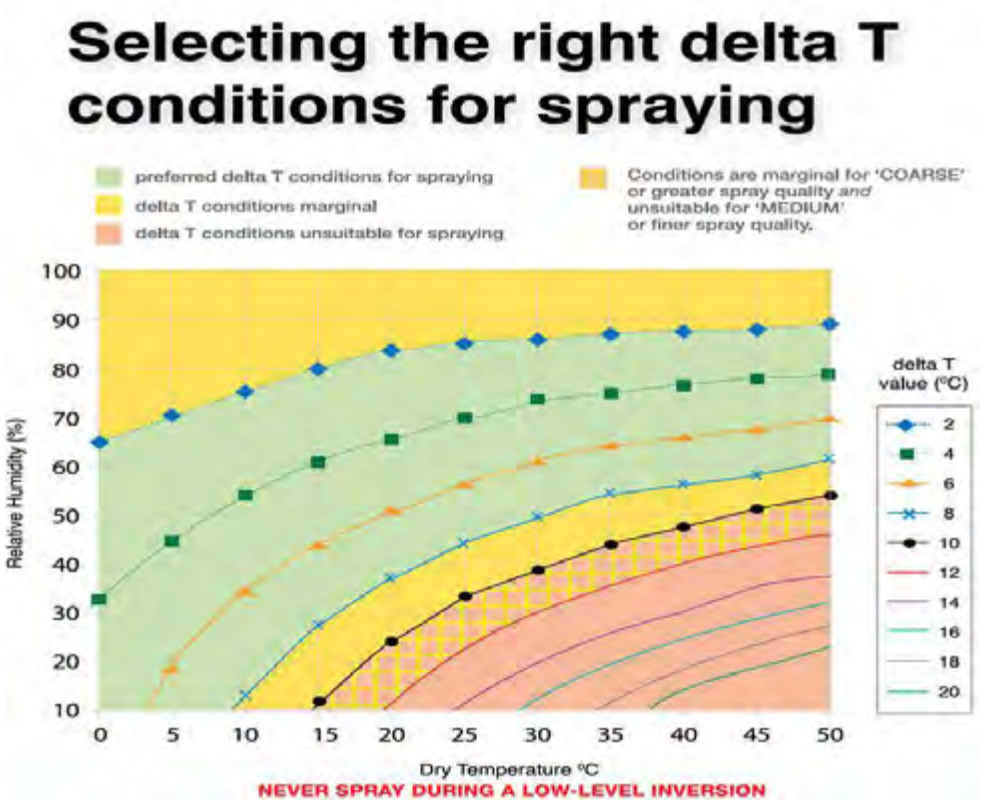
However, the risk of inversions is nearly always greater at night or in the early morning. Spraying during inversion conditions has resulted in massive off-target damage in recent seasons, particularly to sensitive crops such as cotton and grapes.

Important considerations when spraying at night.

- As a result of the APVMA's spray drift initiative, labels will increasingly include the Restraint, 'DO NOT apply during surface temperature inversions conditions at the application site.' Any Restraint is an absolute prohibition. Since surface inversion conditions are prevalent at night, night spraying should be avoided unless the applicator can demonstrate an inversion was not present.
- Plan ahead for spraying by checking local forecast conditions and meteograms.
- Continuously check for inversions before and during spraying. If they are present DO NOT spray. Observe dust habits behind ground rigs and/or use smoke generators to help identify inversion conditions.
- Only spray with nozzles that produce coarse or very coarse droplets. This may mean spraying slower rather than faster. Coarse droplets will still provide effective control when spraying summer weeds.
- Use adjuvants that minimise fine droplets.
- Ensure boom height is not operated higher than necessary.
- Be aware of local off target risks, such as sensitive crops etc.

Night spraying therefore carries some inherently high risks that spray applicators should be continuously monitoring and managing.

Source: M Scott, Agricultural Chemicals Officer, NSW Department of Primary Industries, Orange

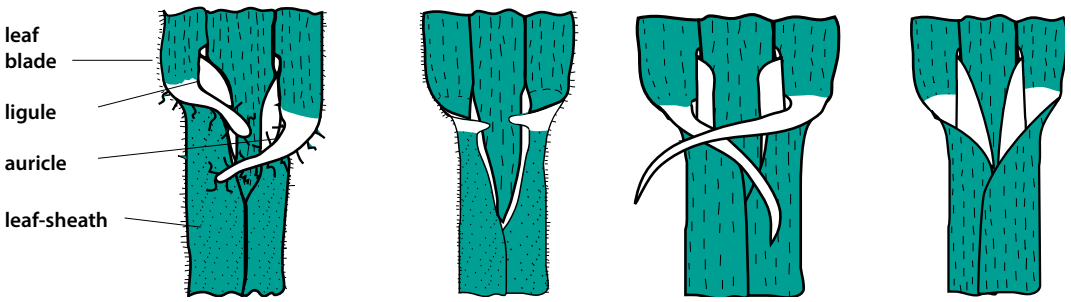


Further information about weather conditions and spraying can be found on the following websites:

www.grdc.com.au/GRDC-FS-SprayPracticalTips
www.grdc.com.au/Resources/Bookshop/2014/01/Weather-essentials-for-pesticide-application

Identifying cereal seedlings

It is extremely important to accurately identify cereal plants, before applying a herbicide for weed control. Cereal seedlings are identified by looking at four important characteristics. This involves taking a close look at the junction of the leaf blade and the leaf sheath (a hand lens may be useful).



	*Wheat and triticale**	*Rye*	*Barley*	*Oats and wild oats***
Ligule	medium	short	medium	medium
Auricle	medium blunt hairy	short hairless	long pointed hairless	absent
Leaf blade twist	clockwise	clockwise	clockwise	anticlockwise
Leaf hairiness	hairy	inconsistent	± hairless	± hairless

Important characteristics are underlined.

* Wheat and triticale are difficult to distinguish by vegetative characters. It is possible to distinguish them during early growth by uprooting the seedling and observing the grain shell. Wheat grain shells are a light colour, and oval. Triticale grain shells are darker and longer.

** Oats cannot be distinguished from wild oats during vegetative growth.

Preferred options

Preferred options in this booklet aim to help farmers and advisers to select the more reliable and effective herbicides available from the vast range of registered products.

Two types of preferred options are indicated with the registered herbicide rate shown within.

is a preferred option where **NO** legumes are in association with the cereal crop.

is a preferred option where legumes are present with the cereal crop, either sown or volunteer.

In no way are preferred options binding on advisers or farmers; they are a guide only. Specific weeds and circumstances need to be considered in making recommendations.

Preferred options should be considered in conjunction with appropriate herbicide resistance strategies.

A preferred option is for a weed species controlled by a herbicide in a specific crop. More than one herbicide may have a preferred option for a specific weed at a given stage of crop growth.

A preferred option may be for application only at a specific stage of growth of the crop even though the herbicide is registered for application at other stages and uses. They may apply only to a specific geographic area of NSW owing to other constraints – e.g. the effect of picloram on clover-based pastures.

Requirements for preferred option status are:

- Registered in commercial use for at least two seasons.
- Proven to be sound, reliable and easy to use under farm conditions.
- Shown efficacy better than other herbicides in at least three districts.
- If possible, supported by departmentally conducted trial or demonstration results.
- Cost effectiveness. Not necessarily the cheapest available.
- Interstate information will be considered.

Table 4. Herbicides for fallow commencement and/or maintenance – Grass weed control

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Imazapic 240 g/L **Flame® Pre-emergent**		Paraquat 250 g/L **Gramoxone® 250**	Paraquat + Diquat 135 + 115 g/L **Spray.Seed® 250**	Amitrole 250 g/L + Paraquat 125 g/L **Alliance®**	Glyphosate 570 g/L **Roundup Ultra® Max**	Glyphosate 540 g/L **Weedmaster® Argo®**	Glyphosate 470 g/L **Weedmaster® DST®**
Grass weeds	**(litres)**		**(litres)**	**(litres)**	**(litres)**	**(litres)**	**(litres)**	**(litres)**
annual phalaris	–	Fallow residual pre-emergent herbicide. Apply to paddock at least 4 months before planting wheat, barley, chickpea. 200 mm rainfall required for plant-back. See Table 2. Best applied to dry soil surface prior to weeds germinating. Northern NSW only.	1.2–2.4	1.2–2.4	–	0.625–0.95	0.33–0.67	0.38–1.5
annual ryegrass	–		1.2–2.4	1.0–3.2	3.0–4.0	0.95-1.25	1.0–1.3 e	1.15–1.5
barley grass	–		1.2–2.4	1.0–3.2	3.0–4.0	0.625–0.95	0.33–1.0	0.38–1.5
barnyard grass	0.15–0.2		1.2–2.4	1.2–2.4	3.0–4.0	0.625–1.3	0.67–1.3	0.76–1.5
blowaway grass	0.15–0.2		–	–	–	–	–	–
brome grass	–		1.2–2.4	1.0–3.2	3.0–4.0	0.95-1.25	1.0–1.3	0.96–1.5
button grass	0.15–0.2		–	–	–	0.625–1.3	0.67–1.3	0.76–1.5
cereals – volunteer	–		1.2–2.4	1.0–3.2	3.0–4.0	0.625–0.95	0.33–1.0	0.38–1.5
couch	–		–	–	–	1.2–1.9 b	1.0–2.0 b	1.15–2.3 b
Johnson grass	–		–	–	–	1.2–1.9	1.3–2.0	1.15–2.3
liverseed grass	0.15–0.2		1.2–2.4	1.2–2.4	–	0.625–1.3	0.67–1.3	0.76–1.5
native millet	–		–	–	–	0.625–1.3	0.67–1.3	0.76–1.5
nut grass	–		–	–	–	1.9 + 1.9 c	2.0 + 2.0 c	2.3 + 2.3 c
phalaris – perennial	–		–	–	–	1.2–1.9	–	1.44–1.9
pigeon grass	–		–	–	–	–	–	–
sorghum – volunteer	–		–	–	–	0.425–1.3	0.67–1.3	0.76–1.5
spiny burrgrass	–		–	–	–	–	–	–
stinkgrass	0.15–0.2		–	1.2–2.4	–	0.425–1.3	0.67–1.3	0.76–1.5
summer grass	–		–	–	–	0.425–1.3	0.33–1.0	0.38–1.5
sweet summer grass	–		–	–	–	–	0.5–1.3	0.57–1.5
vulpia	–		1.2–2.4	1.0–3.2	–	0.95-1.25 a	1.0–1.3 e	1.15–1.5
wild oats	–		0.6–2.0	1.0–3.2	3.0–4.0	0.625–0.95	0.33–1.0	0.38–1.15
windmill grass	–		–	–	–	–	–	–
winter grass	–		1.2–2.4	–	–	0.95-1.25	–	0.96–1.5
Yorkshire fog	–		–	–	–	1.2–1.9	–	–
Rec. water vol L/ha boom	**50 min**		**50–200**	**50–200**	**50–200**	**80 max**	**25–100**	**25–100**
Wheat plant back	**4 months**		**1 hr**	**1 hr**	**0 hr c**	**1 hr**	**6 hr**	**6 hr**
Herbicide group	**B**		**L**	**L**	**L + Q**	**M**	**M**	**M**

a = When treating dense populations, use higher rate, add Wetter TX® and water volumes > 70 L/ha.
b = Best in conjunction with multiple applications and/or cultivation.
c = See label for program.
e = Minimum water rate of 70 L/ha and appropriate nozzles. See label.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014

EXPERIENCE THE POWER OF A SMARTER GLYPHOSATE

NEW

Nufarm weed master® ARGO®

dual salt technology® herbicide

VERY SMART AND VERY STRONG

It's the combination of intelligence and great strength that sets new weedmaster® ARGO® apart. It's strong enough to provide fast knockdown, and smart enough to provide added benefits like a 20 minute commercial rainfast offer* and solve the compatibility issues that affect some other glyphosate products. So mixing it with key partner products like Amicide® Advance 700 makes powerful one-pass weed control easy.

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* weedmaster ARGO delivers commercially acceptable weed control, provided it is applied according to label directions, even just 20 minutes prior to a shower. If weed control fails, Nufarm will replace up to 100% of your initial use amount of weedmaster ARGO for re-treatment. Contact your local reseller or Nufarm on www.nufarm.com/AU/SalesService for claims. Benefits provided to the farmers by this Rainfast Offer are in addition to other rights and remedies available to the consumer under the law.

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NUF0102

Table 5. Herbicides for fallow commencement and/or maintenance – Broadleaf weed control – Part 1

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Tribenuron-methyl 750 g/kg **Express®**	Oxyfluorfen 240 g/L **Goal®**	Carfentrazone ethyl 400 g/L **Hammer® 400EC** f	Pyraflufen-ethyl 2.1 g/L 2,4-D LV Ester 421 g/L **Pyresta®**	Triclopyr + Picloram + Aminopyralid 300 + 100 + 8 g/L **Grazon™ Extra**	Dicamba 500 g/L **Kamba® 500** g	Dicamba 700 g/kg **Cadence®**	Aminopyralid 10 g/L + Fluroxypyr 140 g/L **Hotshot™**	Paraquat + Diquat 135 + 115 g/L **Spray.Seed® 250**	Amitrole 250 g/L +Paraquat 125 g/L **Alliance®**	Glyphosate 570 g/L **Roundup Ultra® Max**	Glyphosate 470 g/L **Weedmaster® DST®**
Broadleaf weeds	(grams)	(millilitres)	(millilitres)	(litres)	(litres)	(litres)	(grams)	(litres)	(litres)	(litres)	(litres)	(litres)
amaranthus	25	–	–	–	–	0.32–0.56 b	230–400	–	–	3.0–4.0	–	–
amsinckia	–	–	–	0.25–0.5 i	–	–	–	–	–	–	–	–
blackberry nightshade	–	–	–	–	0.2–0.4 (S) b	0.32–0.56	230–400	–	–	–	–	–
black bindweed	25 b	–	–	–	–	0.28	200	0.5 g i	–	–	0.425–1.3	–
bladder ketmia	–	–	–	–	–	–	–	–	1.6–2.4	3.0–4.0	0.625–1.3	0.76–1.15 n
Boggabri weed	–	–	–	–	–	–	–	–	1.6–2.4	–	0.425–1.3	0.38–1.45
burrs – Bathurst	–	–	–	–	–	0.32–0.56	230–400	–	1.6–2.4	–	1.2–1.9	0.76–2.3
burrs – noogoora	–	–	–	–	–	0.32–0.56 b	230–400	–	–	–	0.625–1.3	0.76–1.15 n
caltrop/yellow vine	25	–	–	–	–	0.32–0.56 b	230–400	–	1.6–2.4	–	0.425–1.3	0.38–1.15
canola – volunteer	–	–	–	–	–	–	–	–	1.8–2.4 m	3.0–4.0 m	–	–
capeweed	–		15–45	0.25–0.5 i	–	0.16–0.24 b	–	–	1.2–3.2	3.0–4.0	0.95–1.25	0.96–1.5
charlock	–	–	–	–	–	–	–	–	1.2–3.2	–	–	–
chickpea – volunteer	–	–	–	–	–	–	–	–	–	–	–	–
chickweed	–	–	15–45	0.25–0.5 i	–	–	–	–	–	–	–	–
clover	–	–	–	–	–	0.2	140	–	1.2–3.2 p	–	1.2–1.9 c	–
corn gromwell	–	–	–	–	–	–	–	–	1.2–3.2	–	–	–
cudweed	–	–	–	–	–	–	–	–	–	–	–	0.76–1.15
datura (thornapple)	20 b	–	–	–	–	–	230–400	–	1.6–2.4	–s	0.625–1.3	0.76–1.15 n
deadnettle	25 b	75	–	0.25–0.5 i	–	–	–	–	1.2–3.2	–	0.425–1.3	0.575–1.5
docks	–		–	0.5 i e	–	0.28–0.56	200–400	–	–	–	1.2–1.9	–
erodium (storksbill)	–	75	15–45	0.25–0.5 i	–	–	–	–	1.2–3.2 z	3.0–4.0	1.2–1.9	–
fat hen	–	–	–	–	–	0.28–0.56	200–400	–	1.6–2.4	–	–	–
field pea – volunteer	–	–	–	–	–	–	–	–	1.2–1.8 p	3.0–4.0	–	–
fleabane	–	–	–	–	–	–	–	–	–	3.0–4.0	1.15 q r	–
fumitory	–	–	–	–	–	–	–	–	1.2–3.2	–	–	0.76–1.15
goosefoot	–	–	–	–	–	–	–	–	–	3.0–4.0 j	0.625–1.3	0.76–1.15
ground cherry–annual	–	–	–	–	–	–	–	–	–	–	0.625–1.3	0.76–1.15 n
heliotrope – white	–	–	–	–	–	–	–	–	–	–	–	–
Hexham scent	–	–	–	–	–	0.28	200	–	1.6–2.4	–	–	–
hoary cress	–	–	–	–	–	0.28 a	200 a	–	–	–	1.2–1.9	1.15
horehound	–	–	–	–	–	0.32–0.56	230–400	–	1.2–3.2	–	–	–
lucerne (established)	–	–	–	–	0.3–0.5 b	–	–	–	–	–	–	–
lupin – volunteer	–	–	–	–	–	–	–	–	1.2–1.8 p	–	–	–
marshmallow	–	75 u	15–45	0.5–0.9 i	–	–	–	–	1,2–1.8	3.0–4.0	–	–
medic	30	–	–	0.25–0.5 i	–	–	–	–	1.2–3.2 p	3.0–4.0 h	–	–
melons	–	–	–	–	0.2–0.4 b	–	–	–	1.6–2.4	–	0.625–1.3 k l	0.74–1.5 k l
Mexican poppy	–	–	–	–	–	–	–	–	–	–	0.625–1.3	0.76–1.15
mustards	–	–	–	0.5 i h	–	–	–	–	1.2–3.2	3.0–4.0	0.95–1.25	0.38–1.5
New Zealand spinach	20	–	–	–	–	0.28	200	–	1.6–2.4	–	0.625–1.3	0.76–1.15

Always add non-ionic surfactant at 100 mL/100 L spray volume. For best results tankmix with recommended label rates of glyphosate.

Always apply with recommended label rates of glyphosate. Addition of Goal® will improve knockdown and increase speed of control.

Always apply with recommended label rates of knockdown herbicides.

Always add with recommended rate of glyphosate at no less than coarse to very coarse droplets.

Tankmix Roundup® CT + adjuvant for control. Caution: check minimum recropping periods in Table 1.

Observe plant-back period with broadleaf crops.

Observe plant-back period with broadleaf crops. See Table 1.

Observe plant-back periods – see Table 1.

Add wetting agent when water volume is above 100 L/ha.

Parthenium weed	–	–	–	–	–	0.32–0.56	230–400	–	–	–	–	–
Paterson's curse	–	75	15–45	0.25–0.5 i	–	–	–	–	1.8–3.2	3.0–4.0	0.95–1.25	1.15–1.5
peachvine (cowvine)	–	–	–	–	0.2–0.4 b	–	–	–	–	3.0–4.0	–	–
peppercress	–	–	–	–	–	–	–	–	–	–	–	–
pigweed	20 b	–	–	–	–	–	–	0.5 g i	–	–	0.625–1.3	0.38–1.5 n
plantain	–	–	–	–	–	–	–	–	–	–	1.2–1.9	–
potato weed	–	–	–	–	–	–	–	–	–	–	–	–
radish – wild	–	–	15–45	0.25–0.5 i	–	–	–	–	1.2–3.2	3.0–4.0	0.95–1.25	1.15–1.5
rough poppy	–	–	–	–	–	–	–	–	1.2–3.2	–	–	–
saffron thistle	–	–	–	–	–	0.28 a	200 a	–	1.2–3.2	–	0.95–1.25	0.76–1.5
shepherd's purse	–	–	–	–	–	–	–	–	1.2–3.2	–	–	–
skeleton weed	–	–	–	–	–	–	–	–	–	–	–	–
slender thistle	–	–	–	–	–	–	–	–	–	–	–	–
sorrel	–	–	–	–	–	0.28 a	200 a	–	–	–	1.2–1.9	–
soursob	–	–	–	–	–	–	–	–	–	3.0–4.0	0.95	1.15
sowthistle	25	–	–	0.5 i	0.2–0.4 b	–	–	–	–	3.0–4.0	0.425–1.3	0.575–1.5
spear thistle	–	–	–	–	–	0.32–0.56	230–400	–	–	3.0–4.0	0.95–1.25	0.75–1.15
spiny emex	–	–	15–45	–	–	0.28–0.56	200–400	–	1.2–3.2	3.0–4.0	–	–
spurge	–	–	–	–	–	–	–	–	–	–	–	0.76–1.15
stagger weed	–	–	–	–	–	–	–	–	–	–	–	–
star thistle	–	–	–	–	–	0.32–0.56	230–400	–	–	–	–	–
stinging nettle	–	–	–	–	–	–	–	–	1.2–3.2	–	t	t
stinking goosefoot	–	–	–	–	–	–	–	–	–	–	0.625–1.3	0.76–1.15
sub. clover	–	–	15–45	0.5 i	–	0.2	140	–	1.2–3.2 p	–	1.2–1.9 c z	–
sunflower	–	–	–	–	–	0.28–0.56	200–400	–	–	–	–	0.575–1.5
turnip weed	20	–	–	0.25–0.5 i	–	–	–	–	1.2–3.2	–	0.625–1.3	0.76–1.15 n
variegated thistle	–	–	–	–	–	0.28	200	–	–	3.0–4.0	0.95–1.25	0.575–1.5
vetch	–	–	–	–	–	0.28	200	–	1.2–3.2	–	–	–
wild lettuce	20 b or 30	–	–	–	–	–	–	–	–	3.0–4.0	0.625–1.3	0.76–1.15 n
wild turnip	–	–	–	0.25–0.5 i	–	–	–	–	1.2–3.2	3.0–4.0	0.95–1.25	0.76–1.5 n
wireweed	–	–	–	–	–	0.28	200	–	1.2–3.2	3.0–4.0	0.625–1.3	0.76–1.15 n
Rec Water Vol L/ha Boom	**>50**	**30–200**	**50–150**	**60–150**	**50 min**	**50 min**	**50 min**	**80 min**	**50–200**	**50–200**	**80 max**	**25–100**
Wheat plant-back	**3 days**	**24 hr**	**0 hr**	**1–3 days**	**2–4 Mths**	**1–14 days**	**1–14 days**	**4 months g**	**1 hr**	**0 hr**	**1 hr**	**6 hr**
Herbicide group	**B**	**G**	**G**	**G + I**	**I**	**I**	**I**	**I**	**L**	**L + Q**	**M**	**M**

a = Add 0.8 L/ha 2,4-D amine for control.
b = Add glyphosate as per label for control.
c = Tankmix with dicamba for improved control.
d = See label for rates as they vary from Summit RAZE®.
e = Curled dock only.
f = Hammer® also available in 240 g/L, see label for rates.
g = Northern NSW only.
h = Indian hedge mustard only.
i = Add glyphosate – see label.
j = Chenopodium pumilio only.
k = Add Garlon™ 600 at 80–160 mL/ha for prickly/paddy melons or 120–160 mL/ha for Afghan/camel melons.
l = Use glyphosate alone for camel melon only.
m = Includes Roundup-Ready® canola.
n = Prior to stem elongation. After this add Amicide® Advance 700 for control. See label.
p = Add 5 g/ha Ally® or 0.5 L/ha dicamba for control.
q = A minimum of 1.18 L/ha Weedmaster® Argo® + 650 mL–1.1 L/ha Amicide® Advance 700.
r = A minimum of 1.18 L/ha Weedmaster® Argo® + 650 mL–1.1 L/ha Amicide® Advance 700 + followed by 1.6–2.0 L/ha Nuquat®.
t = Add Goal®/Striker®/Spark® at 75 mL/ha for control.
u = Small flowered Mallow.
NS = Not stated.
(S) = Suppression only.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 5. Herbicides for fallow commencement and/or maintenance – Broadleaf weed control – Part 2

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Metsulfuron-methyl 600 g/kg **Ally®**		Imazapic 240 g/L **Flame® Pre-emergent** NNSW only		Bromoxynil 200 g/L **Bromicide® 200**	2,4-D amine 700 g/L **Amicide® Advance 700**	2,4-D amine 800 g/kg **Baton® Low**	2,4-D amine 300 g/L **Various trade names** a	2,4-D LV ester 680 g/L **Estercide® Xtra 680**	2,4-D amine 300 g/L + Picloram 75 g/L + 7.5 g/L aminopyralid **FallowBoss™ Tordon™**	Fluroxypyr 333 g/L **Starane™ Advanced** b		Triclopyr 755 g/L **Garlon™ Fallowmaster™**	
						Note: Use these herbicides with caution when sensitive crops such as cotton, soybeans, grapes etc. are grown nearby.								
Broadleaf weeds	(grams)		(litres)		(litres)	(litres)	(kilograms)	(litres)	(litres)	(litres)	(litres)		(millilitres)	
amaranthus	–	For fallow control, see label for tankmix options with glyphosate products. Add wetting agent as required. Not before undersowing pasture legumes.	0.15–0.2	**Fallow residual pre-emergent herbicide.** Apply to paddock at least 4 months before planting wheat, barley and chickpea. See Table 2. Best applied to dry soil surface **before** weeds germinate. Northern NSW only. Requires 200 mm rainfall before planting.	–	0.745–1.15 d	0.4–1.3	1.8–2.7	0.8	–	–	Add Uptake™ spraying oil at 0.5 L/100 L of spray. When mixing with Roundup® CT to control grasses refer to Roundup® CT label.	–	Add Uptake™ spraying oil at 0.5 L/100 L water. Do not use oils when tankmixing with Roundup® CT. See label for melon species, size and chemical rate.
amsinckia	5 or 7		–		–	–	–	–	–	–	–		–	
blackberry nightshade	–		–		–	0.515–0.745 d	0.4–1.3	1.2–1.8	–	–	–		–	
black bindweed	–		–		1.5 i	–	–	–	–	–	0.45 h		–	
bladder ketmia	–		–		–	0.745–1.15 d	–	1.8–2.7	–	–	0.3 h		–	
Boggabri weed	–		0.15–0.2		–	–	–	–	–	–	–		–	
burrs – Bathurst	–				–	0.515–0.745 d	0.4–1.3	1.2–1.8	0.8–3.3	–	0.45		–	
burrs – noogoora	–		–		–	0.745–1.15 d	0.4–1.3	1.8–2.7	–	–	0.45		–	
caltrop/yellow vine	–		0.15–0.2		–	0.28–0.815 d	0.4–1.3	0.66–1.2	0.62–0.8	–	0.3 h		–	
canola – volunteer	–		–		–	0.88 or 1.2 d	0.4–1.3 t	1.8–2.7 t	0.9–1.3 t	–	–		–	
capeweed	–		–		–	–	–	–	0.53–0.8	–	–		–	
charlock	5		–		–	0.35–0.575 d	0.4–1.3	0.9–1.2	0.41–0.8	–	–		–	
chickpea – volunteer	5		–		–	–	–	–	–	–	–		–	
chickweed	5		–		–	–	–	–	–	–	–		–	
clover	5		–		–	0.545–0.745 d	0.4–1.3	1.2–1.8	0.62–0.8	–	–		–	
corn gromwell	–		–		–	–	–	–	–	–	–		–	
cudweed	–		–		–	–	–	–	–	–	–		–	
datura (thornapple)	–		–		–	0.515–0.745 d	0.4–1.3	1.2–1.8	0.41–1.7	–	0.45		–	
deadnettle	5		–		–	–	–	–	0.8	–	–		–	
docks	5 or 7		–		–	0.39–0.515 d	–	0.9–1.2	1.7–2.5	–	–		–	
erodium (storksbill)	–		–		–	0.515–0.745 d	–	1.2–1.8	0.8	–	–		–	
fat hen	–		–		–	0.745–1.15 d	0.4–1.3	0.8–2.7	0.41–0.8	–	–		–	
field pea – volunteer	7		–		–	0.39–0.515 d	–	0.9–1.2	–	–	–		–	
fleabane	–		–		–	0.65–1.1 d f j	–	–	–	0.7	–		–	
fumitory	5		–		–	0.28–0.815 d	–	0.66–1.2	0.8–3.3	–	–		–	
ground cherry – annual	–				–	0.745–1.15 d	–	1.8–2.7	–	–	0.45		–	
heliotrope – white	–		–		–	–	–	–	–	–	–		–	
Hexham scent	–		–		–	–	–	–	1.5–1.7	–	–		–	
hoary cress	–		–		–	–	0.4–1.3	–	0.8–2.1	–	–		–	
horehound	–		–		–	0.515–0.745 d	–	1.2–1.7	1.7–3.3	–	–		–	
lucerne (established)	–		–		–	–	–	5.0 v	–	–	–		–	
lupin – volunteer	5		–		–	0.39–0.515 d	0.4–1.3	0.9–1.2	0.41–1.7	–	–		–	
marshmallow	–		–		–	0.515–0.745 d	–	–	–	–	0.6		–	
medic	5		–		–	0.39–0.515 d	–	0.9–1.2	–	–	–		–	
melons	–		–		–	0.745–1.15 d	–	1.8–2.7	0.41–0.18	–	–		65–130 e	
Mexican poppy	–		–		–	0.745–1.15 d	–	1.8–2.7	0.8–1.5	–	–		–	
mintweed	–		0.15–0.2		–	–	0.4–1.3	–	0.8–1.5	–	–		–	
mustards	5		–		–	0.28–0.815 d	0.4–1.3	0.66–1.2	0.41–2.5	–	–		–	

Tankmix glyphosate CT or Credit® + surfactant at label rates.

New Zealand spinach	–	–	–	0.28–0.815 d	0.4–1.3	0.66–1.2	0.8	0.7	–	–
parthenium weed	–	–	–	–	–	–	–	–	–	–
Paterson's curse	5 or 7	–	–	0.39–0.515 d	0.4–1.3	0.9–1.2	0.8–1.7	0.7	–	–
peachvine (cowvine)	–	0.15–0.2	1.4–2.1	–	–	1.8–2.7	–	–	0.3 h	–
peppercress	–		–	–	–	–	–	–	–	–
pigweed	–	0.15–0.2	–	–	–	–	–	–	0.25–1.125 h	–
potato weed	–	–	–	0.745–1.15 d	0.4–1.3	1.8–2.7	–	–	–	–
radish – wild	–	–	–	0.28–0.815 d	0.4–1.3	0.66–1.2	–	0.35–0.7	–	–
rough poppy	5	–	–	–	0.4–1.3	–	2.1–2.9	0.35–0.7	–	–
saffron thistle	–	–	–	0.39–0.515 d	0.4–1.3	0.9–1.2	0.41–2.5	0.35–0.7	–	–
scotch thistle	–	–	–	–	–	–	–	–	–	–
shepherd's purse	5	–	–	0.515–0.745 d	0.4–1.3	1.2–1.8	0.8	0.7	–	–
skeleton weed	7 (S)	–	–	0.515–0.745 (S) d	0.4–1.3	1.2–1.8 (S)	0.8–1.7	0.7	–	–
slender thistle	–	–	–	–	0.4–1.3	–	0.8–3.3	0.7	–	–
sorrel	5	–	–	0.515–0.745 d	0.4–1.3	–	–	–	–	–
soursob	5	–	–	–	–	–	–	–	–	–
sowthistle	5	–	–	0.28–0.815 d	–	0.66–1.2	–	–	0.6 y	–
spear thistle	–	–	–	0.39–0.575 d	–	0.9–1.2	1.15–2.1	0.7	–	–
spiny emex	5 or 7	–	–	–	–	–	–	–	0.9	–
spurge	–	–	–	–	–	–	–	–	–	–
stagger weed	5	–	–	–	–	–	–	–	–	–
star thistle	–	–	–	–	–	–	0.8–1.7	–	–	–
stinging nettle	–	–	–	–	–	–	–	–	–	–
stinking goosefoot	–	–	–	–	–	–	0.8	0.7	–	–
sub. clover	5	–	–	–	0.4–1.3	–	0.62–0.8	0.5–0.7	–	–
sunflower	7	–	–	0.39–0.515 d	0.4–1.3	0.9–1.2	0.41–0.8	0.35–0.7	0.6	–
turnip weed	5	–	–	0.28–0.815 d	0.4–1.3	0.66–1.2	0.41–0.8	0.35–0.7	–	–
variegated thistle	–	–	–	0.39–0.515 d	0.4–1.3	0.9–1.2	0.41–3.3	0.35–0.7	–	–
vetch	–	–	–	0.515–0.745 d	–	1.2–1.8	–	0.7	–	–
wild lettuce	–	–	–	0.39–0.515 d	–	0.9–1.2	–	–	0.3 y	–
wild turnip	5	–	–	0.28–0.815 d	0.4–1.3	0.66–1.2	–	0.35–0.7	–	–
wireweed	5 or 7	–	–	0.515–0.745 d	–	1.2–1.8	0.8	0.7	0.9 y	–
Rec Water Vol L/ha Boom	**30 min**	**50 min**	**50–200**	**50–250**	**30–120**	**30–120**	**30–100**	**50–100**	**50 min**	**50 min**
Wheat plant-back	**10 days**	**4 mths**	**NS**	**1–7 days**	**1–7 days**	**1–7 days**	**1–7 days**	**1–7 days**	**7 days**	**7 days**
Herbicide group	**B**	**B**	**C**	**I**	**I**	**I**	**I**	**I**	**I**	**I**

a = 2,4-D Amine also available in 475 g/L, see appropriate labels for rates.
b = Fluroxypyr also available in 400 g/L. See label for rates.
d = Must also add a minimum of 1.18 L/ha Weedmaster® Argo®.
e = Rate for prickly paddy melon 65–130 mL/ha and Afghan or camel melon 95–130 mL/ha of Garlon™ Fallowmaster™ 755.
f = Must also add a minimum of 1.18 L/ha Weedmaster® Argo®, followed by 1.6–2.0 L/ha Nuquat® within 7–10 days of the first application.
h = Add glyphosate for control.
i = 1–1.5 L/ha plus glyphosate.
j = See label for appropriate rate given weed size and season consideration. Minimum water rate 70 L/ha.
r = For prickly/paddy melon add 80 mL Garlon™ 600/ha – do not add crop oil when mixing with glyphosate.
t = See label for rates for controlling Roundup Ready® canola volunteers.
v = 1.0 L/ha up to 4 leaf stage, 1.4 L/ha up to 6 leaf stage.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Restrictions now exist that limit the use of Estercide® 800 at certain times of the year.

* Currently there is a restriction on the use of high volatile esters. These formulations can only be used between 1 May and 31 August. Other formulations of 2,4-D (Low volatile esters and amine formulations) can be used at any time of the year within restraints listed on the respective labels.

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In contrast to several other group G products **Sharpen** has strong activity on a wide range of broadleaf weeds and importantly provides standalone control.

1

BROAD-SPECTRUM
Controls toughest broadleaf weeds including glyphosate resistant weeds.

2

FAST
3 to 5 times faster than glyphosate or 2,4-D.

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FLEXIBLE
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ALWAYS READ AND FOLLOW LABEL DIRECTIONS.

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Table 6. Herbicides for presowing seedbed weed control

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Salvage seedbed preparation																	
	Tribenuron-methyl 750 g/kg Express®	Metosulam 100 g/L Eclipse® 100 SC	Carfentrazone-ethyl 240 g/L Hammer® s	Saflufenacil 700 g/kg Sharpen® WG	Oxyfluorfen 240 g/L Goal®	Flumioxazin 500 g/kg Valor® 500 WG	Pyraflufen-ethyl 2.1 g/L + 2,4-D LV Ester 421 g/L Pyresta®	Pyraflufen-ethyl 20g/L Ecopar®	Fluroxpyr 333 g/L Starane™ Advanced b	Clopyralid 600 g/L Lontrel™ Advanced #	Dicamba 500 g/L Kamba® 500 g	Dicamba 700 g/kg Cadence®	Paraquat + Diquat 135 g + 115 g/L Spray.Seed® 250	Paraquat 250 g/L Gramoxone® 250	Amitrole 250 g/L + Paraquat 125 g/L Alliance®	Glyphosate 570 g/L Roundup Ultra® Max g	Glyphosate 470 g/L Weedmaster® DST® g	Glyphosate 510 g/L Raze®
Crop type	W,B,O	AC	AC	W,B,O,CH, FP,FB,L,LE	AC	AC	AC	WC	W, B, CH	WC, C	AC	AC	AC	AC	WC, C, F, L	AC	AC	AC
aircraft (A) or ground (B)	AB	AB	B	B	AB	B	B	B	AB	AB	AB	AB	B	B	B	AB	AB	AB
Weeds controlled	(grams)	(millilitres)	(millilitres)	(grams)	(millilitres)	(grams)	(litres)	(litres)	(litres)	(millilitres)	(litres)	(grams)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)
amsinckia	–	–	–	9–26	75	–	0.25–0.5 i	–	–	–	–	–	0.8–2.4	–	–	0.625–0.95*	0.38–1.15*	0.7–1.0
annual phalaris	–	–	–	–	75	–	–	–	–	–	–	–	0.8–2.4	1.2–1.6	–	0.625–0.95	0.76–1.5	0.7–1.0
annual ryegrass	–	–	–	9–26	75	–	0.5 i	–	–	–	–	–	0.6–3.2	1.2–1.6	1.5–2.8	0.95–1.25	0.76–1.5	0.7–1.3
barley grass	–	–	–	9–26	75	–	0.5 i	–	–	–	–	–	0.6–3.2	1.2–1.6	1.5–2.8	0.625–0.95	0.38–1.15	0.35–1.0
bedstraw	–	–	–	–	–	–	–	–	0.6	–	–	–	0.8–3.2	–	–	–	–	–
black bindweed	25 i	–	–	–	75	–	–	–	0.45 t	–	0.28	115–170 c	0.8–2.4	–	–	1.2–1.9	–	–
brome grass	–	–	–	9–26	75	–	0.25–0.5 i	–	–	–	–	–	0.6–3.2	1.2–1.6	1.5–2.8	0.95–1.25	0.38–1.5	0.35–1.4
caltrop	25	–	–	–	75	30 i	–		0.3 t	–	0.16–0.24 c	115–170 c	0.8–2.4	–	–	0.425–1.3	–	–
canola – volunteer	–	–	–	9–26	–	30 i	–		–	–	–	–	1.8–2.4 l	1.8–2.4 l	1.5–2.8 l	–	–	–
capeweed	–	–	25–75	9–26	75	30 i	0.25–0.5 i		–	75 y z	0.16–0.24 c	115–170 c	0.8–3.2	–	1.5–2.8	0.95–1.25	0.38–1.5	0.75–1.4
chickpea–volunteer	–	–	–	–	–	–	0.9 i	–	–	75 y	–	–	–	–	–	–	–	–
cereals – volunteer	–	–	–	–	75	–	0.25–0.5 i o	–	–	–	–	–	0.6–3.2	1.2–1.6	1.5–2.8	0.625–0.95	0.38–1.15	0.33–1.0
cleavers	–	–	–	–	–	–	–	–	0.6	–	–	–	–	–	–	–	–	–
corn gromwell	–	–	–	–	–	–	–	–	–	–	–	–	0.8–3.2	1.2–1.6	–	–	–	–
deadnettle	25 or 25 i	–	–	–	75	–	0.25–0.5 i	0.1–0.2 †	–	–	–	–	0.8–3.2	1.2–1.6	–	0.425–1.3	–	–
dock	–	–	–	–	75	–	0.5 e i	–	–	–	0.16–0.24 c	115–170 c	–	–	–	1.2–1.9	0.76–1.9	0.7–1.8
erodium	–	–	25–75	9–26	75	30 i	0.25–0.5 i j	–	–	–	–	–	0.8–3.2	1.2–1.6 x	2.0–2.8	1.2–1.9	1.44–1.9	0.7–1.8 w
faba bean – volunteer	–	–	–	–	–	–	–	–	–	75 y z	–	–	–	–	–	–	–	–
fleabane	–	–	–	17–34	–	–	–	–	–	–	–	–	–	–	2.0–2.8	–	–	–
fieldpea – volunteer	–	–	–	–	–	–	–	–	–	–	0.16–0.24 c	115–170 c	–	–	2.0–2.8	0.32–0.95*	–	–
fumitory	–	–	–	–	75	–	–	–	–	–	–	–	0.8–3.2	1.2–1.6	–	0.32–0.95*	0.76–1.5*	0.7–1.0
goosefoot	–	–	–	–	75	–	–	–	–	–	0.32–0.56	115–170 c	0.8–2.4	–	2.0–2.8	0.625–0.95	–	0.7–1.0
lesser swine cress	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
lupin – volunteer	–	–	–	9–26	75	–	–	–	–	–	–	–	0.8–1.8 m	–	–	0.32–0.95*	0.76–1.5*	0.7–1.0
marshmallow	–	–	25–75	9–26	75	30 i	–	0.1–0.2 †	0.6	–	–	–	–	–	2.0–2.8	–	–	–
medics	30	50	–	9–26	–	30 i	0.25–0.5 i	–	–	–	0.16-0.24 c	115–170 c	1.2–1.8 v	–	2.0–2.8	–	–	–
Mexican poppy	–	–	–	–	75	–	–	–	–	–	–	–	0.8–2.4	1.2–1.6	–	0.625–0.95	–	0.7–1.0
Muskweed	–	–	–	9–26	–	–	–	–	–	–	–	–	–	–	–	–	–	–
mustards	–	–	–	9–26	75	–	0.5 f i	–	–	–	0.16–0.24 c	115–170 c	0.8–3.2	1.2–1.6	1.5–2.8 f	0.95–1.25	1.15–1.5	1.0–1.3
New Zealand spinach	20	–	–	–	75	–	–	–	–	–	0.28	200	0.8–2.4	–	–	0.625–1.3	–	0.7–1.0
Paterson's curse	–	–	25–75	9–26	75	30 i	0.25–0.5 i	–	–	–	0.16–0.24 c	115–170 c	1.2–3.2	–	2.0–2.8	0.95–1.25	0.76–1.5	0.7–1.3
Notes	Always add non ionic-surfactant at 100 mL/100 L spray volume. For best results tankmix with recommended label rates of glyphosate.		Always apply with recommended label rates of knockdown herbicides.	Always apply with recommended label rates of knockdown herbicides. Add Bonza® adjuvant at 1% (Sharpen® WG herbicide may be used alone with a suitable adjuvant for control of volunteer cotton seedlings including Roundup Ready® Flex cotton. Canola has a 16 week plantback.)	Always apply with recommended label rates of glyphosate, paraquat or paraquat/diquat mixtures. Addition of Goal® will improve knockdown and increase speed of control.	Always add label rate of tankmix partner plus Hasten™ or Quicken™ at 0.5 L/100L.	Always add with recommended rate of glyphosate at no less than coarse to very coarse droplets.	Apply as a tankmix with Raze® or other glyphosate product. Apply when weeds are actively growing and at the 2–6-leaf growth stage. Addition of Hot-up™ Spray Adjuvant at 0.5% v/v may be beneficial when applying Ecopar® with a glyphosate herbicide.	Add Uptake™ spraying oil at 0.5 L/100 L of spray. Plant-back for wheat, barley and chickpea is 7 days for rates up to 1.5 L/ha.	Observe plant-back with both cereal and broadleaf crops. Lontrel™ can bind tightly to stubble. See Table 1.	Observe plant-back with broadleaf crops. See Table 1.	Observe plant-back with broadleaf crops. See Table 1.	Use lower rates for full soil disturbance and rates greater than 1 L/ha for minimum soil disturbance at seeding. See label. Add wetting agent where water volume is above 100 L/ha.	Use lower rates for full soil disturbance and higher rates for minimum soil disturbance at seeding. See label. Add wetting agent where water volume is above 100 L/ha.		Lower rates on small weeds and full soil disturbance. No surfactant required.		Lower rates with young weeds and full soil disturbance. Wetting agent not normally required – see label.

peppercress	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.8–2.4	–	–	–	–	–	
phalaris–perennial	–	–	–	–	75	–	–	–	–	–	–	–	–	–	–	–	–	1.2–1.9	1.15–1.5	1.0–1.8	
rough poppy	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.8–3.2	1.2–1.6	–	–	–	0.7–1.0	
radish – wild	–	35 a	25–75	9–26	75	30 i	–	0.1–0.2 †	–	–	–	–	0.8–3.2	–	1.5–2.8	0.95–1.25	1.15–1.5	–	
saffron thistle	–	–	–	–	75	–	–	–	–	–	–	–	0.8–3.2	1.2–1.6	–	0.95–1.25	0.76–1.5	0.7–1.3	
scotch thistle	–	–	–	–	75	–	–	–	–	–	0.28	–	–		–	0.95–1.25	1.15–1.5	0.7–1.3	
skeleton weed	–	–	–	–	75	–	–	–	–	–	–	–	–	–	–	0.95–1.9*	1.15*	1.0	
shepherd's purse	–	–	–	–	–	30 i	–	–	–	–	–	–	–	0.8–3.2	–	–	–	–	
sorrel	–	–	–	–	75	–	–	–	–	–	0.16–0.24 d	115–170 d	–	–	–	1.2–1.9	1.15–1.5	1.0–1.8	
soursob	–	–	–	–	75	–	–	–	–	–	–	–	–	–	2.0–2.8	0.95	1.15*	1.0	
sowthistle	25	–	–	9–26	75	30 i	0.5 i	–	0.6 p	–	0.16–0.24 c	115–170 c	0.8–2.4	1.2–1.6	2.0–2.8	0.425–1.3	–	0.7–1.3	
spear thistle	–	–	–	–	75	–	–	–	–	–	–	–	–	–	2.0–2.8	0.95–1.25	0.76–1.5	0.7–1.3	
spiny emex	–	–	25–75	9–26	75	30 i	–	–	0.9 r	–	0.28	200–400	0.8–3.2	1.2–1.6	2.0–2.8	–	0.38–1.5	0.35–0.9	
stinging nettle	–	–	–	–	–	–	–	–	–	–	–	–	0.8–3.2	–	–	–	–	–	
sub. clover	–	35 u	25–75	9–26	75	30 (S) i	0.5 i	–	–	75 y z	0.2 t	140 t	0.8–3.2 m	–	2.0–2.8	1.2–1.9	1.15–1.5	1.0–1.8	
toad rush	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
turnip weed	20	35 u	–	9–26	75	–	0.25–0.5 i	–	–	–	0.16–0.24 c	115–170 c	0.8–2.4	1.2–1.6	1.5–2.8	0.625–1.3	–	0.7–1.3	
variegated thistle	–	–	–	–	75	–	–	–	–	–	0.16–0.24 c	115–170 c	0.8–2.4	1.2–1.6	2.0–2.8	0.95–1.25	0.76–1.5	0.7–1.4	
vetch	–	–	–	–	–	–	–	–	–	75 y	0.28	200	1.8–3.2	–	–	–	–	–	
vulpia	–	–	–	–	75	–	0.5 i	–	–	–	–	–	0.6–3.2	1.2–1.6	–	0.95–1.25	0.76–1.5	0.7–1.3	
wild lettuce	30 or 20 i	–	–	–	75	–	–	0.1–0.2 †	0.6 p	–	0.16–0.24 c	115–170 c	0.8–2.4	1.2–1.6	2.0–2.8	0.625–1.3	–	–	
wild oats	–	–	–	9–26	75	–	–	–	–	–	–	–	0.6–2.4	0.6	1.5–2.8	0.625–0.95	0.38–1.15	0.35–1.0	
wild turnip	–	35 u	–	–	75	–	0.25–0.5 i	–	–	–	–	–	0.8–3.2	1.2–1.6	–	0.95–1.25	0.76–1.5	0.7–1.3	
winter grass	–	–	–	–	75	–	–	–	–	–	–	–	–	1.2–1.6	–	0.95–1.25	0.76–1.5	0.7–1.4	
wireweed	–	–	–	–	75	30 i	–	0.1–0.2 †	0.8 p	–	0.16–0.24 c	115–170 c	0.8–3.2	1.2–1.6	2.0–2.8	0.625–1.3	–	0.7–1.0	
Water vol L/ha boom	**50 min**	**50–100**	**50–150**	**80–250**	**30–200**	**50 min**	**60–150**	**70–150**	**50 min**	**50 min**	**50 min**	**50 min**	**50–200**	**50–200**	**50–200**	**80 max**	**25–100**	**25–100**	
Wheat plant-back	**3 days**	u	**u**	**1 hr**	**1 day**	**1 hr**	**1–3 days** h	**1 hr**	**7 days**	**7 days**	**1–14 days**	**1–14 days**	**1 hr**	**1 hr**	**0 hr** q	**1 hr**	**24 hr**	**1 hr**	
Herbicide group	**B**	**B**	**G**	**G**	**G**	**G**	**G + I**	**G**	**I**	**I**	**I**	**I**	**L**	**L**	**L + Q**	**M**	**M**	**M**	

a = Add 400–800 mL glyphosate 450 for control.
b = Fluroxypyr is also available in 200 g/L and 400 g/L. See label for rates.
c = Add 0.4– 0.6 L/ha glyphosate 450 for control.
d = Add 0.65– 0.8 L/ha glyphosate 450 for control.
e = Curled dock only.
f = Indian hedge mustard only.
g = Compatable with Amicide® Advance 700 (700 g/L 2,4-D amine).
h = See Table 1 for other crops. Note rainfall required.
i = Add glyphosate for control, see label.
j = Long storksbill only.
k = Add dicamba for improved control.
l = See label for controlling RR canola.
m = For control add 5 g/ha Ally® or 0.5 L/ha dicamba.
n = Add 1.0 L/ha glyphosate 450 for control.
o = Wheat and barley only. See label.
p = Add 0.6 L/ha glyphosate 450 for control.
q = See label for other crops.
r = Add 5 g/ha Ally® for control.
s = Hammer® also available in 400 g/L. See label for rates.
t = Tankmix with glyphosate for best results.
u = See appropriate glyphosate label.
v = See label for tankmix options in minimum till situations.
w = Add Hammer® for improved control.
x = Add Reglone® at 0.75–1.5 L/ha.
y = Add paraquat/diquat or glyphosate for control.
z = Can also be used PSPE at 120–240 g/ha (S). See label.
* = Only registered in conjunction with a full soil disturbance cultivation.
# = Also available as Lontrel™ 750 SG (750 g/kg).
† = White clover, French serradella and snail medic may be damaged.
(S) = Suppression only.

Crop usage
AC = All Crops
W = Wheat
CH = Chickpea
C = Canola
FB = Faba beans
L = Lupins
LE = Lentils
T = Triticale
O = Oats
B = Barley
WC = Winter Cereals
FP = Field Pea

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 7. Herbicides for pre-emergent and post-sowing pre-emergent weed control

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Chlorsulfuron 750 g/kg Glean®	Triasulfuron 750 g/kg Logran® 750	Butafenacil + Triasulfuron 200 + 520 g/kg Logran® B–power	Sulfosulfuron 750 g/kg Monza® Wheat and triticale only	Trifluralin 480 g/L Triflur® X	Pendimethalin 440 g/L Stomp® 440 j	Oryzalin + Trifluralin 125 + 125 g/L Duet® 250 EC	Prosulfocarb 800 g/L + S-Metolachlor 120 g/L Boxer® Gold	Pyroxasulfone 850 g/kg Sakura® 850 WG Wheat and triticale only, not durum	Triallate 500 g/L Avadex® Xtra	S-Metolachlor 960 g/L Dual Gold®	Metolachlor 960 g/L Clincher® Plus	Clopyralid 600 g/L Lontrel™ Advanced h
Incorporation	PSI	PSI	PSI	PSI	PSI	PSI	PSI	IBS	IBS	PSI	IBS	IBS	PSPE
	IBS	IBS	IBS	IBS	IBS	IBS	IBS			IBS	PSPE	PSPE	
Crop type	TW	W only	W only	TW only	AC not O	B, W, FP, CH	B, W, C	W, B	W, T	AC not O	WC	WC	WC, C
aircraft (A) or boom (B)	AB	AB	B	AB	B	AB	B	B	B	B	B	B	AB
Weeds controlled	(grams)	(grams)	(grams)	(grams)	(litres)	(litres)	(litres)	(litres)	(grams)	(litres)	(litres)	(litres)	(litres)
amsinckia	15	30	50	–	1.5–3.0 (S) (IBS) z	–	–	1.5–2.5 c (S)	–	–	–	–	–
annual phalaris	20 b	35	50 u	25 b	0.8 or 1.5–3.0 (IBS) z	–	1.6 or 2.3	1.5–2.5 c	118	–	–	–	–
annual ryegrass	15 or 20	35	50 u	25 b	0.8 or 1.5–3.0 (IBS) z	1.35–2.25	1.6 or 2.3	1.5–2.5 c or 2.5	118	b	0.375–0.5 (S) v	0.565–0.75 (S) v	–
barley grass	20 b	–	–	25 (S)	1.5–3.0 (S) (IBS) z	–	–	1.5–2.5 (S) c or 2.5 (S)	118	–	–	–	–
bedstraw	–	–	–	–	–	–	–	–	–	–	–	–	–
black bindweed	–	30	50	–	–	–	–	–	–	–	–	–	–
brome grass	20(S)	–	–	25 (S)	1.5–3.0 (S) (IBS) z	–	–	1.5–2.5 c (S)	118 (S)	–	–	–	–
caltrop	–	–	–	–	1.5–3.0 (S) (IBS) z	–	–	–	–	–	–	–	–
capeweed	20	35	50 u	–	–	–	–	–	–	–	–	–	0.15–0.3 (S)
cereals – volunteer	–	–	–	–	–	–	–	–	–	–	–	–	–
cleavers	–	–	–	–	–	–	–	–	–	–	–	–	–
crassula	–	–	–	–	–	–	–	1.5–2.5 c or 2.5	–	–	–	–	–
corn gromwell	20	30	50	–	1.5–3.0 (IBS) z	–	–	–	–	–	–	–	–
deadnettle	15 or 20	30	50	–	1.5–3.0 (S) (IBS) z	–	1.6 or 2.3	1.5–2.5 c (S)	–	–	–	–	–
dock	20	–	–	–	–	–	–	–	–	–	–	–	–
erodium	–	–	–	–	–	–	–	–	–	–	–	–	–
faba bean – volunteer	–	–	50 u	–	–	–	–	–	–	–	–	–	0.15–0.3 (S)
fieldpea – volunteer	–	–	50 u	–	–	–	–	–	–	–	–	–	–
fumitory	15 or 20	30	50	25 b	1.5–3.0 (IBS) z	–	1.6 or 2.3 (S)	1.5–2.5 c	–	–	–	–	–
lesser swine cress	–	30	50	–	–	–	–	–	–	–	–	–	–
lupin – volunteer	–	–	–	–	–	–	–	–	–	–	–	–	–
Mexican poppy	–	35(S)	50 (S)	–	–	–	–	–	–	–	–	–	–
mintweed	20	–	–	–	–	–	–	–	–	–	–	–	–
mustards	15	30	50	–	–	–	–	–	–	–	–	–	–
New Zealand spinach	–	–	50	–	–	–	–	–	–	–	–	–	–
Paterson's curse	15	30	50	–	–	–	–	–	–	–	–	–	–
peppercress	–	–	–	–	–	–	–	–	–	–	–	–	–
phalaris – perennial	–	–	–	–	–	–	–	–	–	–	–	–	–
rough poppy	15 or 20	30	50	–	1.5–3.0 (IBS) z	–	–	1.5–2.5 c (S)	–	–	–	–	–
radish – wild	–	35 (S)	50 u(S)	–	–	–	–	–	–	–	–	–	–
saffron thistle	20 (S)	–	–	–	–	–	–	–	–	–	–	–	–

Apply to level seedbed. Incorporate by sowing. Not before undersowing pasture legumes. Only use before sowing wheat or triticale.

Apply to level seedbed. Incorporate by sowing. Wheat only. Not before undersowing legumes.

Apply to level seedbed. Incorporate by sowing. Wheat only. Not before undersowing legumes.

Apply to bare soil prior to or at sowing, and incorporate by sowing. Not where legumes undersown. Rain required within 7–10 days for best results.

Not on oats. In conventional systems, apply 1–4 weeks before sowing and incorporate within 4 hours. In no-till systems and IBS incorporate within 24 hours. For best results incorporate as close to application as practically possible. Sow 5 cm deep. Triflur® X can be used with wheat, barley and triticale in no-till systems at 1.5–3.0 L /ha incorporated by sowing with narrow points and press wheels (see label)

Read label as appropriate rates differ with location, crop type, soil type and incorporation method.

Use 1.6 L rate for conventional cultivation and either incorporate before sowing or incorporate with full disturbance by sowing. Use 2.3 L rate for direct drill and incorporate by sowing with full disturbance. See label. Sow cereal seed to minimum 5 cm depth.

Apply and incorporate by sowing as soon as possible and no longer than 3 days after application.

Apply and incorporate immediately prior to or up to 3 weeks before sowing.

Apply to moist seedbed. Use lower rates on light soils. Sufficient rain is required within 10 days after spraying is spraying PSPE. See label.

Apply to moist seedbed. Use lower rates on light soils. Sufficient rain is required within 10 days after spraying is spraying PSPE. See label.

Observe plant-back with both cereal and broadleaf crops. Lontrel™ can bind tightly to stubble. See Table 1.

scotch thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–
skeleton weed	–	–	50(S)	–	–	–	–	–	–	–	–	–	–	–
shepherd's purse	15 or 20	30	50	–	–	–	–	–	–	–	–	–	–	–
sorrel	–	–	–	–	–	–	–	–	–	–	–	–	–	–
soursob	15	–	50	–	–	–	–	–	–	–	–	–	–	–
sowthistle	–	30	50 u	–	–	–	–	–	–	–	–	–	–	–
spear thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–
spiny emex	20	35	50 u	–	1.5–3.0 (S) (IBS)	–	–	–	–	–	–	–	–	–
stinging nettle	–	–	–	–	–	–	–	–	–	–	–	–	–	–
sub. clover	–	–	50 u	–	–	–	–	–	–	–	–	–	–	0.15–0.3 (S)
toad rush	–	–	–	–	–	–	–	1.5–2.5	118	–	0.15–0.25	0.225–0.375	–	
turnip weed	–	30	50	–	–	–	–	–	–	–	–	–	–	–
variegated thistle	–	30 (S)	50 (S)	–	–	–	–	–	–	–	–	–	–	–
vetch	–	–	–	–	–	–	–	–	–	–	–	–	–	–
vulpia	–	–	–	–	1.5–3.0 (S) (IBS)	1.5–2.25 (S)	1.6 (S)	1.5–2.5 c or 2.5	118	–	–	–	–	–
wild lettuce	–	30	50	–	–	–	–	–	–	–	–	–	–	–
wild oats	–	–	u	a	1.5–3.0 (S) (IBS) a	(S)	1.6 or 2.3 (S)	1.5–2.5 c d	118 (S)	1.6 f e	–	–	–	–
wild turnip	15	30	50	25	–	–	–	–	–	–	–	–	–	–
winter grass	–	–	–	–	1.5–3.0 (IBS)	–	–	–	–	–	–	–	–	–
wireweed	15 or 20	35	50	b	0.8 or 1.5–3.0 (IBS)	1.35–2.25	1.6 or 2.3	1.5–2.5 c	–	b	–	–	–	–
Water vol L/ha boom	**30 min**	**50–100**	**50–100**	**40–100**	**70–450**	**50–200**	**50–100**	**50 min**	**50–100**	**30–100**	**60 min**	**–**	**50 min**	
Wheat plant-back	**0 day**	**0 day**	**0 day 1 day durum**	**0 day**	**0 day (IBS) or 1–4 wks**	**0 day**	**0 day**	**0 day**	**0 day**	**0 day**	**0 day**	**0 day**	**NA**	
Herbicide group	Group B products. All will severely damage undersown or volunteer legumes				**D**	**D**	**D**	**J, K**	**K**	**J**	**K**	**K**	**I**	

a = Add Avadex® Xtra for control.
b = Add trifluralin for control.
c = Add 0.8–1.5 L/ha Triflur® 480 for control.
d = Surface germinating only.
e = Add Glean®, Lusta®, or Logran® for improved control in wheat and triticale.
f = Preferred option for Northern NSW.
j = Pendimethalin also available in 330 g/L. See label for rates.
h = Also available as Lontrel™ 750 SG (750 g/kg).
u = Logran® B-power gives knock-down control of small (up to 2-leaf) emerged weeds. Add Hasten™ or non-ionic wetter for knockdown.
v = Barley and oats only.
z = Alternatively apply 1.5–2.0 L/ha Triflur® X + 1.6–2.0 L/ha Avadex® Xtra for control. When adding Avadex® Xtra incorporate within 6 hours.
(S) = Suppression only.

Crop usage
AC = All Crops
W = Wheat
CH = Chickpea
C = Canola
T = Triticale
O = Oats
B = Barley
WC = Winter cereals
FP = Field pea

Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergent.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 8. Herbicides for weed control for wheat and barley – Early post-emergence – Part 1

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Flumetsulam 800 g/kg **Broadstrike™**		Metsulfuron-methyl 600 g/kg **Ally®** g		Chlorsulfuron 750 g/kg **Glean®**		Sulfosulfuron 750 g/kg **Monza®** Wheat and triticale only		Triasulfuron 750 g/kg **Logran® 750 WG**		Metribuzin 700 g/kg **Sencor® 700**	Bromoxynil 200 g/L **Bromicide®**		Terbutryn flowable 500 g/L **Igran®**		Diuron WG ◆ + MCPA 900 g/kg + 500 g/L **Diurex® WG** c + MCPA Amine 500		Bromoxynil + MCPA 200 + 200 g/L **Buctril® MA**		MCPA + Dicamba 340 + 80 g/L **Kamba® M**		MCPA 750 g/L **Thistle-Killem® 750**		MCPA 570 g/L **LVE Agritone®**		Picloram + MCPA 26 + 420 g/L **Tordon™ 242**		MCPA + Diflufenican 250 + 25 g/L **Tigrex®**		Pyrasulfotole 37.5 g/L + Bromoxynil 210 g/L **Velocity®**		Pyrasulfotole 50 g/L + MCPA 250 g/L **Precept® 300 EC** o	
Apply at crop growth stage	**3 L–Joint (wheat) Mid Till–Joint (barley)**		**3 L–Jo**		**2 L–Ea Till**		**Emerg–Ea Till**		**1-leaf–Ea Till** Not before 3 L stage when tankmixing		**3 L–8 Wks**	**3 L–Full Till**		**3 L–Ea Till**		**3–5 L Till**		**3 L–Full Till**		**Ea Till –Full Till**		**5 L–Prior to booting**		**3 L–Bo**		**Ea Till –Full Till**		**3–5-leaf–L Till**		**2 L–Full Till**		**3 L–1st node (wheat) 5 L–1st node (barley)**	
Zadoks code	**13–31, 16–31**		**13–35**		**12–23**		**11–22**		**11–21**		**13–8 Wks**	**13–30**		**13–21**		**13–23**		**13–30**		**21–30**		**15–23**		**13–37**		**22–30**		**13–30**		**12–30**		**13, 15–31**	
Weeds controlled	**(grams)**		**(grams)**		**(grams)**		**(grams)**		**(grams)**		**(grams)**	**(litres)**		**(litres)**		**(grams + litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**	
amsinckia	25	Safe on undersown lucerne, medics and sub-clovers after the 2–3 trifoliate leaf stage. Add Uptake™ spraying oil or wetting agent for wheat and undersowns or wetting agent only for barley.	5 or 7	Add surfactant.	15	Not on barley before 2-leaf stage. Add wetting agent. Not Preferred Recommendation for barley.	25	Wheat and triticale only. Add D-C-Tate® 2 L/100 L spray volume. Not for use with undersown legumes. Note: Plant-backs on label. Don't use on flood or furrow irrigations or soils with pH > 8.5.	–	Spray before crop reaches early tillering. For best results apply when soil conditions are moist and weeds are small.	–	1.4–2.0	Not on undersown medics, Persian or Berseem clover. Avoid spraying when temperatures above 20° C.	0.55–0.85	Avoid spraying when temperatures exceed 18°C. Do not use on undersown medics or lucerne.	280 + 0.5	Use only on moist soil. This is a tank mix.	1.4–2.0	1.4 L/ha can be used at 3-leaf stage.	–	Damage can occur if crop not actively growing. Do not apply after the fully-tillered stage.	–	See label for crop stage, weed size and chemical rate. Barley: Use only from 5-leaf stage to flag-leaf just visible (Z15–37). Maximum rate in barley 1.4 L/ha.	–	Do not plant susceptible crops within 12 months of applying the product.	–	Can be used on undersown sub-clover and some other clovers. See label. Not on lucerne or annual medics. Application should be made from the third to the eighth trifoliate leaf stage.	0.6–1.0	Add Hasten™ 1% v/v, Supercharge® 0.75% v/v or Uptake™ 0.5% v/v. Note recropping intervals on label.	0.75–1.0	Spray grade liquid ammonium sulfate or Hasten™ (1% v/v) must be used with Precept®. Do not use non-ionic surfactants. Note recropping intervals on label.
annual phalaris	–		–		–		–		–		–	–		–		–		–		–		–		–		–		–		–		–	
annual ryegrass	–		–		15 or 25 a		–		–		–	–		–		–		–		–		–		–		–		–		–		–	
barley grass	–		–		–		25 (S)		–		–	–		–		–		–		–		–		–		–		–		–		–	
bedstraw	–		–		–		–		–		–	1.4–2.0		–		–		–		–		–		–		–		0.67–1.0		0.75–1.0			
black bindweed	–		–		20		–		10 p		–	1.4–2.0		p		–		1.4–2.1		1.7		0.97–1.35 v		–		1.0		–		0.5–1.0		–	
brome grass	–		–		–		20–25 (S)		–		–	–		–		–		–		–		–		–		–		–		–		–	
buchan weed	25 (S) m		–		–		–		–		–	–		–		–		–		–		–		–		–		–		–		–	
canola – volunteer	25 w		–		–		20 w		–		–	–		–		–		1.4–2.0 n		–		0.33 l v		0.44–1.84 v		–		0.5 n		0.5–1.0 n		0.5–1.0	
capeweed	25 m		–		–		–		–		–	1.4–2.0		0.55–0.85		280 + 0.5		1.4–2.0		1.0–1.7		1.45 v		0.44–1.84 v		–		0.5–1.0		0.5–1.0		0.5 f	
charlock	25		5		15		–		–		–	–		0.55–0.85 b		280 + 0.5		1.4–2.0		1.0–1.7		0.66 v		0.44–1.84 v		–		0.5–1.0		–		–	
cereals – volunteer	–		–		–		–		–		–	–		–		–		–		–		–		–		–		–		–		–	
chickpea – volunteer	–		5		–		–		–		–	–		–		–		–		–		–		–		–		–		0.5–1.0 (S)		0.5 f	
cleavers	–		–		–		–		–		–	–		–		–		–		–		–		–		–		–		–		–	
clover	–		5		–		–		–		–	–		–		–		–		1.7		–		–		–		–		–		0.5 f k	
corn gromwell	–		–		20		–		–		–	1.4–2.0		0.55–0.85		280 + 0.5		1.4–2.0		–		–		–		–		1.0		0.5–1.0		0.5–1.0	
common barbgrass	–		–		–		–		–		–	–		–		–		–		–		–		–		–		–		–		–	
deadnettle	25 (S) m		5		15 or 20		–		10–13 p		–	–		0.55–0.85 p		280 + 0.5		–		–		1.45 v		–		–		1.0		0.5–1.0		0.5–1.0	
dock	–		5 or 7		–		–		–		–	–		–		–		–		1.0–1.7		–		–		–		1.0 (S)		–		–	
erodium	–		–		–		–		–		–	–		–		–		–		–		–		–		–		1.0 (S) h		–		–	
faba bean – volunteer	–		–		–		–		10 p		–	–		p		–		–		–		–		–		–		–		0.5		0.5 f	
field pea – volunteer	–		7		–		20		10 p		–	–		p		–		–		–		–		–		–		–		0.5 (S)–1.0		0.5–1.0 or 0.5 f	
fumitory	–		5		20		–		–		–	2.0		0.55–0.85		–		1.4–2.0		–		0.93 v		0.44–1.84 v		–		0.75		0.5–1.0		0.5–1.0	
lesser swinecress	–		–		–		–		–		–	1.4–2.0		–		–		–		–		–		–		–		–		–		–	
lupin – volunteer	25		5		–		–		–		–	–		–		–		–		–		0.46–0.96 v		–		–		1.0 (S)		0.5–1.0		0.5–1.0	
medics	–		5		–		–		10 p		–	–		p		–		–		–		–		–		–		–		0.5 (S)–1.0		0.5 f or 1.0	
Mexican poppy	–		–		–		–		10–13 p		–	2.0		p		–		1.4–2.0		–		–		–		–		–		–		–	

mintweed	–	–	20	–	–	–	–	–	–	1.4–2.0	1.7	1.35 v	–	–	–	Application prior to the 3 trifoliate leaf stage may result in damage to clover.	–	For best results apply in warmer temperature and high light intensity and > 1hr of daylight left after application.	–	For best results apply in warmer temperature and high light intensity and > 1hr of daylight left after application.
mustards	25	5	15	25	6.5–10 p	–	2.0	0.55–0.85 bp	280 + 0.5	1.4–2.0	1.0–1.7	0.66 v	0.44–1.84 v	1.0	0.5–1.0		0.5		0.5 j	
New Zealand spinach	25 (S)	–	–	–	–	–	–	–	–	–	1.7	–	–	1.0 (S)	–		–		–	
Paterson's curse	25 (S) m	5 or 7	15	–	–	–	2.0	0.55–0.85	–	1.4–2.0	–	0.66–0.96 v	0.44–1.84 v	–	1.0 (S)		0.5–1.0		0.5–1.0	
peppercress	25	–	–	–	–	–	1.4–2.0	–	–	–	–	–	–	–	1.0 (S)		–		–	
radish – wild	25 (S) m	–	15 or 20	20	10–13 p	–	2.0	p	280 + 0.5	1.4–2.0	1.0–1.7	0.66 v	0.175–0.35 + 0.35–0.5 Nugrex® y	1.0	0.5–1.0 q		0.5–1.0		0.5–1.0 i	
rough poppy	–	5	20	–	–	–	–	–	–	1.4–2.0	–	–	–	–	1.0 (S)		–		–	
saffron thistle	–	–	–	–	–	–	1.4–2.0	–	–	1.4–2.0	1.7	0.66–1.35 v	0.44–1.84 v	1.0	1.0		0.67–1.0		–	
shepherd's purse	25	5	20	–	10 p	–	1.4–2.0	p	–	1.4–2.0	–	–	–	–	0.5–1.0		0.5–1.0		–	
skeleton weed	–	7 (S)	–	–	–	–	–	–	–	–	–	0.96–1.35 v	0.44–1.84 v	1.0	1.0 (S)		–		–	
slender thistle	–	–	–	–	–	–	–	–	–	1.4–2.0	–	0.66–1.35 v	0.44–1.84 v	–	–		–		–	
sorrel	–	5	–	–	–	–	–	–	–	–	1.0–1.7	–	–	–	–		–		–	
soursob	–	5	20	–	–	–	–	–	1.1	–	–	–	–	–	–		–		–	
sowthistle	–	5	–	–	–	–	–	–	–	1.4–2.1 r	–	–	–	1.0	1.0 (S)		0.5–1.0		0.5–1.0	
spear/black thistle	–	–	–	–	–	–	–	–	–	–	–	0.96–1.35 v	0.44–1.84 v	–	–		–		–	
spiny emex	25 (S) m	5 or 7	–	–	–	–	2.0	0.55–0.85 b	280 + 0.5	1.4–2.0	1.0–1.7	–	–	1.0	1.0 (S)		0.5–1.0		0.75–1.0 (S)	
St Barnaby thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–		–	
sunflower – volunteer	–	7	–	–	13 p	–	–	p	–	–	–	0.69–1.0 v	–	–	–		–		–	
toad rush	–	e	e	–	–	110 t u	–	0.55–0.85	–	–	–	–	0.44–1.84 v	–	1.0		–		–	
turnip weed	15–25	5	15	–	6.5 p	–	2.0	0.55–0.85 bp	280 + 0.5	1.4–2.0	1.0–1.7	0.66 v	0.44–1.84 v	1.0	0.5–1.0		0.5–1.0		0.5–1.0	
variegated thistle	–	–	–	–	–	–	1.4–2.0	–	–	1.4–2.0	1.7	0.66–1.35 v	0.44–1.84 v	1.0	1.0 (S)		–		–	
vetch	–	–	–	–	13 p	–	–	0.6 p	–	–	1.0	–	–	–	1.0 (S)		0.5–1.0 (S)		0.5 f	
vulpia	–	–	–	25	–	–	–	–	–	–	–	–	–	–	–		–		–	
wild lettuce	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.5–1.0		0.5–1.0		0.5–1.0	
wild oats	–	–	–	25 (S)	–	–	–	–	–	–	–	–	–	–	–		–		–	
wild turnip	25	5	15	20	6.5–10 p	–	2.0	0.55–0.85 bp	280 + 0.5	1.4–2.0	1.0–1.7	0.66 v	0.44–1.84 v	1.0	0.5–1.0		0.5		0.5–1.0	
wireweed	–	5 or 7	20	–	–	–	2.0	–	–	1.4–2.0	1.0–1.7	–	–	1.0(S)	0.75 (S)		0.5 (S)–1.0		0.5–1.0	
Recom water L/ha	**50–150**	**50 min**	**30 min**	**40–100**	**30–100**	**–**	**50–200**	**50–100**	**20–100**	**50–200**	**50 min**	**30–120**	**30–120**	**50 min**	**50 min**		**70–150**		**50–100**	
Herbicide group	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**C**	**C + I**	**C + I**	**I**	**I**	**I**	**I**	**I + F**		**H + C**		**H + I**	

a = No more than 3 leaves of annual ryegrass. Use more than 50 L/ha water.
b = Tank mix with 0.3 L/ha MCPA 500 g/L or 0.3 L/ha 2,4-D (as amine) 500 g/L for control.
c = Alternatively Diuron Flowable 500 g/L.
d = Metribuzin also available as 480 g/L.
e = Can be tankmixed with Sencor® 480 for toad rush control (See label).
f = Add Lontrel™ Advanced for control. See label for rates.
g = Can be mixed with MCPA amine or terbutryn.
h = Long storksbill only (Erodium botrys).
i = **DO NOT** use the 0.5 L/ha rate where excellent coverage is not possible.
j = Indian hedge mustard only.
k = Sub clover only.
m = See label for tankmix of Broadstrike™ and other herbicides for control.
n = See label for rates for controlling RR Canola.
o = Also available as Precept® 150. See label for rates.
p = Tankmix of Igran® and Logran® can be used for control. See label.
q = Tankmix 350–500 mL/ha Tigrex® plus 175–350 mL/ha MCPA LVE (570 g/L) for control.
r = Northern NSW only.
t = Application of Sencor® to barley on soils with pH > 7.0 will result in severe crop damage.
u = Toad rush should be sprayed at the 2–4 leaf stage. Spray after rain when soil moisture is plentiful and soil is moist to the surface. Take advantage of dew on soil surface.
v = See critical comments on label in 'Directions for Use', showing varying rate according to weed size.
w = Not Clearfield canola volunteers.
y = See label for crop and weed stage and appropriate rate.
(S) = Suppression only.
◆ = See *What's new in 2014* on page 3.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 8. Herbicides for weed control for wheat and barley – Early post-emergence – Part 2

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Metosulam 100 g/L **Eclipse® 100 SC**		Thifensulfuron + Metsulfuron-methyl 682 + 68 g/kg **Harmony® M**		Bromoxynil + Diflufenican 250 + 25 g/L **Jaguar®**		Terbutryn + MCPA 275 + 160 g/L **Agtryne® MA**	MCPA + Bromoxynil + Dicamba 140 + 280 + 40 g/L **Broadside®**	Fluroxypyr 333 g/L **Starane™ Advanced**		Clopyralid 600 g/L **Lontrel™ Advanced** b	2,4-DB 500 g/L **Buttress®**		Fluroxypyr 140 g/L + Aminopyralid 10 g/L **Hotshot™**		Dicamba 700 g/kg **Cadence®**		Dicamba 500 g/L **Kamba® 500**		MCPA 375 g/L + Florasulam 7 g/L **Conclude™**		Clopyralid 300 g/L + Florasulam 50g/L **Torpedo™**	Picolinafen 50 g/L+ MCPA 500 g/L **Paragon®**		Picolinafen 35 g/L + Bromoxynil 210 g/L + MCPA 350 g/L **Flight® EC**	Pyraflufen-ethyl 20 g/L **Ecopar®**
Apply at crop growth stage	**2 L–1st node**		**3 L–Boot**		**2 L–Full Till**		**3–5-leaf**	**3 L–Full Till**	**3 L–Flag**		**2 L–1st node**	**5L–Full Till**		**3 L–1st node**		**3 L–Mid Till**		**5 L–Ea Till**		**3 L–Flag**		**2 L–1st node**	**3 L–5 L**		**3 L–Mid Till**	**2 L–Mid Till**
Zadoks code	**12–31**		**13–39**		**12–29**		**13–15**	**13–30**	**13–39**		**12–31**	**15–31**		**13–31**		**13–25**		**15–22**		**13–39**		**12–31**	**13–15**		**13–28**	**12–25**
Weeds controlled	**(millilitres)**		**(grams)**		**(litres)**		**(litres)**	**(litres)**	**(litres)**		**(litres)**	**(litres)**		**(litres)**		**(grams)**		**(litres)**		**(litres)**		**(litres)**	**(litres)**		**(millilitres)**	**(litres)**
amsinckia	50	Apply with 0.5 L Uptake™ spraying oil or 1 L D-C-Trate®/100 L water. Can be tankmixed with 0.35–0.5 L/ha to broaden weed spectrum.	–	NW slopes and plains only.	0.75	Can be used on undersown sub-clover and lucerne. Not annual medics. Application should be made from the first to the eighth trifoliate leaf stage.	1.0	0.75–1.4	–	Can be tankmixed with Ally®, MCPA LVE or MCPA amine to broaden weed spectrum.	–	–	Boom only. Good quality water essential.	–	Add BS1000® (when mixed with metsulfuron-methyl).	115 m or p	Add wetter. Do not apply after mid-tillering stage as crop damage may result.	–	Damage can occur if crop not actively growing or crop after mid- tillering stage. Small weeds.	–	Always add Uptake™ spraying oil at 500 mL/100 L water, unless tankmixing with Ally®. When tankmixing with Ally® add a non-ionic wetter at 200 mL/200 L.	–	–	Do not use 0.5 L/ha rate on crops younger than 5 leaf. Do not apply rates higher than 0.25 L/ha to crops in the 3 leaf stage.	–	–
annual phalaris	–		–		–		–	–	–		–	–		–		–		–		–		–	–		–	–
annual ryegrass	–		–		–		–	–	–		–	–		–		–		–		–		–	–		–	–
barley grass	–		–		–		–	–	–		–	–		–		–		–		–		–	–		–	–
bedstraw	50 (S) u		–		1.0 (S)		–	–	0.3		–	–		–		–		–		0.7		0.1 h	–		–	0.4 i
black bindweed	–		40		0.5–1.0		–	1.0–1.4	0.3–0.45		–	–		0.5–0.75 e		200 m or p		0.28		–		–	–		–	–
brome grass	–		–		–		–	–	–		–	–		–		–		–		–		–	–		–	–
buchan weed	–		–		–		–	–	–		–	–		–		–		–		–		–	–		–	–
canola – volunteer	50 o		–		0.5–0.75*		–	1.4	–		–	–		–		–		–		–		–	0.25 *		360	0.4 i *
capeweed	35–50 u		–		0.5–1.0		1.0	0.75–1.4	–		0.15 h	2.1–3.2		–		115 p (S)		0.16 v		0.7 (S)		0.1 h	0.25–0.5		360–720	0.4 i
charlock	–		–		0.5–0.75		1.0	–	–		–	2.1–3.2		–		115 m or r		0.16 v		–		–	0.25–0.5		360–720	–
cereals – volunteer	–		–		–		–	–	–		–	–		–		–		–		–		–	–		–	–
chickpea – volunteer	35–50 u		–		–		–	–	–		0.1 h	–		0.75 e		115–200		–		0.7		0.075–0.1	–		–	0.4 l
cleavers	–		–		–		–	–	0.6		–	–		–		–		–		–		–	–		–	–
clover	50 (S) nu		–		–		–	–	–		0.075–0.1 h	–		–		115–200		0.28		–		–	–		–	0.4 ln
corn gromwell	–		–		0.5–0.75		1.0	1.0–1.4	–		–	–		–		–		–		–		–	0.5		720	–
common barbgrass	–		–		–		–	–	–		–	–		–		–		–		–		–	–		–	–
deadnettle	–		30		0.5–0.75		1.5	–	0.9		–	–		0.5–0.75 ce		115 m		0.2–0.28 m		–		–	0.5 (S)		720 (S)	0.4 l
dock	–		–		1.0 (S)		–	0.75–1.4	–		–	2.1–3.2 x		–		200 r		0.16 or 0.28 v		–		–	–		–	–
erodium	–		–		0.5 (S)		–	–	–		–	–		–		–		–		–		–	–		–	0.4 i
faba bean – volunteer	35–50 u		–		–		–	–	–		0.125 h	–		0.5–0.75 f		200 r		–		0.7		0.075–0.1	–		–	0.4 l
field pea – volunteer	50 (S) u		–		0.75 (S)		–	–	–		0.075 h	–		0.5–0.75 f		115–200		–		0.7		0.075–0.1	–		–	–
fumitory	–		40		0.75–1.0 (S)		1.0	1.0–1.4	–		–	2.1–3.2		–		–		–		–		–	0.5 (S)		540–720 (S) h	0.4 l
lesser swinecress	–		–		1.1		–	–	–		–	–		–		–		–		–		–	–		–	–
lupin – volunteer	35–50 u		–		0.5–1 (S)		–	–	0.9		0.125 h	–		0.5 g		115		–		0.7		0.075–0.1	0.5 (S)		720 (S) i	0.4 i
medics	50 (S) u		–		–		–	–	–		0.075–0.1 h	–		–		–		–		–		0.075–0.1 j	–		–	0.4 l
Mexican poppy	–		–		–		–	–	–		–	2.1–3.2		–		–		–		–		–	–		–	–
mintweed	–		–		1.0 (S)		–	–	–		–	–		–		200 t		0.28 t		–		–	–		–	–
mustards	50		45		0.5–1.0		1.0	0.75–1.4	0.3–0.9 h		–	2.1–3.2		–		115 m or p		0.16 v		0.7		0.075–0.1 h	0.25–0.5		360–720	0.4 i
New Zealand spinach	–		40		–		–	–	–		–	–		–		200		0.28		–		–	–		–	–

Paterson's curse	–	–	0.5–0.75	1.0	–	–	–	2.1–3.2	–	–	–	–	0.1 h	–	–	0.4 l
peppercress	–	30–40	1.1	–	–	–	–	–	–	–	–	–	–	–	–	–
radish – wild	50	–	0.5–1.0 y	–	0.75–1.4	0.3–0.9 h	–	–	–	115 p or r	0.16 v	0.7	0.075–0.1 h	0.25–0.5	360–720	0.3–0.4 i
rough poppy	–	–	0.5–0.75	1.0	–	–	–	–	–	115 m	–	–	–	–	–	–
saffron thistle	35–50 u	–	1.0	–	–	–	0.025 k h	2.1–3.2	–	200 t	0.28 t	–	–	0.5	720	–
shepherd's purse	–	–	1.0	–	–	0.3–0.9 h	–	2.1–3.2	–	115 m	–	–	–	0.25–0.5	360–720	–
skeleton weed	–	–	1.0(S)	–	–	–	0.25 a	–	–	–	–	–	–	–	–	–
slender thistle	35–50 u	–	–	–	–	–	0.025 k	2.1–3.2	–	–	–	–	–	–	–	–
sorrel	–	–	1.0(S)	–	–	–	–	–	–	115 m	0.28 t	–	–	–	–	0.4 l
soursob	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.4 l
sowthistle	35–50 u	30–40	1.0 (S)	–	–	0.6	0.05 q	2.1–3.2	0.5–0.75 cde	115 m	–	–	–	0.5 (S)	720 (S)	0.4 l
spear/black thistle	35–50 u	–	–	–	–	–	0.025 k	2.1–3.2	–	200	–	–	–	–	–	–
spiny emex	–	40–45	0.5–0.75	1.5	0.75–1.4	0.9	–	2.1–3.2	0.5–0.75 de	200 m or p or r	0.16 v	0.7	0.1 h	0.5 (S)	720 (S)	0.4 l
St Barnaby thistle	35–50 u	–	–	–	–	–	0.15 h	–	–	–	–	–	–	–	–	–
sunflower – volunteer	–	40	–	–	–	–	–	–	–	–	0.28	–	–	–	–	–
toad rush	–	–	1.0 (S)	1.5	–	–	–	–	–	–	–	–	0.1 h	0.5	720	–
turnip weed	35–50	30	0.5–0.75	1.0	–	0.3–0.9 h	–	2.1–3.2	–	m or p or r	0.16 v	0.7	0.1 h	0.25–0.5	360–720	0.4 l
variegated thistle	35–50 u	–	1.0	–	–	–	0.025 k	2.1–3.2	0.5–0.75 de	200	0.28	–	–	–	–	–
vetch	35–50 u	–	1.0	–	–	–	0.05 h	–	0.5–0.75 f	115–200	0.16–0.28 w	0.7	0.1 h	–	–	–
vulpia	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
wild lettuce	35–50 u	40	1.0 (S)	–	–	0.6	0.075 h	2.1–3.2	0.75 e	115 m	–	–	–	0.25–0.5	360–720	0.4 i
wild oats	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
wild turnip	50	–	0.5–0.75	1.0	–	0.3–0.9 h	–	2.1–3.2	–	m or p or r	0.16 v	0.7	–	0.25–0.5	360–720	0.4 i
wireweed	–	40	1.0	1.5	0.75–1.0	0.9	–	2.1–3.2	0.5–0.75 ce	200 m or r	0.16 or 0.28 v	–	–	–	–	0.4 l
Recom water L/ha	**50–100**	**50 min**	**50 min**	**50–100**	**50 min**	**50 min**	**50 min**	**110 min**	**80 min**	**50 min**	**50 min**	**50–100**	**50–100**	**50 min**	**50–150**	**70–150**
Herbicide group	**B**	**B**	**C + F**	**C + I**	**C + I**	**I**	**I**	**I**	**I**	**I**	**I**	**I + B**	**I + B**	**F + I**	**C + F + I**	**G**

a = Add 1.0 L/ha MCPA 500 g/L for control.
b = Also available as Lontrel™ 750 SG (750 g/kg).
c = Add 5 g of metsulfuron-methyl (600 g/kg) and non-ionic wetter at 100 mL/100 L of water. See label.
d = Add 500–700 mL MCPA LVE. See label.
e = Northern NSW only.
f = 500 mL (southern NSW), 750 mL (northern NSW).
g = Southern NSW only.
h = See label for tankmix options.
i = Add 500 mL/ha MCPA 500 for control (NOT MCPA LVE).
j = Snail medic only.
k = Mix with 1 L/ha MCPA amine or 0.7 L/ha LVE MCPA for control.
l = Add 500 mL/ha MCPA 500 + 5 g/ha Esteem® WDG.
m = Tankmix 115 g /ha Cadence® with 5 g/ha Ally® for control with surfactant such as BS1000® at 100 mL/100 L spray.
n = Subclover only.
o = Not Clearfield canola volunteers.
p = Tankmix 115 g/ha Cadence® with 50 mL/ha Eclipse® 100 SC for control apply with Uptake™ spraying oil at 0.5 L/100 L water or D-C-Trate® oil at 1 L/100 L water.
q = Add 800 mL Tordon™ 242 or 5 g Ally® + 700 mL MCPA LVE.
r = Tankmix 115 g/ha Cadence® with 0.7 L/ha MCPA (500 g/L) for control.
t = Tankmix Cadence® with 1.2 L/ha MCPA (500 g/L) for control.
u = Add partner herbicide for control, see label.
v = Tankmix with 0.7 L/ha MCPA amine 500 g/L for control.
w = Add 700 mL/ha MCPA LVE when using lower rate.
x = Seedlings only.
y = Tankmix 500 mL/ha Jaguar® with 200–400 mL/ha MCPA LVE (500 g/L) for control.
z = *Angustifolius* (narrow-leaf) lupin.
* = See label for controlling RR Canola volunteers.
(S) = Suppression only.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 8. Herbicides for weed control for wheat and barley – Early post-emergence – Part 3

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Tralkoxydim 400 g/kg **Achieve® WG** (Pentagon) e		Diclofop-methyl 500 g/L **Hoegrass® 500**		Fenoxaprop-p-ethyl 110 g/L **Wildcat® 110 EC** Wheat only		Clodinafop-propargyl 240 g/L + 60 g/L Cloquintocet-mexyl **Topik®** Wheat only		Diclofop-methyl + Fenoxaprop p-ethyl 250 g/L + 13 g/L **Tristar® Advance**		Diclofop-methyl 200 g/L + Sethoxydim 20 g/L **Decision®**		Pinoxaden + Cloquintocet-mexyl 100 g/L + 25 g/L **Axial®**		Fenoxaprop-p-ethyl 13.6 g/L + Diclofop-methyl 200 g/L + Sethoxydim 20 g/L **Cheetah® Gold**		Fenoxyprop-p-ethyl 69 g/L + Cloquintocet-mexyl 34.5 g/L **Foxtrot®**		Flamprop-m-methyl 90 g/L **Mataven® 90** (Judgement®) c Wheat only		Imazamox 33 g/L + Imazapyr 15 g/L **Intervix®** Clearfield wheat and Clearfield barley only		Sulfosulfron 750 g/kg **Monza®** Wheat only		Pyroxsulam 30 g/L + Cloquintocet-mexyl 90 g/L **Crusader™** Wheat only (not durum)		Iodosulfuron-methyl-sodium 100 g/L **Hussar® OD** Wheat and barley only		Mesosulfuron-methyl 30 g/L **Atlantis® OD** Wheat only		MCPA + Imazapic + Imazapyr 288.5 g/L + 22 g/L + 7.3 g/L **Midas®** Clearfield wheat only	
Apply at crop growth stage	2 L–Ea Till		2 L–Ea Till		2 L–Mid Till		2 L–Late Jnt		2 L–Ea Till		2 L–1 Till		2 L–Boot		2 L–2 Till		2 L–Mid Till		3 L–Full Till		3 L–1st node		Em –Ea Till		3 L–1st node		3 L–5 Till		Not before 3 L		4L–Flag L	
Zadoks code	12–22		12–21 (w)		12–24		12–37		12–22		12, 14–21		12–49		12–22		12–24		13–30		13–31		11–22		13–31		13–25		> Z13		14–37	
Weeds controlled	(grams)		(litres)		(litres)		(millilitres)		(litres)		(litres)		(litres)		(litres)		(litres)		(litres)		(millilitres)		(grams)		(millilitres)		(millilitres)		(litres)		(litres)	
amsinckia	–	Add 0.75 or 1 L Supercharge® or Amplify® /100 L.	–	Add wetting agent e.g. 250 mL BS1000®/100 L water. Maximum rate for barley 1.1 L/ha at 4–5-leaf stage only. Diclofop-methyl is also available in a 375 g/L formulation (Rhino®, Hostage®).	–	Add wetting agent, e.g.BS1000® at 250 mL/100 L spray.	–	Add 1 L D-C-Trate® oil/100 L spray or 0.5 L Uptake™ or Hasten™ oil/100 L spray.	–	Suppression of annual phalaris may be improved by adding 250 mL BS1000®/100 L water.	–	Add the crop oil Hasten™ at 1% v/v (i.e. 1.0 L/100 L of spray mixture) when Decision® is being applied alone.	–	Always add 500 mL Adigor® spray adjuvant/100 L of water. Use the lower rate when weeds are actively growing without stress, small in size and of low density. **DO NOT** apply later than the first awns visible stage (GS49) of the crop.	–	Cheetah® Gold must be mixed with either Uptake™ at 0.5% v/v or Hasten™ at 1% v/v.	–	Do not apply to durum varieties. Spray wild oats from 3-leaf to the end of tillering stage. Do not apply to wheat after beginning of jointing. Apply Uptake™ only when spraytopping.	–	Not for use in 1 gene wheat such as Clearfield JNZ or Clearfield STL. Always add Supercharge® at 0.5 L/100L.	25	Add D-C-Trate® at 2 L/100 L of spray. Spray small weeds (see label). Not on undersown legumes. Good soil moisture required for effective results	–	Always use BS1000® at 250 mL/100 L. Note recropping intervals. See label.	–	Wheat: apply 4–7 weeks after sowing when wheat at 3-leaf–5 tiller stage. Barley: apply 4 leaf–5 tiller stage. See Critical Comments on label for use in barley, as barley can be sensitive to Hussar® OD under certain conditions.Weeds young and actively growing. Use only on varieties listed on label.	–	Atlantis® OD must always be applied with a non-ionic wetting agent (e.g. BS1000® at 0.25% v/v). Atlantis® OD must not be mixed with zinc based foliar fertilisers as a loss of efficiency can occur. Suppression of brome grass may be improved with the use of Hasten™ at 1% v/v.	0.9	Note: use on Clearfield System wheat varieties only; apply to crops in the 4L to start of flagleaf stage. Apply early post-emergent to actively growing grass weeds (3-leaf to 2 tiller stage) and broadleaf weeds (2–6 leaf stage).
annual phalaris	380–500 (S)		–		0.4–0.5 d		85–160		1.5 (S)		–		0.2–0.25		1.0 (S)		0.635–0.8		–		–		25		–		100 x		0.33		0.9	
annual ryegrass	380–500		0.75		f		160–210		1.5		1.0		0.25–0.3 (S)		1.0		–		–		600–750		–		500 (S)		75–100		0.33 (S)		0.9 w	
barley grass	–		–		–		–		–		–		–		–		–		–		375–750		25 (S)		–		–		0.33 (S)		0.9	
bedstraw	–		–		–		–		–		–		–		–		–		–		600–750 (S)		–		500		100 (S)		–		0.9	
black bindweed	–		–		–		–		–		–		–		–		–		–		–		–		–		75 (S)		–		0.9 (S)	
brome grass	–		–		–		–		–		–		–		–		–		–		375–750		20–25 (S)		500		–		0.33 (S)		0.9	
buchan weed	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
canola – volunteer	–		–		–		–		–		–		–		–		–		–		–		20 n		500 n		–		–		0.9 n	
capeweed	–		–		–		–		–		–		–		–		–		–		–		–		500 + k		–		–		0.9	
cereals – volunteer	–		–		–		–		–		–		–		–		–		–		375–750		–		–		–		–		0.9	
charlock	–		–		–		–		–		–		–		–		–		–		–		–		–		75		–		–	
chickpea – volunteer	–		–		–		–		–		–		–		–		–		–		–		–		500		–		–		–	
cleavers	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
clover	–		–		–		–		–		–		–		–		–		–		600–750 i		–		–		75		–		0.9	
corn gromwell	–		–		–		–		–		–		–		–		–		–		–		–		–		75 (S)		–		0.9	
common barbgrass	–		j		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
deadnettle	–		–		–		–		–		–		–		–		–		–		–		–		–		75		–		0.9	
dock	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
erodium	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		0.9 (S)	
faba bean – volunteer	–		–		–		–		–		–		–		–		–		–		–		–		500		–		–		0.9 (S)	
field pea – volunteer	–		–		–		–		–		–		–		–		–		–		–		20		500		75 (S)		–		–	
fumitory	–		–		–		–		–		–		–		–		–		–		–		–		–		75		–		0.9	
lesser swinecress	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
lupin – volunteer	–		–		–		–		–		–		–		–		–		–		–		–		500		75		–		–	
medics	–		–		–		–		–		–		–		–		–		–		–		–		500		75		–		0.9 (S)	
Mexican poppy	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
mintweed	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		0.9 (S)	
mustards	–		–		–		–		–		–		–		–		–		–		375–750		25 (S)		500 + k		75		–		0.9	
New Zealand spinach	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	

Paterson's curse	–	–	–	–	–	–	–	–	–	–	–	–	–	100	Do not use where group 'B' resistance is likely to be a problem or where a group B herbicide has been applied to the current crop. Not compatible with zinc foliar fertilisers.	–	0.9
pepper cress	–	–	–	–	–	–	–	–	–	–	–	375–750	–	–		–	–
radish – wild	–	–	–	–	–	–	–	–	–	–	–	–	20	500 + k		100	–	0.9
rough poppy	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–
saffron thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	0.9(S)
shepherd's purse	–	–	–	–	–	–	–	–	–	–	–	–	–	–		75	–	0.9
skeleton weed	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–
slender thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–
sorrel	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–
soursob	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–
sowthistle	–	–	–	–	–	–	–	–	–	–	–	–	–	500 + k		100 (S)	–	0.9 (S)
spear/black thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	0.9
spiny emex	–	–	–	–	–	–	–	–	–	–	–	600–750 (S)	–	–		100	–	0.9
St Barnaby thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–
sunflower – volunteer	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	–
toad rush	–	–	–	–	–	–	–	–	–	–	–	–	–	–		75 (S)	–	0.9
turnip weed	–	–	–	–	–	–	–	–	–	–	–	–	–	500		75	–	0.9
variegated thistle	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	0.9
vetch	–	–	–	–	–	–	–	–	–	–	–	–	–	500 (S)		75 (S) a	–	0.9 (S)
vulpia	–	–	–	–	–	–	–	–	–	–	–	600–750 (S)	25	–		–	–	0.9 (S)
wild lettuce	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–	0.9 (S)
wild oats	300–500	1.1–1.5	0.3–0.4 d	65–125 h	1.5	–	0.15–0.2	1.0	0.475–0.635	1.25–2.5 b c	375–750	25 (S)	500	100		0.33	0.9
wild turnip	–	–	–	–	–	–	–	–	–	–	375–750	20	–	–		–	0.9
wireweed	–	–	–	–	–	–	–	–	–	–	–	–	–	75		–	0.9
Rec water L/ha boom	**50–150**	**50–150**	**50–100**	**50–110**	**50–100**	**50–150**	**50 min**	**50–150**	**50–100**	**30–100**	**70 min**	**40–100**	**50–100**	**50–80**		**50–80**	**50 min**
Herbicide group	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**Z**	**B**	**B**	**B**	**B**		**B**	**B + I**

a = Wild vetch only (*Vicia sativa*).
b = Use higher rate prior to jointing. For spraytopping use 1.25–1.875 L/ha. See label for crop variety safety.
c = Judgement® contains 75 g/L flamprop-m-methyl. See label for rates.
d = Mixtures with some broadleaf herbicides may result in reduced grass weed control. See label. Use alone for phalaris control.
e = Pentagon® contains 600 g/L tralkoxydim.
f = Hoegrass® can be tank-mixed with Wildcat® or Puma® Progress for ryegrass control.
h = Rate in southern NSW is 65–85 mL/ha and in northern NSW 65–125 mL/ha.
i = Subclover only.
j = Hoegrass® 375 registered for control.
k = See label for tankmix options.
n = Not Clearfield canola. See label for controlling RR Canola volunteers.
w = Where ALS (group B) resistant ryegrass is known to be present, application of a group D herbicide such as trifluralin or Stomp® 330 EC should be made prior to sowing.
x = *Phalaris paradoxa* only.
(S) = Suppression only.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 9. Herbicides for weed control for wheat and barley – Late post-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Flamprop-M-methyl 90 g/L **Mataven® 90 (Judgement®)** c **Wheat only**		Pinoxaden 100 g/L + cloquintocet-mexyl 25 g/L **Axial®**		Triasulfuron 750 g/kg **Logran®**		Flumetsulam 800 g/kg **Broadstrike™**		Low Volatile 2,4-D Ester 680 g/L **Estercide® Xtra 680**	2,4-D amine 700 g/L **Amicide® Advance 700**		2,4-D amine 800 g/kg **Baton® Low**		2,4-DB 500 g/L **Buttress®**		MCPA 750 g/L **Thistle-Killem® 750**		MCPA 570 g/L **LVE Agritone®**		Picloram + MCPA 26 + 420 g/L **Tordon™ 242**		Picloram + 2,4-D 75 + 300 g/L **Tordon™ 75-D**		Clopyralid 600 g/L **Lontrel™ Advanced** a e
Apply at crop growth stage	**Prior flag leaf**		**Up to awn peep**		**Prior flower**		**Fi–Ea dough**		**Full Till–Bo**	**Full Till–Bo**		**Full Till–Bo**		**5 L–F Till**		**Full Till–Bo**		**3 L–Bo**		**Ea Till–Full Till**		**M Till–Joint**		**2 L–1st node**	
Zadoks code	**Prior Z40**		**12–49**		**31–60**		**61–83**		**31–37**	**30–37**		**30–37**		**15–37**		**30–37**		**13–37**		**22–30**		**23–31**		**12–31**	
Weeds controlled	**(litres)**		**(litres)**		**(grams)**		**(grams)**		**(litres)**	**(litres)**		**(kilograms)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**	
amsinckia	–	**Selective spray topping** rates for wild oats. Add Uptake™ spraying oil at 0.5 L/100 L spray. Spray wild oats between stem elongation and booting stage and wheat no later than flag leaf sage (Z40). Do NOT apply to Durum varieties. See label.	–	For spray topping wild oats. Zadok 30–47. Always add 500 mL of Adigor®/100 L. Do not apply Axial® more than once per crop. Sth NSW 150–200 mL Axial® Nth NSW 200 mL.	–	**Late salvage spray.** Add crop oil at 1 L/100 L spray or surfactant at recommended rates. Spray radish during early flowering. **DO NOT** spray crop during flowering.	–	Salvage spray to prevent seed set in wild radish and turnip weed. Spray least–mature weeds from early flowering to early pod set of most mature weeds, and crop from flowering to early dough stage. Add Uptake™ oil or wetter (barley). Can be used on undersown lucerne, clovers and annual medics.	–	–	Maximum rate on wheat 1.5 L/ha, barley 1.25 L/ha.	–	Maximum rate on wheat 1.3 L/ha, barley 1.1 L/ha.	–	Boom only. Good quality water essential.	Tankmix 1	Undersown legumes tolerant to lower rates – see label. Not on medics or lucerne.	–	See label for crop stage, weed size and chemical rate. Barley: Use only from 5-leaf stage to flag-leaf just visible (Z15–37). Maximum rate in barley 1.4 L/ha.	–	Do not plant susceptible crops within 12 months of applying the product.	–	Do not plant susceptible crops within 12 months of applying the product.	–	
annual ryegrass	–		–		–		–		–	–		–		–		–		–		–		–		–	
annual phalaris	–		–		–		–		–	–		–		–		–		–		–		–		–	
black bindweed	–		–		–		–		–	–		–		–		0.46–1.45		–		1.0 d		0.3		–	
capeweed	–		–		–		–		0.53–0.8	–		–		2.1–3.2		Tankmix 1		0.44–1.84 j		–		–		0.15	
canola – volunteer	–		–		–		–		0.41–0.8 i	0.9–1.25		–		–		See label		0.44–1.84 j		–		–		–	
charlock	–		–		–		–		0.41	0.5–0.98		0.25–1.3		2.1–3.2		Tankmix 1		0.44–1.84 j		–		–		–	
clover	–		–		–		–		0.62–0.8	1.1		0.25–1.3		–		–		–		–		–		–	
corn gromwell	–		–		–		–		0.8	–		–		–		Tankmix 1		–		–		–		–	
deadnettle	–		–		–		–		0.8	–		–		–		Tankmix 1		–		–		–		–	
erodium	–		–		–		–		0.8	–		–		–		Tankmix 1		–		–		–		–	
fleabane	–		–		–		–		–	1.4 k		–		–		–		–		–		–		–	
fumitory	–		–		–		–		0.8	–		–		2.1–3.2		0.46–1.45		0.44–1.84 j		–		–		–	
Mexican poppy	–		–		–		–		0.8	–		–		2.1–		–		–		–		–		–	
mintweed	–		–		–		–		0.8	0.98		–		–		0.46–1.45		–		–		0.3 b		–	
mustards	–		–		–		–		0.41–0.8	0.5–0.98		0.25–1.3		2.1–3.2		0.46–1.45		0.44–1.84 j		1.0		0.3 b		–	
New Zealand spinach	–		–		–		–		0.8	0.98–1.5		0.25–1.3		–		–		–		1.0 (S)		0.3		–	
Paterson's curse	–		–		–		–		0.8	0.98–1.5		0.25–1.3		2.1–3.2		0.46–1.45		0.44–1.84 j		–		–		–	
radish – wild	–		–		10–15 h		25		0.41–0.8	1.25–1.5		0.25–1.3		–		Tankmix 1		0.44–1.84 j		1.0		0.3 b		–	
rough poppy	–		–		–		–		0.41–0.8	0.98		0.25–1.3		–		0.46–1.45		–		–		–		–	
saffron thistle	–		–		–		–		0.41–0.8	0.5–1.5		0.25–1.3		2.1–3.2		0.46–1.45		0.44–1.84 j		1.0		0.3		–	
scotch thistle	–		–		–		–		–	–		–		–		–		0.44–1.84 j		–		–		–	
shepherd's purse	–		–		–		–		0.8	0.98–1.5		0.25–1.3		2.1–3.2		–		–		–		–		–	
skeleton weed	–		–		–		–		0.8	0.98–1.5		0.25–1.3		–		–		0.44–1.84 j		1.0		–		–	
slender thistle	–		–		–		–		0.8	0.715–1.5		0.25–1.3		2.1–3.2		–		0.44–1.84 j		–		–		–	
sorrel	–		–		–		–		–	1.5		0.25–1.3		–		–		–		–		–		–	
sowthistle	–		–		–		–		–	1.5		–		2.1–3.2		–		–		1.0		0.3		–	
spear thistle	–		–		–		–		–	–		–		2.1–3.2		0.46–1.45		0.44–1.84 j		–		–		–	
spiny emex	–		–		–		–		–	–		–		2.1–3.2		Tankmix 1		–		1.0		0.3		–	
St Barnaby thistle	–		–		–		–		–	–		–		–		–		–		–		–		0.15	
sunflower	–		–		–		–		0.41–0.8	0.5–1.25		0.25–1.3		–		–		0.44–1.84 j		–		0.3 b		–	
turnip weed	–		–		–		25		0.41–0.8	0.5–0.98		0.25–1.3		2.1–3.2		Tankmix 1		0.44–1.84 j		1.0		0.3 b		–	
variegated thistle	–		–		–		–		0.41–0.8	0.5–1.5		0.25–1.3		2.1–3.2		0.46–1.45		0.44–1.84 j		1.0		0.3 b		–	
vetch	–		–		–		–		–	–		–		–		–		–		–		–		0.05	
wild oats	1.25–1.875 c		0.2		–		–		–	–		–		–		–		–		–		–		–	
wild turnip	–		–		–		–		0.41–0.8	0.5–0.98		0.25–1.3		2.1–3.2		Tankmix 1		0.44–1.84 j		1.0		–		–	
wireweed	–		–		–		–		0.8	–		–		2.1–3.2		–		–		1.0(S)		0.3 b (S)		–	
Recom water L/ha boom	**30–100 min**		**50 min**		**30–100**		**100 min**		**30–100**	**50–250**		**30–120**		**110 min**		**30–120**		**30–120**		**50 min**		**50–100 min**		**50 min**	
Herbicide group	**Z**		A		**B**		**B**		**I**	**I**		**I**		**I**		**I**		**I**		**I**		**I**		**I**	

2,4-DB is not safe on woolly pod vetch, berseem and red clovers.

a = See label for tankmix options. b = Tank mix with 0.47 L/ha 2,4-D amine for control. c = Judgement® contains 75 g/L flamprop-M-methyl. See label for rates. d = Preferred option for northern NSW only. e = Also available as Lontrel™ 750 SG (750 g/kg).

f = Subclover. (S) = Suppression only. h = 10 g/ha rate, only on some triasulfuron labels. i = See label for controlling RR canola volunteers. j = See critical comments on label in 'Directions for Use', showing varying rate according to weed size. k = Fleabane up to 6-leaf rosette stage. Apply in 70–100 L water.

Tankmix 1 = 330 mL/ha + 500 mL/ha Crop Care Diuron Flowable.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014

Table 10. Herbicides for weed control for oats – Early post-emergence – Part 1

Rate per hectare	Metosulam 100 g/L **Eclipse® 100 SC**		Chlorsulfuron 750 g/kg **Glean®**		Clopyralid 300 g/L + Florasulam 50 g/L **Torpedo™**		Bromoxynil 200 g/L **Bromoxynil**		Bromoxynil + MCPA 200 + 200 g/L **Buctril® MA**		Bromoxynil + MCPA + Dicamba 140 + 280 + 40 g/L **Broadside®**		Pyraflufen-ethyl 20 g/L **Ecopar®**		Pyrasulfotole 50 g/L + MCPA 250 g/L **Precept® 300 EC** s		Dicamba 500 g/L **Kamba® 500**		MCPA + Dicamba 340 + 80 g/L **Kamba® M**		Fluroxypyr 333 g/L **Starane™ Advanced** t		Aminopyralid 10 g/L + Fluroxypyr 140 g/L **Hotshot™**		MCPA 375 g/L + Florasulam 7 g/L **Conclude™**		MCPA + Diflufenican 250 g + 25 g/L **Tigrex®**	
Apply at crop growth stage	**2 L–1st Node**		**2 L–Ea Till**		**3 L–1st Node**		**3 L–Ful Till**		**3 L–Ful Till**		**3 L–Ful Till**		**2 L–Mid Till**		**3 L–1st node**		**5L–Ea Till**		**Ea–Ful Till**		**3-leaf–Flag leaf**		**3 L–1st node**		**3 L–Flag**		**3/5 L–L Till**	
Zadoks code	**12–31**		**12–23**		**13–31**		**13–30**		**13–30**		**13–30**		**12–25**		**13–31**		**15–22**		**21–30**		**13–39**		**13–31**		**13–39**		**13–30**	
Weeds controlled	**(millilitres)**		**(grams)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(millilitres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**	
amsinckia	50	Apply with 0.5 L Uptake™ spraying oil or 1 L D-C-Trate® oil/100 L water. Can be tankmixed with 0.35–0.5 L LVE MCPA/ha for improved control. See label.	15	Not before 2-leaf stage of oats. Moist soils or rain within 7 days enhances results. Add wetter.	–	Always add 500 mL/100 L Uptake™ spraying oil. See label when mixing Torpedo™ with grass weed herbicides.	1.4–2.0	Not on undersown medics. Avoid spraying when temperatures are above 20°C. Aerial application can be unsatisfactory.	1.4–2.0	1.4 L/ha can be used at 3-leaf stage.	0.75–1.4		–		0.75–1.0	Spray grade liquid ammonium sulfate, Hasten™ (1% v/v), Supercharge® (0.75% v/v) or Uptake™ (0.5% v/v) must be used with Precept®. Do not use non-ionic surfactants. Note recropping intervals on label. For best results apply in warmer temperatures and high light intensity and > 1 hr of daylight left after application.	–	Damage can occur if crop not actively growing or at right stage. Small weeds.	–	Can be tankmixed with Eclipse®, MCPA LVE or MCPA amine to broaden weed spectrum. Do not use metsulfuron-methyl mixes in Oats.	–	Always add Uptake™ spraying oil at 500 mL/100 L water, unless tankmixing with Ally®. When tankmixing with Ally® add a non-ionic wetter at 200 mL/200 L.	–	Can be used on undersown sub-clover and some other clovers. See label. Not on lucerne or annual medics. Application should be made from the third to the eighth trifoliate leaf stage.	–	
annual ryegrass	–		20 or 25 a		–		–		–		–		–		–		–		–		–		–		–		–	
bedstraw	50 (S) r		–		0.1 h		1.4–2.0		–		–		400		0.75–1.0		–		–		0.3		–		0.7		–	
black bindweed	–		20		0.1 h		1.4–2.0		1.4–2.0		1.0		–		–		0.28		1.7		0.3–0.45		0.5–0.75 f		–		–	
canola – volunteer	50 h		–		–		–		–		1.4		400		0.5–1.0 u		–		–		–		–		–		0.5 u	
capeweed	35–50 r		–		0.1 h		1.4–2.0		1.4–2.0		0.75–1.4		400		0.5 n		0.16 b		1.0–1.7		–		–		0.7 (S)		0.5–1.0	
charlock	–		15		–		–		1.4–2.0		–		–		–		0.16 b		1.0–1.7		–		–		–		0.5–1.0	
cleavers	–		–		–		–		–		–		–		–		–		–		0.6		–		–		–	
clover	50 (S) m		–		–		–		–		–		–		0.5 n q		0.28		1.7		–		–		–		–	
corn gromwell	–		20		–		1.4–2.0		1.4–2.0		1.0		–		0.5–1.0		–		–		–		–		–		1.0	
deadnettle	–		15 or 20		–		–		–		–		–		0.5–1.0		–		–		0.9		0.5–0.75 f g		–		1.0	
dock – seedlings	–		–		–		–		–		0.75–1.4		–		–		0.16 b		1.0–1.7		–		–		–		1.0 (S)	
faba bean – volunteer	35–50 r		–		0.075–0.1		–		–		–		–		0.5 n		–		–		–		0.5–0.75 d		0.7		–	
field pea – volunteer	50 (S)		–		0.075–0.1		–		1.4–2.0		–		–		0.5–1.0 n		–		–		–		0.5–0.75 d		0.7		–	
fumitory	–		20		–		2.0		1.4–2.0		1.0		–		0.5–1.0		–		–		–		–		–		0.75	
lupin – volunteer	35–50 r		–		0.075–0.1		–		–		–		400		0.5–1.0		–		–		0.9		0.5–0.75 k		0.7		1.0 (S)	
Mexican poppy	–		–		–		2.0		1.4–2.0		–		–		–		–		–		–		–		–		–	
mintweed	–		20		–		–		1.4–2.0		–		–		–		0.28 g		1.7		–		–		–		–	
mustards	50		15		0.075–0.1		2.0		1.4–2.0		0.75–1.4		400		0.5 o		0.16 b		1.0–1.7		0.3–0.9 p		–		0.7 o		0.5–1.0	
New Zealand spinach	–		–		–		–		–		–		–		–		0.28		1.7		–		–		–		–	
Paterson's curse	–		15		–		2.0		1.4–2.0		–		–		0.5–1.0		–		–		–		–		–		1.0 (S)	
radish – wild	50		15 or 20		0.075–0.1		2.0		1.4–2.0		0.75–1.4		300–400		0.5–1.0		0.16 b		1.0–1.7		0.3–0.9 p		–		0.7		0.5–1.0 i	
rough poppy	–		20		–		–		1.4–2.0		–		–		–		–		–		–		–		–		1.0 (S)	
saffron thistle	35–50 r		–		–		1.4–2.0		1.4–2.0		–		–		–		–		1.7		–		–		–		1.0	
shepherd's purse	–		20		–		1.4–2.0		1.4–2.0		–		–		–		–		–		0.3–0.9 p		–		–		0.5–1.0	
skeleton weed	–		–		–		–		–		–		–		–		–		–		–		–		–		1.0 (S)	
slender thistle	35–50 r		–		–		–		1.4–2.0		–		–		–		–		–		–		–		–		–	
sorrel	–		–		–		–		–		–		–		–		–		1.0		–		–		–		–	
soursob	–		20		–		–		–		–		–		–		–		–		–		–		–		–	
sowthistle	35–50 r		–		–		–		1.4–2.1 j		–		–		0.5–1.0		–		–		0.6		0.5–0.75 f p		–		1.0 (S)	
spear/black thistle	–		–		–		–		–		–		–		–		–		–		–		–		–		–	
spiny emex	–		–		–		2.0		–		0.75–1.4		–		0.75–1.0 (S)		0.16 b		1.0–1.7		0.9		0.5–0.75 f p		0.7		1.0 (S)	
toad rush	–		–		–		–		1.4–2.1		–		–		–		–		–		–		–		–		1.0	
turnip weed	35–50		15		0.1 h		2.0		1.4–2.0		–		–		0.5–1.0		0.16 b		1.0–1.7		0.3–0.9 p		–		0.7		0.5–1.0	
variegated thistle	35–50 r		–		–		1.4–2.0		1.4–2.0		–		–		–		0.28		1.7		–		0.5–0.75 f p		–		1.0 (S)	
vetch	35–50 r		–		–		–		–		–		–		0.5 n		0.16 b		1.0–1.7		–		0.5–0.75 d		0.7		1.0 (S)	
wild lettuce	35–50 r		–		0.1 h		–		–		–		400		0.5–1.0		–		–		0.3–0.6		0.75 f		–		0.5–1.0	
wild oats	–		–		–		–		–		–		–		–		–		–		–		–		–		–	
wild turnip	50		15		–		2.0		1.4–2.0		–		400		0.5–1.0		0.16 b		1.0–1.7		0.3–0.9 p		–		0.7		0.5–1.0	
wireweed	–		20		–		2.0		–		0.75–1.4		–		0.55–1.0		0.16 b		1.0–1.7		–		–		–		0.75 (S)	
Rec water L/ha boom	**50–100**		**30 min**		**50–100**		**50–200**		**50–200**		**50 min**		**50 min**		**50–100**		**50 min**		**50 min**		**50 min**		**80 min**		**50–100**		**50 min**	
Herbicide group	**B**		**B**		**B + I**		**C**		**C + I**		**C + I**		**G**		**H + I**		**I**		**I**		**I**		**I**		**I + B**		**I + F**	

a = No more than 3 leaves of annual ryegrass. Use more than 50 L/ha water.
b = Tankmix with 0.7 L/ha MCPA amine (500 g/L) for control.
d = 500 mL (southern NSW), 750 mL (northern NSW).
e = Add 500–700 mL MCPA LVE. See label.
f = Northern NSW only.
g = Tankmix with 1.2 L/ha MCPA 500.
h = Not Clearfield canola volunteers.
i = Tankmix 350–500 mL/ha Tigrex® plus 200–400 mL/ha MCPA LVE (500 g/L) for control.
j = Northern NSW only.
k = Southern NSW only.
m = Subclover only.
n = Add Lontrel™ Advanced for control. See label for rates.
o = Indian hedge mustard only.
p = See label for tankmix options.
q = Subclover only.
r = Add partner herbicide for control. See label.
s = Also available as Precept® 150. See label for rates.
t = Fluroxypyr also available in 200 g/L and 400 g/L. See label for rates.
u = See label for controlling RR Canola volunteers.
(S) = Suppression only.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014

Table 10. Herbicides for weed control for oats – Early post-emergence – Part 2

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Flumetsulam 800 g/kg **Broadstrike™**		Diuron flowable ◆ 500 g/L **Diuron 500** g	Terbutryn flowable 500 g/L **Igran®** e		Terbutryn + MCPA 275g + 160 g/L **Agtryne® MA**		Picolinafen + MCPA 50 g + 500 g/L **Paragon®**		Picolinafen + MCPA + Bromoxynil 35 g/L+ 350g/L + 210 g/L **Flight® EC**		Picloram + MCPA 26 + 420 g/L **Tordon™ 242**		MCPA 750 g/L **Thistle-Killem® 750**	MCPA 570 g/L **LVE Agritone®**		Dicamba 700 g/kg **Cadence®**		Clopyralid 600 g/L **Lontrel™ Advanced** h	2,4-DB 500 g/L **Buttress®**	
Apply at crop growth stage	**Mid Till–E Jo**		**3–5 L Till**	**3 L–E Till**		**3 L–5L**		**3 L to 5 L**		**3 L to Late tiller**		**E Till–Full Till**		**5L–E Ti**	**3 L–E Flag**		**3 L–M Till**		**2 L–1st node**	**5L–F Till**	
Zadoks code	**23–31**		**13–23**	**13–21**		**13–15**		**13–15**		**13–28**		**22–30**		**15–37**	**13–37**		**13–25**		**12–31**	**15–37**	
Weeds controlled	**(grams)**		**(litres)**	**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**	**(litres)**		**(grams)**		**(litres)**	**(litres)**	
amsinckia	25	Safe on undersown lucerne, medics and sub-clovers after the 2–3 trifoliate leaf stage. Use only wetting agent such as BS1000® with oats.	0.9	0.55–0.85	Avoid spraying when temperatures exceed 18°C. Do not use on undersown medics, lucerne or white clover. See variety safety caution on label.	1.0	See oat variety sensitivities on label and Table 28.	–	Do not use 0.5 L/ha rate on crops younger than 5 leaf. Do not apply rates higher than 0.25 L/ha to crops in the 3 leaf stage.	–	Slight transient yellowing may occur in oats.	–	Do not plant susceptible crops within 12 months of applying the product.	–	–	Max rate between 3 L–5-leaf stage 0.44 L/ha	m	Add wetting agent. Do not apply after mid-tillering as crop damage may result.	–	–	Boomspray only. Good quality water essential.
annual ryegrass	–		–	–		–		–		–		–		–	–		–		–	–	
black bindweed	–		–	p		–		–		–		1.0		0.46–1.45 a	–		200		–	–	
canola – volunteer	25 f		–	–		–		0.25 n		0.36		–		–	–		–		–	–	
capeweed	25 r		0.9	0.55–0.85		1.0		0.25–0.5		0.36–0.72		–		0.46–1.45 a	0.44–1.4 a		115 t		0.15 b	2.1–3.2	
charlock	25		0.9	0.55–0.85 b		1.0		0.25–0.5		0.36–0.72		–		0.46–1.45 a	0.44–1.4 a		115 t		–	2.1–3.2	
clover	–		–	–		–		–		–		–		–	–		115–200		0.075–0.1 x	–	
corn gromwell	–		–	0.55–0.85		1.0		0.5		0.72		–		–	–		–		–	–	
deadnettle	25 (S) r		–	0.55–0.85		1.5		0.5 (S)		0.72 (S)		–		–	–		–		–	–	
dock	–		–	–		–		–		–		–		–	–		200 t		–	–	
field pea – volunteer	–		–	p		–		–		–		–		–	–		115–200		0.075 d	–	
fumitory	25 r		–	0.55–0.85		1.0		0.5 (S)		0.54 a–0.72 (S)		–		0.46–1.45 a	0.44–1.4 a		–		–	2.1–3.2	
lupin – volunteer	25		–	–		–		0.5 (S)		0.72 (S) u		–		–	–		115		0.125 d	–	
Mexican poppy	–		–	p		–		–		–		–		–	–		–		–	–	
mintweed	–		–	–		–		–		–		–		0.46–1.45 a	–		–		–	–	
mustards	25		0.9	0.55–0.85 bp		1.0		0.25–0.5		0.36–0.72		1.0		0.46–1.45 a	0.44–1.4 a		115 m t		–	2.1–3.2	
New Zealand spinach	25 (S)		–	–		–		–		–		1.0 (S)		–	–		200		–	–	
Paterson's curse	25 (S) r		–	0.55–0.85		1.0		–		–		–		0.46–1.45 a	0.44–1.4 a		–		–	2.1–3.2	
radish – wild	25 (S) r		–	p		–		0.25–0.5		0.36–0.72		1.0		0.46–1.45 a	0.44–1.4 a		m or t		–	–	
rough poppy	–		0.9	–		1.0		–		–		–		–	–		–		–	–	
saffron thistle	–		0.9	–		–		0.5		0.72		1.0		0.46–1.45 a	0.44–1.4 a		–		0.025 k	2.1–3.2	
shepherd's purse	25		–	p		–		0.25–0.5		0.36–0.72		–		–	–		–		–	2.1–3.2	
skeleton weed	–		–	–		–		–		–		1.0		0.46–1.45 a	0.44–1.4 a		–		0.25 c	–	
slender thistle	–		–	–		–		–		–		–		–	0.44–1.4 a		–		0.025 k	2.1–3.2	
sorrel	–		–	–		–		–		–		–		–	–		–		–	–	
soursob	–		–	–		–		–		–		–		–	–		–		–	–	
sowthistle	–		–	–		–		0.5 (S)		0.72 (S)		1.0		–	–		–		0.05 d	2.1–3.2	
spear thistle	–		–	–		–		–		–		–		0.46–1.45 a	0.44–1.4 a		200		0.025 k	2.1–3.2	
spiny emex	25 (S) r		0.9	0.55–0.85 b		1.5		0.5 (S)		0.72 (S)		1.0		–	–		200 m or t		–	2.1–3.2	
toad rush	–		–	0.55–0.85		1.5		0.5		0.72		–		–	–		–		–	–	
turnip weed	15–25		0.9	0.55–0.85 b p		1.0		0.25–0.5		0.36–0.72		1.0		0.46–1.45 a	0.44–1.4 a		m or t		–	2.1–3.2	
variegated thistle	–		–	–		–		–		–		1.0		0.46–1.45 a	0.44–1.4 a		200		0.025 k	2.1–3.2	
wild lettuce	–		–	–		–		0.25–0.5		0.36–0.72		–		–	–		–		0.075 d	2.1–3.2	
wild oats	–		–	–		–		–		–		–		–	–		–		–	–	
wild turnip	25		0.9	0.55–0.85 b p		1.0		0.25–0.5		0.36–0.72		1.0		0.46–1.45 a	0.44–1.4 a		m or t		–	2.1–3.2	
wireweed	–		–	–		1.5		–		–		1.0 (S)		–	–		200		–	2.1–3.2	
Rec water L/ha boom	**50–150**		**50–100**	**50–100**		**50–100**		**50 min**		**50–150**		**50 min**		**30–120**	**30–120**		**50 min**		**50 min**	**110–220**	
Herbicide group	**B**		**C**	**C**		**C + I**		**F + I**		**C+ I + F**		**I**		**I**	**I**		**I**		**I**	**I**	

a = Refer to weed table on label. Weed size will dictate rate.
b = Tank mix with 0.3 L/ha MCPA 500 g/L or 0.3 L 2,4-D amine 500 g/L for control.
c = Add 1.0 L/ha MCPA 500 g/L for control.
d = See label for tankmix options.
e = Do not apply to Avon, Saia, Cassia or Barmah varieties of oats. Consult agronomist before using on other varieties.
f = Not Clearfield canola volunteers.
g = Alternatively Diurex® 900 WG 900 g/kg.
h = Also available as Lontrel™ 750 SG (750 g/kg).
k = Tankmix with 1 L/ha MCPA Amine or 0.7 L LVE MCPA/ha for control.
m = Tankmix 115 g/ha Cadence® with 50 mL/ha Eclipse® 100 SC for control. Add Uptake™ spraying oil at 0.5 L/100 L water or 1 L D-C-Trate® oil/100 L water.
n = See label for comntrolling RR canola volunteers.
p = Tankmix of Igran® and Logran® can be used for control. See label.
r = See label for tankmix of Broadstrike™ and other herbicides for control. See label.
t = Tankmix 115 g Cadence®/ha with 0.7 L MCPA (500 g/L) per ha for control.
u = Angustifolius (narrow leaf) lupins only.
x = Subclover only.
(S) = Suppression only.
◆ = See *What's new in 2014* on page 3.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014

Table 11. Herbicides for weed control for oats – Late post-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Triasulfuron 750 g/kg **Logran®**		Flumetsulam 800 g/kg **Broadstrike™**		2,4-D amine 700 g/L **Amicide® Advance 700**		2,4-D amine 800 g/kg **Baton® Low**	2,4-DB 500 g/L **Buttress®**		MCPA 750 g/L **Thistle-Killem® 750**		MCPA LVE 570 g/L **LVE Agritone®**		Picloram + MCPA 26 + 420 g/L **Tordon™ 242**		Picloram + 2,4-D + aminopyralid (75 + 300 g/L + 7.5 g/L) **FallowBoss™ Tordon™**	
Apply at crop growth stage	Late P.E.		Fl–Ea dough		Fully Till–Boot		Fully Till–Boot	5 L–F Till		Fully Till–Bo		5L–Ea Flag		Ea Till–Full Till		Mid Till–Jo	
Zadoks code	31–60		61–83		30–37		30–37	15–37		30–37		15–38		22–30		23–31	
Weeds controlled	(grams)		(grams)		(litres)		(kilograms)	(litres)		(litres)		(litres)		(litres)		(litres)	
amsinckia	–	**Late Salvage Spray.** Add crop oil at 1 L/100 L spray. Spray radish at early flowering. **DO NOT** spray crop during anthesis or flowering. May cause leaf yellowing.	–	**Salvage spray** to prevent seed set in wild radish and turnip weed. Spray least mature weeds from early flowering to early pod set of most mature weeds, and crop from flowering to early dough stage. Add wetter only in oats. Can be used on undersown lucerne, clovers and annual medics.	–	Maximum rate on oats 0.715 L/ha.	–	–	Boomspray only. Good quality water is essential.	–	Undersown sub-clovers may be slightly retarded. Do not apply to undersown medics or lucerne.	–	Undersown legumes tolerant to lower rates – see label. Not on medics or lucerne.	–	Do not plant susceptible crops within 12 months of applying the product.	–	Do not plant susceptible crops within 12 months of applying the product.
annual ryegrass	–		–		–		–	–		–		–		–		–	
black bindweed	–		–		–		–	–		–		–		1.0 d		0.3	
capeweed	–		–		–		–	2.1–3.2		0.46–1.45		0.44–1.4		–		–	
charlock	–		–		0.5–0.715		0.25–0.6	2.1–3.2		0.46–1.45		0.44–1.4		–		–	
clover	–		–		0.715		0.25–0.6	–		–		–		–		–	
corn gromwell	–		–		–		–	–		–		–		–		–	
deadnettle	–		–		–		–	–		–		–		–		–	
fumitory	–		–		–		–	2.1–3.2		–		0.44–1.4		–		–	
Mexican poppy	–		–		–		–	–		–		–		–		–	
mintweed	–		–		0.715		0.25–0.6	2.1–3.2		0.46–1.45		–		–		0.3 b	
mustards	–		–		0.5–0.715		0.25–0.6	2.1–3.2		0.46–1.45		0.44–1.4		1.0		0.3 b	
New Zealand spinach	–		–		0.715		0.25–0.6	–		–		–		1.0 (S)		0.3	
Paterson's curse	–		–		0.715		0.25–0.6	2.1–3.2		0.46–1.45		0.44–1.4		–		–	
radish – wild	10–15 c		25		0.715		0.25–0.6	–		0.46–1.45		0.44–1.4 f		1.0		0.3 b	
rough poppy	–		–		0.715		0.25–0.6	–		–		–		–		–	
saffron thistle	–		–		0.5–0.715		0.25–0.6	2.1–3.2		0.46–1.45		0.44–1.4		1.0		0.3	
scotch thistle	–		–		–		–	–		–		0.44–1.4		–		–	
shepherd's purse	–		–		0.715		0.25–0.6	2.1–3.2		0.46–1.45		–		–		–	
skeleton weed	–		–		0.715		0.25–0.6	–		0.46–1.45		0.44–1.4		1.0		–	
slender thistle	–		–		0.715		0.25–0.6	2.1–3.2		–		0.44–1.4		–		–	
sorrel	–		–		0.715		0.25–0.6	–		–		–		–		–	
sowthistle	–		–		0.715		–	2.1–3.2		–		–		1.0		0.3	
spear thistle	–		–		–		–	2.1–3.2		0.46–1.45		0.44–1.4		–		–	
spiny emex	–		–		–		–	2.1–3.2		–		–		1.0		0.3	
turnip weed	–		25s		0.5–0.715		0.25–0.6	2.1–3.2		0.46–1.45		0.44–1.4		1.0		0.3 b	
variegated thistle	–		–		0.5–0.715		0.25–0.6	2.1–3.2		0.46–1.45		0.44–1.4		1.0		0.3 b	
wild oats	–		–		–		–	–		–		–		–		–	
wild turnip	–		–		0.5–0.715		0.25–0.6	2.1–3.2		0.46–1.45		0.44–1.4		1.0		–	
wireweed	–		–		–		–	2.1–3.2		–		–		1.0 (S)		0.3 b (S)	
Recom water L/ha boom	30–100		100 min		30–120		30–120	110–220		30–120		30–120		50 min		50 min	
Herbicide group	B		B		I		I	I		I		I		I		I	

b = Tank mix with 375 mL/ha 2,4-D Amine 625 for control.
c = 10 g/ha rate, only on some triasulfuron labels.
d = Preferred option for northern NSW only.
e = See label for tankmix options.
f = See label for tankmix options with Nugrex® for improved control in wild radish.
(S) = Suppression only.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

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Herbicide resistance management

• Rotate herbicide groups • Avoid spraying dense weed infestations

Defining herbicide resistance

Herbicide resistance is the inherent ability of a weed to survive a herbicide rate that would normally control it. This is not the same phenomena as poor herbicide performance.

Why it is a problem?

If herbicide resistance develops, herbicides from different chemical 'groups' or different control methods will have to be used to control the weed. These options may be more expensive or less effective. Once developed, herbicide resistance will persist for many years.

Understanding herbicides

Herbicides act by interfering with specific processes in plants. This is known as the herbicides 'mode of action' (MOA).

Watch your paddocks

- Keep accurate records.
- Monitor weed populations and record results of herbicides used.
- If herbicide resistance is suspected, prevent weed seed set.
- If a herbicide does not work, find out why.
- Check that weed survival is not due to spraying error.
- Conduct your own paddock tests to confirm herbicide failure and what herbicides are still effective.
- Have a herbicide resistance test carried out on seed from suspected plants testing for resistance to other herbicide (MOA) groups.
- Do not introduce or spread resistant weeds in contaminated grain or hay.
- Resistance can develop from fence lines and irrigation channels. Closely monitor and test for resistance in these areas.

Herbicide resistance testing

The best investment a grain grower can make is to test any weedy outbreak that is suspected of having herbicide resistance. It provides valuable information about the herbicides that don't work, but more importantly the herbicides that are effective. An approximate cost of a broad spectrum test is $600 to $700. This would include at least six to seven herbicides. This cost is rather insignificant compared to a widespread spray failure over 200 hectares that costs $30/ha in herbicides; totalling $6,000 in wasted herbicide, not including crop yield losses and the blow out in weed seed for future years.

There are two types of tests available; a quick test and a seed test. The quick test involves live seedlings being sent away for re-potting and spraying. Once the plants have fully recovered they are sprayed with herbicides of your choice. Results are usually reported between four and eight weeks after arrival at the testing facility. This is usually too late to enable re-treatment of the 'suspect' patches, but does provide early knowledge about the nature of the problem and what is likely to work in the future. One disadvantage of the quick test is it cannot test for pre-emergence herbicides, as the plants are already emerged.

A seed test requires seed to be sent and often involves breaking seed dormancy upon arrival. It is a useful test if you require herbicide resistance testing of pre-emergence herbicides. The turnover time is approximately four months and results are usually sent to clients in April (if seed was sent in December). This will allow ample time to decide what herbicides to use for the next crop.

Which herbicides should I test?

Ideally test any and every herbicide that you might wish to use in the future for the target weed species (there are a few exceptions – read on). Any application of herbicide that results in survivors setting seed will classify as some selection pressure for resistance. Be sure to include some herbicides that you have not yet used.

There are two reasons for this; firstly you may have developed cross resistance, i.e. confirmed resistance without a history of it being used, or new crop rotations in the future will allow the use of new herbicide groups. A good mixture of 'fop' and 'dim' herbicides is recommended and if you intend to use Axial® ('den' herbicide) include it. If ARG (annual ryegrass) is your key weed and you grow wheat, pulse or a Clearfield crop it is worthwhile including a sulfonylurea herbicide (e.g. Glean®, Ally® or Logran®) and an imidazolinone herbicide (e.g. Spinnaker®, Raptor®). Testing for trifluralin or Avadex® resistance would only be required if you have a history of using them for at least 10 applications in that paddock of concern.

The inclusion of Mataven® in the list of herbicides is essential if wild oats are to be tested because it can be applied late post-emergence in wheat crops to prevent wild oat seed set and is a Group Z herbicide – could be a vital tool in herbicide resistance management – but it has a history of often being cross resistant with Group A resistance.

Lastly, never under-estimate the number of glyphosate applications these weeds could have received. As a cautious measure, including glyphosate as a test herbicide is a wise choice, especially for ARG. There are many cases of glyphosate resistant ARG in NSW. Although there is a chance of discovering glyphosate resistant weeds, resistance testing may discover concerning or low levels of survival following glyphosate application. If this occurs, it maybe the precursor for the development of glyphosate resistance.

What contact details do I need to get started?

There are two testing services; the contact details and other relevant information are provided in Table 1.

Table 1. Information about each herbicide resistance provider

Information	Plant Science Consulting	Charles Sturt Uni – Herbicide Resistance Testing Service
Office number	(08) 8342 4606 – fax	(02) 6933 2420, (02) 6933 2924 – fax
Mobile number	0400 664 460	N/A
Email	info@plantscienceconsulting.com	jbroster@csu.edu.au
Postal Address	22 Linley Avenue, Prospect SA 5082	Herbicide Resistance Testing, School of Agricultural and Wine Sciences, Charles Sturt University, Locked Bag 588, Wagga Wagga, NSW 2678
Webpage	www.plantscienceconsulting.com	N/A
Seed Test?	Yes	Yes
Quick Test?	Yes	No

Tony Cook, Technical Specialist, Weeds, NSW DPI, Tamworth

NSW GOVERNMENT Department of Primary Industries

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Tony Cook 3/14

Preventing herbicide resistance

Aim to:

- Reduce weed numbers by preventing seed set.
- Avoid spraying dense weed infestations and begin a cropping phase with low weed numbers.
- Use as many different control options (chemical and non-chemical) as possible in both crop and pasture phases.

When using herbicides:

- Rotate herbicides from different groups.
- Reduce reliance on high-risk herbicides (Groups A and B).
- Make every herbicide application count – use the rate that kills.
- The 'double knock' herbicide option; before sowing – glyphosate followed by paraquat + diquat.

Weed control options for crop and pasture phases

Pasture phase		Cropping phase	
Chemical	**Non-chemical**	**Chemical**	**Non-chemical**
Spray topping Winter cleaning Chemical Fallow	Competitive pasture Make silage or hay Cultivated fallow Grazing	Crop topping Pre-sow knockdown Selective spraytop Selective herbicides Lower risk herbicides Rotating modes of action	Competitive crop Timely cultivation Green manure crop Later sowing Silage or hay crops Collect or burn weed seeds

Mode of Action Groups (as at 27 June 2013)

Produced courtesy CropLife Australia Limited, Locked Bag 916, Canberra ACT 2601. Phone (02) 6230 6399 Fax (02) 6230 6355
Website www.croplifeaustralia.org.au Email info@croplifeaustralia.org.au

High Resistance Risk

CHEMICAL FAMILY	ACTIVE CONSTITUENT (FIRST REGISTERED TRADE NAME)
GROUP A Inhibitors of acetyl coA carboxylase (Inhibitors of fat synthesis/ACC'ase inhibitors)	
Aryloxyphenoxypropionates: (Fops):	clodinafop (Topik®), cyhalofop (Barnstorm®), diclofop (Cheetah® Gold*, Decision®*, Hoegrass®, Tristar® Advance*), fenoxaprop (Cheetah® Gold*,Tristar® Advance*, Wildcat®), fluazifop (Fusilade®), haloxyfop (Motsa®*, Verdict®, Exert®), propaquizafop (Shogun®), quizalofop (Targa®)
Cyclohexanediones: (Dims):	butroxydim (Factor®, Falcon®, Fusion®), clethodim (Motsa®*, Select®, Sequence®), profoxydim (Aura®), sethoxydim (Cheetah® Gold*, Decision®*, Sertin®), tepraloxydim (Arama®), tralkoxydim (Achieve®)
Phenylpyrazoles: (Dens):	pinoxaden (Axial®)
GROUP B Inhibitors of acetolactate synthase (ALS inhibitors)	
Sulfonylureas: (SUs):	azimsulfuron (Gulliver®), bensulfuron (Londax®), chlorsulfuron (Glean®), ethoxysulfuron (Hero®), formasulfuron (Tribute®), halosulfuron (Sempra®), iodosulfuron (Hussar®), mesosulfuron (Atlantis®), metsulfuron (Ally®, Associate®, Harmony®* M, Trounce®*, Ultimate Brushweed®* Herbicide), prosulfuron (Casper®), rimsulfuron (Titus®), sulfometuron (Oust®), sulfosulfuron (Monza®), thifensulfuron (Harmony®* M), triasulfuron, (Logran®, Logran® B-Power®*), tribenuron (Express®), trifloxysulfuron (Envoke®, Krismat®*)
Imidazolinones: (Imis):	imazamox (Raptor®, Claw®, Intervix®*), imazapic (Flame®, Midas®*, OnDuty®*, Sentry®*, Spark®), imazapyr (Arsenal Xpress®*, Midas®*, OnDuty®*, Intervix®*, Lightning®*), imazethapyr (Spinnaker®, Lightning®*)
Triazolopyrimidines: (Sulfonamides):	flumetsulam (Broadstrike®, Broadsword®), florasulam (Conclude®*,Torpedo®*, XPand®*), metosulam (Eclipse®), pyroxsulam (Crusader®)
Pyrimidinylthiobenzoates:	bispyribac (Nominee®), pyrithiobac (Staple®)

* This product contains more than one active constituent.

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Moderate Resistance Risk

CHEMICAL FAMILY	ACTIVE CONSTITUENT (FIRST REGISTERED TRADE NAME)
GROUP C Inhibitors of photosynthesis at photosystem II (PS II inhibitors)	
Triazines:	ametryn (Amigan®*, Primatol Z®, Gesapax®Combi*, Krismat®), atrazine (Gesaprim®, Gesapax® Combi*, Primextra® Gold*), cyanazine (Bladex®), prometryn (Gesagard®, Cotogard®*, Bandit®*), propazine (Agaprop®), simazine (Gesatop®), terbuthylazine (Terbyne®), terbutryn (Amigan®*, Igran®, Agtryne® MA*)
Triazinones:	hexazinone (Velpar® L, Velpar® K4*), metribuzin (Sencor®)
Uracils:	bromacil (Hyvar®, Krovar®*), terbacil (Sinbar®)
Pyridazinones:	chloridazon (Pyramin®)
Phenylcarbamates:	phenmedipham (Betanal®)
Ureas:	diuron (Karmex®, Krovar®*, Velpar® K4*, Diurex®), fluometuron (Cotoran®, Cotogard®*, Bandit®*), linuron (Afalon®), methabenzthiazuron (Tribunil®), siduron (Tupersan®), tebuthiuron (Graslan®)
Amides:	propanil (Stam®)
Nitriles:	bromoxynil (Buctril®, Bromicide®, Buctril® MA*, Barrel®*, Jaguar®*, Velocity®*, Flight®*), ioxynil (Totril®, Actril® DS*)
Benzothiadiazinones:	bentazone (Basagran®, Basagran® M60*, Dictate®, Dictate® M60)
GROUP D Inhibitors of microtubule assembly	
Dinitroanilines (DNAs):	oryzalin (Surflan®, Rout®*), pendimethalin (Stomp®), prodiamine (Barricade®), trifluralin (Treflan®)
Benzoic acids:	chlorthal (Dacthal®, Prothal®)
Benzamides:	propyzamide (Kerb®)
Pyridines:	dithiopyr (Dimension®), thiazopyr (Visor®)
GROUP E Inhibitors of mitosis / microtubule organisation	
Carbamates:	carbetamide (Carbetamex®), chlorpropham (Chlorpropham)
GROUP F Bleachers: Inhibitors of carotenoid biosynthesis at the phytoene desaturase step (PDS inhibitors)	
Nicotinanilides:	diflufenican (Brodal®, Jaguar®*, Tigrex®*, Chipco Spearhead®*, Minder®)
Picolinamides:	picolinafen (Paragon®*, Sniper®, Flight®*)
Pyridazinones:	norflurazon (Solicam®)
GROUP G Inhibitors of protoporphyrinogen oxidase (PPOs)	
Diphenylethers:	acifluorfen (Blazer®), oxyfluorfen (Goal®, Rout®*, Striker®)
N-phenylphthalimides:	flumioxazin (Pledge®, Valor®, Terrain®)
Oxadiazoles:	oxadiargyl (Raft®), oxadiazon (Ronstar®)
Triazolinones:	carfentrazone (Affinity®, Broadway®*, Nail™, Hammer®)
Pyrimidindiones:	butafenacil (Logran® B-Power®*, Resolva®), saflufenacil (Sharpen® WG)
Phenylpyrazole:	pyraflufen (Ecopar®, Pyresta®*)
GROUP H Bleachers: Inhibitors of 4-hydroxyphenyl-pyruvate dioxygenase (HPPDs)	
Pyrazoles:	benzofenap (Taipan®, Viper®), pyrasulfotole (Precept®*,Velocity®*)
Isoxazoles:	isoxaflutole (Balance®)
GROUP I Disruptors of plant cell growth (Synthetic Auxins)	
Phenoxycarboxylic acids (Phenoxys):	2,4-D (Amicide®, Actril DS®*, Pyresta®*, Baton®), 2,4-DB (Trifolamine®, Buttress®), dichlorprop (Lantana 600®), MCPA (MCPA, Agritone®, Buctril® MA*, Conclude®*, Banvel M®, Kamba® M, Midas®*, Paragon®*, Tigrex®*, Barrel®*, Tordon 242®*, Basagran® M60*, Chipco Spearhead®*, Agtryne® MA*, Precept®*, Flight®*), mecoprop (Methar Tri-Kombi®*, Multiweed®*, Mecopropamine®, Mecoban®)
Benzoic acids:	dicamba (Barrel®*, Kamba® M, Methar Tri-Kombi®*, Banvel®, Banvel M®, Casper®, Mecoban®)
Pyridine carboxylic acids (Pyridines):	aminopyralid (Hotshot®*, Grazon Extra®*), clopyralid (Lontrel®, Torpedo®*, Chipco Spearhead®*, Archer®), fluroxypyr (Starane®, Hotshot®*, Comet®), picloram (Tordon®, Tordon 242®*, Trooper®, Grazon Extra®*, Trinoc®*), triclopyr (Garlon®, Invader®, Grazon Extra®*, Ultimate Brushweed®* Herbicide, Concentrate Tough Roundup®* Weedkiller)
Quinoline carboxylic acids:	quinclorac (Drive®)

* This product contains more than one active constituent.

Moderate Resistance Risk (continued)

CHEMICAL FAMILY	ACTIVE CONSTITUENT (FIRST REGISTERED TRADE NAME)
GROUP J Inhibitors of fat synthesis (Not ACCase inhibitors)	
Chlorocarbonic acids:	2,2–DPA (Dalapon®), flupropanate (Frenock®)
Thiocarbamates:	EPTC (Eptam®), molinate (Ordram®), pebulate (Tillam®), prosulfocarb (Boxer® Gold*), thiobencarb (Saturn®), triallate (Avadex®), vernolate (Vernam®)
Phosphorodithioates:	bensulide (Prefar®)
Benzofurans:	ethofumesate (Tramat®)
GROUP K Inhibitors of cell division / Inhibitors of very long chain fatty acids (VLCFA inhibitors)	
Acetamides:	napropamide (Devrinol®)
Chloroacetamides:	dimethenamid (Frontier®-P, Outlook®), metolachlor (Boxer® Gold*, Bounce®, Dual® Gold, Primextra® Gold*), propachlor (Ramrod®, Prothal®*)
Isoxazolines:	proxasulfone (Sakura®)
GROUP L Inhibitors of photosynthesis at photosystem I (PSI inhibitors)	
Bipyridyls:	diquat (Reglone®, Revolver®, Spray Seed®*), paraquat (Gramoxone®, Nuquat®, Shirquat®, Spray Seed®*, Alliance®*)
GROUP M Inhibitors of EPSP synthase	
Glycines:	glyphosate (Gladiator®, Roundup®, Trounce®*, Illico®*, Arsenal Xpress®*, Broadway®*, Resolva®, Weedmaster®, Concentrate Tough Roundup®* Weedkiller)
GROUP N Inhibitors of glutamine synthetase	
Phosphinic acids:	glufosinate (Basta®, Biffo®, Liberty®)
GROUP O Inhibitors of cell wall (cellulose) synthesis	
Nitriles:	dichlobenil (Casoron®)
Benzamides:	isoxaben (Gallery®, X-Pand®*)
GROUP P Inhibitors of auxin transport	
Phthalamates:	naptalam (Alanap-L®)
GROUP Q Bleachers: Inhibitors of carotenoid biosynthesis unknown target	
Triazoles:	amitrole (Amitrole®, Illico®*, Alliance®*)
Isoxazolidinones:	clomazone (Command®, Director®, Viper®*)
GROUP R Inhibitors of dihydropteroate synthase (DHP inhibitors)	
Carbamates:	asulam (Asulox®)
GROUP Z Herbicides with unknown and probably diverse sites of action	
Arylaminopropionic acids:	flamprop (Mataven L®)
Dicarboxylic acids:	endothal (Endothal®)
Organoarsenicals:	DSMA (disodium methylarsonate) (Methar®), MSMA (Daconate®)

* This product contains more than one active constituent.

This strategy is a guide only and does not endorse particular products, groups of products or cultural methods in terms of their performance. Always follow the product label for specific use instructions. While all effort has been taken with the information supplied in this document no responsibility, actual or implied, is taken for the day to day accuracy of product or active constituent specific information. Readers should check with the Australian regulator's (APVMA) product database for contemporary information on products and actives. The data base can be sourced through www.apvma.gov.au. The information given in this strategy is provided in good faith and without any liability for loss or damage suffered as a result of its application and use.

Advice given in this strategy is valid as at 27 June 2013. All previous versions of this strategy are now invalid.

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Surveys for herbicide resistant grass weeds in southern Australia

Key points

- Herbicide resistance is common in annual ryegrass in most cropping regions of southern Australia
- Trifluralin and Select® resistance are increasing
- Resistance to herbicides is also present in wild oats and brome grass
- Glyphosate resistance occurs where there is intensive use of glyphosate and few or no other weed control tactics
- Some alternatives to glyphosate will control glyphosate-resistant annual ryegrass on fence lines.

Random surveys of weed populations across southern Australia have identified considerable levels of herbicide resistance in annual ryegrass across southern Australia. There are variations across regions, with trifluralin beginning to emerge as an issue (Table 1). These regional differences reflect differences in cropping practices and hence herbicide use patterns. Of particular concern is the increase in Select® resistance and was reported in 7% of samples (Table 3). More emphasis should be aimed at crop competition and annual ryegrass weed seed capture/destruction at harvest to maintain or extend the life of Select® and other effective post-emergence herbicides.

The incidence of multiple resistance within annual ryegrass concerning. Approximatley 80% of samples tested had resistance to at least 2 herbicide mode of actions. In some rare cases resistance to 4 herbicide groups has developed (Table 2).

Table 1. Percentage of annual ryegrass samples resistant or developing resistance to each herbicide group

	2009	2010	2011	2012	2013
A (fops)	90	90	83	96	90
A (dims)	16	26	43	50	12
A (dens)	100	70	100	81	84
B	91	93	74	85	93
C	0	1	0	1	0
D	12	13	3	5	3

Table 2. Results of annual ryegrass samples cross resistance screening showing percentage of samples resistant or developing resistance to different groups

No of groups	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)
5	0	0	0	0	0
4	0	1.4	5.6	1.3	0.5
3	21.5	27.0	19.4	12.8	10.8
2	60.0	56.8	47.2	66.0	68.6
1	16.9	13.5	27.8	18.0	16.8
0	1.6	1.3	0	1.9	3.2
No of samples	65	74	36	156	185

Management of wild oats was previously reliant on post-emergence herbicides. Consequently there is a high frequency of resistance to 'fops', 'dims', and 'den' chemistry. Although there is some reasonable benefit of using the 'dim' chemistry, in the past two years there has been a steady increase in resistance to this group (Table 4). More pre-emergence herbicides are being use in NSW cropping systems to combat these issues with wild oats. Effective crop competition in combination with effective pre- and post-emergence herbicide should prolong the effective life of these herbicides.

Herbicide resistance in winter broad leaf species is steadily increasing. In 2013, a population of wild radish was confirmed resistant to 2,4-D amine (Group I) in central NSW. There are other populations of this weed resistant to Group B in southern NSW. Fleabane is glyphosate resistant and is located over all of NSW due to its windborne seed. Another weed spread by wind, sowthistle, has been reported as glyphosate resistant in 2014 and is currently confined to northern NSW. However, Group B resistance is present in this species. Two brassica species, Indian hedge mustard and Charlock are reported to have Group B resistance in NSW.

Table 3. Results for ryegrass samples showing percentage resistant (Res) or developing resistance (DR) to individual Group A herbicides

	Tested	Res	DR	%	Susc.
'Fops'					
Hoegrass®	176	147	11	90	18
Verdict®	14	12	0	86	2
'Dims'					
Select®	231	7	9	7	215
Achieve®	17	12	1	76	4
Factor®	7	1	0	14	6
'Den'					
Axial®	43	34	2	84	7
'Fop' and 'Dim'					
Decision®	3	3	0	100	0

Table 4. Percentage of wild oat samples found to be resistant since 2010 (number tested in brackets)

	2010 % (no)	2011 % (no)	2012 % (no)	2013 % (no)
'Fops'	84 (25)	89 (9)	74 (71)	81 (43)
'Dims'	0 (25)	0 (8)	7 (75)	9 (55)
'Dens'	33 (6)	50 (4)	12 (51)	46 (26)
B	17 (6)	0 (4)	12 (52)	8 (52)
Z	14 (21)	13 (8)	67 (3)	44 (9)

Glyphosate resistance in annual ryegrass

There are now 347 confirmed sites with glyphosate resistant annual ryegrass in Australia. These come from four states and a variety of situations (Table 5). Glyphosate resistant annual ryegrass occurs when populations are treated intensively with glyphosate, where no other herbicides are applied and where there is little or no tillage. Relying solely on glyphosate for weed control is the greatest risk factor for glyphosate resistant weeds.

Table 5: Situations containing glyphosate resistant annual ryegrass

Situation		Number of sites	States
Broadacre cropping	Chemical fallow	29	NSW
	Winter grains	99	NSW, Vic, SA, WA
	Irrigated crops	1	SA
	Summer grains	1	NSW
Horticulture	Tree crops	5	NSW, SA
	Vine crops	22	SA, WA
	Vegetables	2	Vic
Other	Driveway	4	NSW, Vic, SA, WA
	Fence line/Crop margin	82	NSW, Vic, SA, WA
	Around buildings	2	NSW
	Irrigation channel/Drain	12	NSW, Vic, SA
	Airstrip	1	SA
	Railway	2	NSW, WA
	Roadside	85	NSW, SA, WA

From Preston, C. (2009) Australian Glyphosate Resistance Register. Australian Glyphosate Sustainability Working Group. Online. Available from www.glyphosateresistance.org.au

Table 6: Glyphosate resistant fleabane across Australia

Situation		Number of sites	States
Broadacre cropping	Chemical fallow	8	NSW, Qld
	Around buildings	1	NSW
	Irrigation channel/Drain	10	NSW
	Railway	3	NSW
	Roadside	27	NSW, Qld, SA

Table 7: Percentage of paddocks with herbicide resistant broadleaf weeds in cropping regions of Victoria

Region	Year	Indian hedge mustard		Wild radish		Sowthistle
		Populations resistant (%)				
		Glean®	2,4-D	Glean®	2,4-D	Glean®
Vic – Western	2010	35	0	nt	nt	81
Vic – Southern	2010	nt	nt	0	0	64

Current March 2014. Tony Cook, Technical Specialist, Weeds, NSW DPI, Tamworth. Chris Preston[1], Peter Boutsalis[1], Jenna Malone[1], Gurjeet Gill[1] and John Broster[2].
[1] School of Agriculture, Food & Wine, University of Adelaide, PMB1 Glen Osmond SA 5064. [2] School of Agricultural & Wine Sciences, Charles Sturt University, Locked Bag 588, Wagga Wagga NSW 2678. GRDC Projects UA00098 and UA00104.

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Table 12. Herbicides for weed control for cereal rye and triticale – Early post-emergence – Part 1

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Fenoxaprop-p-ethyl 69 g/L + Cloquintocet-mexyl 34.5 g/L **Foxtrot®**	Chlorsulfuron 750 g/kg **Glean®**		Metsulfuron-methyl 600 g/kg **Ally®**		Bromoxynil 200 g/L **Bromicide®**		Terbutryn 500 g/L **Igran®** Triticale only		Bromoxynil + Diflufenican 250 + 25 g/L **Jaguar®**		Bromoxynil + MCPA 200 + 200 g/L **Buctril® MA**		Bromoxynil + MCPA + Dicamba 140 + 280 + 40 g/L **Broadside®**	Picolinafen + MCPA 50g + 500 g/L **Paragon®**		Picolinafen + MCPA + Bromoxynil 35 g/L + 350 g/L + 210 g/L **Flight® EC**		Pyraflufen-ethyl 20g/L **Ecopar®** Triticale only	Dicamba 500 g/L **Kamba® 500**		MCPA + Dicamba 340 + 80 g/L **Kamba® M**		Picloram + MCPA 26 + 420 g/L **Tordon™ 242** Triticale only		MCPA LVE 570 g/L **LVE Agritone®**		Fluroxypyr 333 g/L **Starane™ Advanced** Triticale only		Clopyralid 300 g/L + Florasulam 50 g/L **Torpedo™** Triticale only	MCPA 375 g/L + Florasulam 7 g/L **Conclude™** Triticale only	
Apply at crop growth stage	**2 L–5 L**	**2 L–Ea Till**		**3 L–Jo**		**3 L–Ful Till**		**3 L–Ea Till**		**2 L–F Till**		**5 L–Ful Till**		**3 L–Ful Till**	**3 L–5 L**		**3 L–Late Till**		**2 L–Mid Till**	**5 L–Ea Till**		**Ea–Fully Till**		**Ea Till–Full Till**		**3–5 L**		**3 L–Flag leaf**		**2 L–1st node**	**3 L–Flag**	
Zadoks code	**12–15**	**12–23**		**13–35**		**13–30**		**13–21**		**13–29**		**15–30**		**13–30**	**13–15**		**13–28**		**12–25**	**15–22**		**21–30**		**22–30**		**13–15**		**13–39**		**12–31**	**13–39**	
Weed controlled	**(litres)**	**(grams)**		**(grams)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**	**(litres)**		**(litres)**		**(litres)**	**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**	**(litres)**	
amsinckia	–	15	Moist soil or rain within 7 days improves results. Add wetter.	5 or 7	Add surfactant.	1.4–2.0	Not on undersown medics. Avoid spraying when temperatures above 20°C. Aerial application can be unsatisfactory.	0.55–0.85	Avoid spraying when temperatures exceed 18°C. Do not use on undersown lucerne and medics.	0.75	Can be used on clover and lucerne. Not on annual medics. Application should be made from first to eighth trifoliate leaf stage.	1.4–2.0	1.4 L/ha can be used at 3-leaf stage.	0.75–1.0	–	Do not use 0.5 L/ha rate on crops younger than 5 leaf. Do not apply rates higher than 0.25 L/ha to crops in the 3 leaf stage.	–		–	Damage can occur if crop not actively growing or after mid-tillering stage.	–	Damage can occur if crop not actively growing. Do not apply after the fully tillered stage.	–	Do not plant susceptible crops within 12 months of applying the product.	–	Maximum rate at 3–5-leaf crop stage 0.44 L/ha.	–	Can be tankmixed with Ally®, MCPA LVE and MCPA amine to broaden weed control.	–	–	Always add Uptake™ spraying oil at 500 mL/100 L water, unless tankmixing with Ally®. When tankmixing with Ally® add a non-ionic wetter at 200 mL/200 L.
annual ryegrass	–	20 or 25a		–		–		–		–		–		–	–		–		–	–		–		–		–		–	–		–	
annual phalaris	0.635– 0.8	–		–		–		–		–		–		–	–		–		–	–		–		–		–		–	–		–	
bedstraw	–	–		–		1.4–2.0		–		1.0 (S)		–		–	–		–		0.4 d	–		–		–		–		0.3		0.1 e	0.7	
black bindweed	–	20		–		1.4–2.0		–		0.5–1.0		1.4–2.0		1.0–1.4	–		–		–	0.28		1.7		1.0		–		0.3–0.4		–	–		–	
capeweed	–	–		–		1.4–2.0		0.55–0.85		0.5–1.0		1.4–2.0		0.75–1.0	0.25–0.5		0.36–0.72		0.4 d	0.16 c		1.0–1.7		–		0.44		–		0.1 e	0.7 (S)		–	
canola – volunteer	–	–		–		–		–		0.5–0.75 j		–		1.4	0.25 j		0.36		0.4 d j	–		–		–		0.44 j		–		–	–		–	
charlock	–	15		5		–		0.55–0.85 b		0.5–0.75		1.4–2.0		–	0.25–0.5		0.36–0.72		–	0.16 c		1.0–1.7		–		0.44		–		–	–		–	
cleavers	–	–		–		–		–		–		–		–	–		–		–	–		–		–		–		0.6		–	–		–	
clover	–	–		5		–		–		–		–		–	–		–		0.4 fi	0.28		1.7		–		–		–		–	–		–	
corn gromwell	–	20		–		1.4–2.0		0.55–0.85		0.5–0.75		1.4–2.0		1.0–1.4	0.5		0.72		–	–		–		–		–		–		–	–		–	
deadnettle	–	15 or 20		5		–		0.55–0.85		0.5–0.75		–		–	0.5 (S)		0.72 (S)		0.4 f	–		–		–		–		0.9		–	–		–	
dock – seedling	–	–		–		–		–		1.0 (S)		–		0.75–1.0	–		–		–	0.16 c		1.0–1.7		–		–		–		–	–		–	
fumitory	–	20		5		2.0		0.55–0.85		0.75–1.0 (S)		1.4–2.0		1.0–1.4	0.5 (S)		0.54–0.72 (S)		0.4 f	–		–		–		0.44		–		–	–		–	
Mexican poppy	–	–		–		2.0		–		–		1.4–2.0		–	–		–		–	–		–		–		–		–		–	–		–	
mintweed	–	20		–		–		–		1.0 (S)		1.4–2.0		–	–		–		–	–		1.7		–		–		–		–	–		–	
mustards	–	15		5		2.0		0.55–0.85 b		0.5–1.0		1.4–2.0		0.75–1.0	0.25–0.5		0.36–0.72		0.4 d	0.16 c		1.0–1.7		1.0		0.44		–		0.075–0.1 e	0.7		–	
New Zealand spinach	–	–		–		–		–		–		–		–	–		–		–	0.28		1.7		1.0 (S)		–		–		–	–		–	
Paterson's curse	–	15		5 or 7		2.0		0.55–0.85		0.5–0.75		1.4–2.0		–	–		–		0.4 f	–		–		–		0.44		–		–	–		–	
radish – wild	–	15 or 20		–		2.0		–		0.5–1.0 g		1.4–2.0		0.75–1.0	0.25–0.5		0.36–0.72		0.3–0.4 d	0.16 c		1.0–1.7		1.0		0.44 k		–		0.075–0.1 e	0.7		–	
Rough poppy	–	20		5		–		–		0.5–0.75		1.4–2.0		–	–		–		–	–		–		–		–		–		–	–		–	
saffron thistle	–	–		–		1.4–2.0		–		1.0		1.4–2.0		–	0.5		0.72		–	–		1.7		1.0		0.44		–		–	–		–	
shepherd's purse	–	20		5		1.4–2.0		–		1.0		1.4–2.0		–	0.25–0.5		0.36–0.72		–	–		–		–		–		–		–	–		–	
skeleton weed	–	–		7 (S)		–		–		1.0 (S)		–		–	–		–		–	–		–		1.0		0.44		–		–	–		–	
slender thistle	–	–		–		–		–		–		1.4–2.0		–	–		–		–	–		–		–		0.44		–		–	–		–	
sorrel	–	–		5		–		–		1.0 (S)		–		–	–		–		0.4 f	–		1.0–1.7		–		–		–		–	–		–	
soursob	–	20		5		–		–		–		–		–	–		–		0.4 f	–		–		–		–		–		–	–		–	
sowthistle	–	–		5		–		–		–		1.4–2.1 h		–	0.5(S)		0.72 (S)		0.4 f	–		–		1.0		–		0.6		–	–		–	
spiny emex	–	–		5 or 7		2.0		0.55–0.85 b		0.5–0.75		1.4–2.0		0.75–1.0	0.5(S)		0.72 (S)		0.4 f	0.16 c		1.0–1.7		1.0		–		0.9		0.1 e	0.7		–	

Continued over page

Table 12. Herbicides for weed control for cereal rye and triticale – Early post-emergence – Part 1 (continued)

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Fenoxaprop-p-ethyl 69 g/L + Cloquintocet-mexyl 34.5 g/L **Foxtrot®**	Chlorsulfuron 750 g/kg **Glean®**	Metsulfuron-methyl 600 g/kg **Ally®**	Bromoxynil 200 g/L **Bromicide®**	Terbutryn 500 g/L **Igran®** Triticale only	Bromoxynil + Diflufenican 250 + 25 g/L **Jaguar®**	Bromoxynil + MCPA 200 + 200 g/L **Buctril® MA**	Bromoxynil + MCPA + Dicamba 140 + 280 + 40 g/L **Broadside®**	Picolinafen + MCPA 50g + 500 g/L **Paragon®**	Picolinafen + MCPA + Bromoxynil 35 g/L + 350 g/L + 210 g/L **Flight® EC**	Pyraflufen-ethyl 20 g/L **Ecopar®** Triticale only	Dicamba 500 g/L **Kamba® 500**	MCPA + Dicamba 340 + 80 g/L **Kamba® M**	Picloram + MCPA 26 + 420 g/L **Tordon™ 242** Triticale only	MCPA LVE 570 g/L **LVE Agritone®**	Fluroxypyr 333 g/L **Starane™ Advanced** Triticale only	Clopyralid 300 g/L + Florasulam 50g/L **Torpedo™** Triticale only	MCPA 375 g/L + Florasulam 7 g/L **Conclude™** Triticale only
Apply at crop growth stage	2L–5L	2 L–Ea Till	3 L–Jo	3 L–Ful Till	3 L–Ea Till	2 L–F Till	5L–Ful Till	3 L–Ful Till	3 L–5 L	3L–Late Till	2L–Mid Till	5L–Ea Till	Ea–Fully Till	Ea Till–Full Till	3–5 L	3 L–Flag leaf	2L–1st node	3 L–Flag
Zadoks code	12–15	12–23	13–35	13–30	13–21	13–29	15–30	13–30	13–15	13–28	12–25	15–22	21–30	22–30	12–29	13–39	12–31	13–39
Weed controlled	(litres)	(grams)	(grams)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)
toad rush	–	–	–	–	0.55–0.85	1.0 (S)	–	–	0.5	0.72	–	–	–	–	–	–	–	–
turnip weed	–	15	5	2.0	0.55–0.85 b	0.5–0.75	1.4–2.0	–	0.25–0.5	0.36–0.72	0.4 f	0.16 c	1.0–1.7	1.0	0.44	–	0.1 e	0.7
variegated thistle	–	–	–	1.4–2.0	–	1.0	1.4–2.0	–	–	–	–	0.28	1.7	1.0	0.44	–	–	–
volunteer fieldpea	–	–	7	–	–	0.75 (S)	–	–	–	–	–	–	–	–	–	–	0.075–0.1	–
wild lettuce	–	–	–	–	–	1.0 (S)	–	–	0.25–0.5	0.36–0.72	0.4 d	–	–	–	–	0.3	–	–
wild oats	0.475–0.635	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
wild turnip	–	15	5	2.0	0.55–0.85 b	0.5–0.75	1.4–2.0	–	0.25–0.5	0.36–0.72	0.4 d	0.16 c	1.0–1.7	1.0	0.44	–	–	0.7
wireweed	–	20	5 or 7	2.0	–	1.0	1.4–2.0	0.75–1.0	–	–	0.4 f	0.16 c	1.0–1.7	1.0 (S)	–	0.9	–	–
Rec water L/ha Boom	50–100	30 min	50 min	50–200	50–100	50 min	50–200	50 min	50 min	50 –150	70 –150	50 min	50 min	50 min	30–120	50 min	50–100	50–100
Herbicide group	A	B	B	C	C	C + F	C + I	C + I	F + I	C + F + I	G	I	I	I	I	I	I + B	I + B

a = No more than 3 leaves of annual ryegrass. Use more than 50 L/ha water.
b = Tankmix with 0.3 L/ha MCPA 500 g/L or 0.3 L/ha 2,4-D amine 500 g/L for control.
c = Tankmix with 0.7 L/ha MCPA amine 500 g/L for control.
d = Add 500 mL/ha MCPA 500 for control (NOT MCPA LVE).
e = See label for tankmix options.
f = Add 500 mL MCPA 500 + 5 g/ha Esteem® WDG.
g = Tankmix 500 mL/ha Jaguar® with 200–400 mL/ha MCPA LVE (500 g/L) for control.
h = Northern NSW only.
i = Sub clover only.
j = See label for controlling RR canola volunteers.
j = See label for tankmix options with Nugrex® for improved control.
(S) = Suppression only.

is a preferred option where NO legumes are to be undersown with the crop. is a option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 12. Herbicides for weed control for cereal rye and triticale – Early post-emergence – Part 2

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Fenoxaprop-p-ethyl 110 g/L **Wildcat®**		Diclofop-methyl + Fenoxaprop-p-ethyl 250 g + 13 g/L **Tristar® Advance**		Diclofop-methyl 500 g/L **Hoegrass® 500** (Rhino® 375) i		Tralkoxydim 400 g/kg **Achieve® WG** (Pentagon®) e		Flamprop-m-methyl 90 g/L **Mataven® 90** (Judgement®) c Triticale only		Metosulam 100 g/L **Eclipse® 100 SC**		Thifensulfuron + Metsulfuron-methyl 682 + 68 g/kg **Harmony® M** Triticale only		Flumetsulam 800 g/kg **Broadstrike™**		Diuron WG ◆ + MCPA 900 g/kg + 500 g/L **Diurex® WG** g + MCPA Amine 500		Pyrasulfotole 37.5 g/L + Bromoxynil 10 g/L **Velocity®**		Pyrasulfotole 50 g/L + MCPA 250 g/L **Precept® 300 EC** b		Dicamba 700 g/kg **Cadence®**		Clopyralid 600 g/L **Lontrel™ Advanced** s Triticale only		Fluroxypyr 140 g/L + Aminopyralid 10 g/L **Hotshot™** Triticale only		MCPA + Diflufenican 250 + 25 g/L **Tigrex®**	
Apply at crop growth stage	**2 L–Mid Till**		**2 L–Ea Till**		**2 L–Early Till**		**2 L–Ea Till**		**3 L–Full Till**		**2 L–1st node**		**3 L–Boot**		**Mid Till–Ea Jo**		**3–5 L Till**		**2 L–Full Till**		**3 L–1st node**		**3 L–Mid Till**		**2 L–Boot**		**3 L–1st node**		**3–5 L to L Till**	
Zadoks code	**12–24**		**12–22**		**13–21**		**12–22**		**13–30**		**12–31**		**13–30**		**23–31**		**13–23**		**12–30**		**13–31**		**13–25**		**12–35/45**		**13–31**		**13–30**	
Weeds controlled	**(litres)**		**(litres)**		**(litres)**		**(grams)**		**(litres)**		**(millilitres)**		**(grams)**		**(grams)**		**(kg + L)**		**(litres)**		**(litres)**		**(grams)**		**(litres)**		**(litres)**		**(litres)**	
amsinckia	–	Add wetting agent e.g. BS1000® at 250 mL/100 L spray.	–	Suppression of annual phalaris may be improved by the addition of 250 mL BS1000®/100 L spray.	–	Add wetting agent e.g. 250 mL BS1000®/100 L water. Diclofop-methyl is also available in a 375 g/L formulation (Rhino®, Hostage®).	–	Add 0.75 or 1 L Supercharge® or Amplify® 100 L spray.	–	Spray wild oats from 3-leaf to end of tillering stage. Spray crop before beginning of jointing. Do not use any wetting agent.	50	Apply with 0.5 L Uptake™ spraying oil or 1 L D-C-Trate® oil/100 L water. Can be tankmixed with 0.35–0.5 L/ha LVE MCPA for improved control. See label.	–	Safe on undersown lucerne, medics, sub-clover, after the 2–3 trifoliate leaf stage. Use Uptake™ spraying oil on wetting agents such as BS1000® with triticale and cereal rye.	25	Use only on moist soils.	0.28 + 0.5	Add Hasten™ (1% v/v). Note recropping intervals on label. For best results apply in warmer temperatures and high light intensity and > 1 hr of daylight left after application.	0.6–1.0	Spray grade liquid ammonium sulfate, Hasten™ (1% v/v), Supercharge® (0.75% v/v) or Uptake™ (0.5% v/v) must be used with Precept®. Note recropping intervals on label. For best results apply in warmer temperature and high light intensity and > 1 hr of daylight left after application.	0.75–1.0	Add wetting agent. Do not apply after mid-tillering stage, as crop damage may occur.	–	Lontrel™ also available as soluble granule 750 g/kg formulation.	–	Add BS1000® (when mixing with mesulfuron-methyl).	–	Can be used on undersown sub-clover and other clovers. See label. Not on lucerne or annual medics. Application should be made from the third to the eighth trifoliate leaf stage.
annual ryegrass	a		1.5		0.75		380–500		–		–		–		–		–		–		–		–		–		–		–	
annual phalaris	0.4–0.5 k		1.5(S)		–		380–500 (S)		–		–		–		–		–		–		–		–		–		–		–	
bedstraw	–		–		–		–		–		50 (S) y		–		–		–		0.67–1.0		0.75–1.0		–		–		–		–	
black bindweed	–		–		–		–		–		–		40		–		–		0.5–1.0		–		200 w		–		0.5–0.75 v		–	
canola – volunteer	–		–		–		–		–		50 o		–		25 o		–		0.5–1.0 A		0.5–1.0 A		–		–		–		0.5 A	
capeweed	–		–		–		–		–		35–50 y		–		25		0.28 + 0.5		0.5–1.0		0.5 u		115 t		0.15		–		0.5–1.0	
charlock	–		–		–		–		–		–		–		25		0.28 + 0.5		–		–		115 t		–		–		0.5–1.0	
chickpea – volunteer	–		–		–		–		–		35–50 y		–		–		–		0.5–1.0 (S)		0.5 u		–		0.125		0.75 v		–	
cleavers	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
clover	–		–		–		–		–		50 (S) xy		–		–		–		–		0.5 x		115 t		0.075 x		–		–	
common barbgrass	–		–		j		–		–		–		–		–		–		–		–		–		–		–		–	
corn gromwell	–		–		–		–		–		–		–		–		0.28 + 0.5		0.5–1.0		0.5–1.0		–		–		–		1.0	
deadnettle	–		–		–		–		–		–		30		–		0.28 + 0.5		0.5–1.0		0.5–1.0		115 p w		–		0.5–0.75 fv		1.0	
dock	–		–		–		–		–		–		–		–		–		–		–		115 t		–		–		1.0 (S)	
faba bean – volunteer	–		–		–		–		–		35–50 y		–		–		–		0.5–1.0		0.5 u		200 w		0.125		0.5–0.75 d		–	
field pea – volunteer	–		–		–		–		–		50 (S) y		–		–		–		0.5 (S) 0.67–1.0		0.5–1.0 u		115 t		0.075		0.5–0.75 d		–	
fumitory	–		–		–		–		–		–		40		25 n		–		0.5–1.0		0.5–1.0		–		–		–		0.75	
lupin – volunteer	–		–		–		–		–		35–50 y		–		25 n		–		0.5–1.0		0.5–1.0		–		0.125		0.5 m		1.0 (S)	
Mexican poppy	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
mintweed	–		–		–		–		–		–		–		–		–		–		–		–		–		–		–	
mustards	–		–		–		–		–		50		45		25		0.28 + 0.5		0.5–1.0		0.5 l		115 t		–		–		0.5–1.0	
New Zealand spinach	–		–		–		–		–		–		40		25 (S)		–		–		–		200 w		–		–		–	
Paterson's curse	–		–		–		–		–		–		–		25 (S) n		–		0.5–1.0		0.5–1.0		–		–		–		1.0 (S)	
peppercress	–		–		–		–		–		–		30–40		25		–		–		–		–		–		–		1.0 (S)	
radish – wild	–		–		–		–		–		50		–		25 (S) n		0.28 + 0.5		0.5–1.0		0.5–1.0		115 t		–		–		0.5–1.0 q	
rough poppy	–		–		–		–		–		–		–		–		–		–		–		115 p w		–		–		1.0 (S)	
saffron thistle	–		–		–		–		–		35–50 y		–		–		–		0.67–1.0		–		–		Tankmix M		–		1.0	
shepherd's purse	–		–		–		–		–		–		–		25		–		0.5–1.0		–		115 p w		–		–		0.5–1.0	
skeleton weed	–		–		–		–		–		–		–		–		–		–		–		–		0.25 h		–		1.0 (S)	
slender thistle	–		–		–		–		–		35–50 y		–		–		–		–		–		–		Tankmix M		–		–	
sorrel	–		–		–		–		–		–		–				–		–		–		–		–		–		–	
soursob	–		–		–		–		–		–		–		–		1.1 w		–		–		–		–		–		–	
sowthistle	–		–		–		–		–		35–50 y		30–40		–		–		0.5–1.0		0.5–1.0		115 p w		–		0.5–0.75 q v or f		1.0 (S)	
spear/black thistle	–		–		–		–		–		35–50 y		–		–		–		–		–		–		–		–		–	
spiny emex	–		–		–		–		–		–		40–45		25 (S)		0.28 + 0.5		0.75–1.0 (S)		0.75–1.0 (S)		115 t		–		0.5–0.75 qv		1.0 (S)	

Continued over page

Table 12. Herbicides for weed control for cereal rye and triticale – Early post-emergence – Part 2 (continued)

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Fenoxaprop-p-ethyl 110 g/L **Wildcat®**	Diclofop-methyl + Fenoxaprop-p-ethyl 250 g + 13 g/L **Tristar® Advance**	Diclofop-methyl 500 g/L **Hoegrass® 500** (Rhino® 375) i	Tralkoxydim 400 g/kg **Achieve® WG** (Pentagon®) e	Flamprop-m-methyl 90 g/L **Mataven® 90** (Judgement®) c Triticale only	Metosulam 100 g/L **Eclipse® 100 SC**	Thifensulfuron + Metsulfuron-methyl 682 + 68 g/kg **Harmony® M** Triticale only	Flumetsulam 800 g/kg **Broadstrike™**	Diuron WG ◆ + MCPA 900 g/kg + 500 g/L **Diurex® WG** g + MCPA Amine 500	Pyrasulfotole 37.5 g/L + Bromoxynil 10 g/L **Velocity®**	Pyrasulfotole 50 g/L + MCPA 250 g/L **Precept® 300 EC** b	Dicamba 700 g/kg **Cadence®**	Clopyralid 600 g/L **Lontrel™ Advanced** s Triticale only	Fluroxypyr 140 g/L + Aminopyralid 10 g/L **Hotshot™** Triticale only	MCPA + Diflufenican 250 + 25 g/L **Tigrex®**
Apply at crop growth stage	**2 L–Mid Till**	**2 L–Ea Till**	**2 L–Early Till**	**2 L–Ea Till**	**3 L–Full Till**	**2 L–1st node**	**3 L–Boot**	**Mid Till–Ea Jo**	**3–5 L Till**	**2 L–Full Till**	**3 L–1st node**	**3 L–Mid Till**	**2 L–Boot**	**3 L–1st node**	**3–5 L to L Till**
Zadoks code	**12–24**	**12–22**	**13–21**	**12–22**	**13–30**	**12–31**	**13–30**	**23–31**	**13–23**	**12–30**	**13–31**	**13–25**	**12–35/45**	**13–31**	**13–30**
Weeds controlled	**(litres)**	**(litres)**	**(litres)**	**(grams)**	**(litres)**	**(millilitres)**	**(grams)**	**(grams)**	**(kg + L)**	**(litres)**	**(litres)**	**(grams)**	**(litres)**	**(litres)**	**(litres)**
toad rush	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.0
turnip weed	–	–	–	–	–	35–50	30	15–25	0.28 + 0.5	0.5–1.0	0.5–1.0	115 t	–	–	0.5–1.0
variegated thistle	–	–	–	–	–	35–50 y	–	–	–	–	–	200 w	Tankmix M	0.5–0.75 q v	1.0 (S)
vetch	–	–	–	–	–	35–50 y	–	–	–	0.5–1.0 (S)	0.5 u	115 t	0.05	0.5–0.75 d	–
wild lettuce	–	–	–	–	–	35–50 y	40	–	–	0.5–1.0	0.5–1.0	115 p w	–	0.75 v	0.5–1.0
wild oats	0.3–0.4 k	1.5	1.1–1.5	300–500	2.5 c	–	–	–	–	–	–	–	–	–	–
wild turnip	–	–	–	–	–	50	–	25	0.28–0.5	0.5–1.0	0.5–1.0	115 t	–	–	0.5–1.0
wireweed	–	–	–	–	–	–	40	–	–	0.5 (S) 0.67–1.0	0.5–1.0	115 t	–	0.5–0.75 f v	0.75 (S)
Rec water L/ha boom	**50–100**	**50–100**	**50–150**	**50–150**	**30–100**	**50–100**	**50 min**	**50–150**	**20–100**	**50–150**	**50–100**	**50 min**	**50 min**	**80 min**	**50 min**
Herbicide group	**A**	**A**	**A**	**A**	**Z**	**B**	**B**	**B**	**C + I**	**H + C**	**H + I**	**I**	**I**	**I**	**I + F**

Note: Monza® (sulfosulfron 750 g/kg) is registered for post-emergent use on triticale for control of amsinckia, field pea – volunteer, wild radish, vulpia, and wild turnip (herbicide group B). Tigrex® and Bromoxynil damage medics.

a = Can be tankmixed with Hoegrass®
b = Also available as Precept® 150. See label for rates.
c = Contains 75 g/L flamprop-M-methyl. Use 3 L/ha rate.
d = 500 mL (southern NSW), 750 mL (northern NSW).
e = Tralkoxydim also available in 600 g/L formulation, see label for rates.
f = Add 5 g metsulfuron-methyl (600 g/kg) and non-ionic wetter at 100 mL/100 L of water.
g = Alternatively Diuron Flowable® 500, 500 g/L.
h = Add 1.0 L/ha MCPA 500 g/L for control.
i = Rhino® contains 375 g/L diclofop – methyl. See label for rates.
j = Rhino® and Hostage® registered for control.
k = Mixtures with broadleaf herbicides may result in reduced grass weed control – see label. Use alone for phalaris control.
l = Indian hedge mustard only.
m = Southern NSW only.
n = See label for tankmix of Broadstrike™ and other herbicides for control.
o = Not Clearfield Canola volunteers.
p = Tankmix 115 g/ha Cadence® with 5 g/ha Ally® for control. Add surfactant such as 100 mL BS1000®/100 L spray.
q = Add 500–700 mL MCPA LVE. See label.
r = Tankmix 115 g/ha Cadence® with 50 mL/ha Eclipse® 100 SC for control. Apply with Uptake™ spraying oil at 0.5 L/100 L water or D-C-Trate® oil at 1 L/100 L water.
s = Clopyralid also available in 750 SG. See label for rates.
t = Tankmix 115 g/ha Cadence® with 0.7 L/ha MCPA amine (500 g/L)/ha for control.
u = Add Lontrel™ 750 SG for control. See label for rates.
v = Northern NSW only.
w = Triticale only.
x = Subclover only.
y = Add partner herbicide for control. See label.
z = *Angustifolius* (narrow-leaf) lupin.
M = Mix 25 mL/ha Lontrel™ Advanced with 1 L/ha MCPA Amine (500 g/L) or 0.7 L/ha LVE MCPA (500 g/L) for control.
A = See label for controlling RR canola volunteers.
(S) = Suppression only.
◆ = See *What's new in 2014* on page 3.

is a preferred option where NO legumes are to be undersown with the crop. is a preferred option where legumes are to be sown with the crop READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 13. Herbicides for weed control for cereal rye and triticale – Late post-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Flumetsulam 800 g/kg **Broadstrike™**	Low Volatile 2,4-D Ester 680 g/L **Estercide® Xtra 680**	2,4-D amine 700 g/L **Amicide® Advance 700**	2,4-D amine 800 g/kg **Baton® Low**	2,4-DB 500 g/L **Buttress®**	MCPA 750 g/L **Thistle-Killem® 750** Triticale only	MCPA LVE 570 g/L **LVE Agritone®**	Picloram + MCPA 26 + 420 g/L **Tordon™ 242** Triticale only	Picloram + 2,4-D + aminopyralid (75 + 300 + 7.5 g/L) **FallowBoss™ Tordon™** Triticale only
Apply at crop growth stage	**Flower to early dough**	**Fully Till–Boot**	**Fully Till–Boot**	**Fully Till–Boot**	**Fully Till–Boot**	**Fully Till–Boot**	**5 L–Boot**	**Ea Till–Full Till**	**Mid Till–Joint**
Zadoks code	**61–83**	**31–37**	**31–37**	**31–37**	**15–33**	**31–37**	**15–37**	**22–30**	**23–31**
Weeds controlled	**(grams)**	**(litres)**	**(litres)**	**(kilograms)**	**(litres)**	**(litres)**	**(litres)**	**(litres)**	**(litres)**
amsinckia	–	–	–	–	–	–	–	–	–
annual ryegrass	–	–	–	–	–	–	–	–	–
black bindweed	–	–	–	–	–	0.46–1.45	–	1.0	0.3
capeweed	–	0.53–0.8	–	–	2.1-3.2	0.46–1.45	0.44–1.4	–	–
canola – volunteer	–	–	0.9-1.25	–	–	–	1.31 a	–	–
charlock	–	0.41	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	–	–
clover	–	0.62–0.8	0.285–1.25	0.25–1.1	–	–	–	–	–
corn gromwell	–	0.8	–	–	–	–	–	–	–
deadnettle	–	0.8	–	–	–	–	–	–	–
fumitory	–	0.8	–	–	2.1-3.2	–	0.44–1.4	–	–
Mexican poppy	–	0.8	–	–	2.1-3.2	–	–	–	–
mintweed	–	0.8	0.285–1.25	0.25–1.1	–	0.46–1.45	–	–	0.3 b
mustards	–	0.41–0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	1.0	0.3 b
New Zealand spinach	–	0.8	0.285–1.25	0.25–1.1	–	–	–	1.0 (S)	0.3
Paterson's curse	–	0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	–	–
Prickly Lettuce	–	–	–	–	2.1-3.2	–	–	–	–
radish – wild	25	0.41–0.8	0.285–1.25	0.25–1.1	–	0.46–1.45	0.44–1.4 d	1.0	0.3 b
rough poppy	–	0.41–0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	–	–	–
saffron thistle	–	0.41–0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	1.0	0.3
Scotch thistle	–	–	–	–	–	–	0.44–1.4	–	–
shepherd's purse	–	0.8	0.285–1.25	0.25–1.1	2.1-3.2	–	–	–	–
skeleton weed	–	0.8	0.285–1.25	0.25–1.1	–	0.46–1.45	0.44–1.4	1.0	–
slender thistle	–	0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	–	–
sorrel	–	–	0.285–1.25	0.25–1.1	–	–	–	–	–
sowthistle	–	–	0.285–1.25	–	2.1-3.2	–	–	1.0	0.3
spear thistle	–	–	–	–	2.1-3.2	0.46–1.45	0.44–1.4	–	–
spiny emex	–	–	–	–	2.1-3.2	–	–	1.0	0.3
turnip weed	25	0.41–0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	1.0	0.3 b
variegated thistle	–	0.41–0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	1.0	0.3 b
wild oats	–	–	–	–	–		–	–	–
wild turnip	–	0.41–0.8	0.285–1.25	0.25–1.1	2.1-3.2	0.46–1.45	0.44–1.4	1.0	–
wireweed	–	0.8	–	–	2.1-3.2	–	–	1.0 (S)	0.3 b
Recom water L/ha boom	**100 min**	**30–100**	**30–120**	**30–120**	**110–220**	**60–220**	**30–120**	**50 min**	**50 min**
Herbicide group/mode	**B**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**

Salvage spray to prevent seed set in wild radish and turnip weed. Spray least-mature weeds from early flowering to early pod set of most mature weeds, and crop from flowering to early dough stage. Add Uptake™ oil or wetter. Can be used on undersown lucerne clovers and annual medics.

Boom only. Good quality water essential.

Undersown sub-clovers may be slightly retarded. Do not apply to undersown medics or lucerne. See label for comments regarding weed size and application rate.

Undersown legumes tolerant to lower rates – see label. Not on medics or lucerne.

Do not plant susceptible crops within 12 months of applying the product.

Do not plant susceptible crops within 12 months of applying the product.

All the above herbicides will damage undersown legumes except 2,4-DB, which has not been fully tested on all lucerne varieties and may cause unacceptable damage. 2,4-DB is safe for use on sub-clover and medics. 2,4-DB is not safe on woolly pod vetch, berseem and red clovers.

is a preferred option where NO legumes are to be undersown with the crop. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

a = See label for controlling RR canola volunteers.
b = Tank mix with 0.375 L/ha 2,4-D amine (625 g/L) for control.
c = See label for tankmix options.
d = See label for tankmix options with Nugrex® for improved control in wild radish.
h = Can be tankmixed with MCPA or 2,4-D amine.
(S) = Suppression only.

Table 14. Herbicides for weed control for canola – Pre-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Pre-emergence								
	Terbuthylazine 750 g/kg Terbyne® Triazine Tolerant (TT) canola only		Simazine and/or Atrazine Gesatop® and/or Gesaprim® Triazine Tolerant (TT) canola only	Trifluralin 480 g/L Triflur® X	Pendimethalin 440 g/L Stomp® 440	Trifluralin + Oryzalin 125g + 125 g/L Duet® 250 EC	Tri-allate 500 g/L Avadex® Xtra	S-Metolachlor 960 g/L Dual® Gold	Metolachlor 960 g/L Clincher® Plus
Incorporation/growth stage application	IBS	PSPE	PSI, IBS PSPE	PSI IBS	PSI IBS	PSI IBS	PSI IBS	IBS PSPE	IBS PSPE
Weeds controlled	(kilograms)		(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)
amsinckia	–	–	–	–	–	–	–	–	–
annual phalaris	–	1.0–1.4 (S)	–	1.2–1.7 or 1.5–3.0 (IBS) d	–	1.6 or 2.3	a	–	–
annual ryegrass	–	1.0–1.4 (S)	(S)	1.2–1.7 or 1.5–3.0 (IBS) d	1.35–2.25	1.6 or 2.3	a c	–	–
barley grass	–	–	(S)	1.5–3.0 (S) (IBS) d	–	–	–	–	–
bedstraw	–	–	–	–	–	–	–	–	–
brome grass	–	–	(S)	1.5–3.0 (S) (IBS) d	–	–	–	–	–
capeweed	–	–	✓	–	–	–	–	–	–
cereals – volunteer	–	–	–	–	–	–	–	–	–
charlock	–	–	✓	–	–	–	–	–	–
common barbgrass	–	–	–	–	–	–	–	–	–
corn gromwell	–	1.0–1.4	✓	1.5–3.0 (IBS) d	–	–	–	–	–
deadnettle	–	1.0–1.4	–	1.5–3.0 (S) (IBS)	–	1.6 or 2.3	–	–	–
fababean – volunteer	–	–	–	–	–	–	–	–	–
field pea – volunteer	–	–	–	–	–	–	–	–	–
fumitory	–	–	✓	1.2–1.7 (S) or 1.5–3.0 (IBS) d	–	1.6 or 2.3 (S)	–	–	–
lupin – volunteer	–	–	–	–	–	–	–	–	–
Mexican poppy	–	–	–	–	–	–	–	–	–
medics – volunteer	–	1.0–1.4	–	–	–	–	–	–	–
mustards	–	–	✓	–	–	–	–	–	–
Paterson's curse	–	–	✓	–	–	–	–	–	–
saffron thistle	–	–	–	–	–	–	–	–	–
scotch thistle	–	–	–	–	–	–	–	–	–
shepherd's purse	–	1.0–1.4	✓	–	–	–	–	–	–
skeleton weed	–	–	–	–	–	–	–	–	–
spiny emex	1.0–1.4 (S)	1.0–1.4 (S)	✓	1.5–3.0 (S) (IBS) d	–	–	–	–	–
sub. clover	–	–	✓	–	–	–	–	–	–
toadrush	–	–	–	–	–	–	–	0.15–0.25	0.225–0.375
turnips – wild	–	1.0–1.4	✓	–	–	–	–	–	–
variegated thistle	–	–	–	–	–	–	–	–	–
vulpia	–	–	✓	1.5–3.0 (S) (IBS) d	1.5–2.25 (S)	1.6 (S)	–	–	–
wild mustard	–	1.0–1.4	–	–	–	–	–	–	–
wild oats	–	1.0–1.4 (S)	(S)	1.2–1.7 (S) or 1.5–3.0 (IBS) d	1.35–2.25 (S)	1.6 or 2.3 (S)	1.6 a	–	–
wild radish	1.0–1.4 (S)	1.0–1.4	(S)	–	–	–	–	–	–
winter grass	–	–	–	–	–	–	–	–	–
wireweed	–	1.0–1.4	–	1.2–1.7 or 1.5–3.0 (IBS) d	1.35–2.25	1.6 or 2.3	c	–	–
Comments	Terbyne® can be used IBS or PSPE. Use the lower rate on light soils and the high rate on heavier soils. Sufficient rain is necessary within 2–3 weeks after application.		Use on triazine-tolerant varieties only. Can be applied pre-emergence or post-sowing pre-emergence. Rates depend on soil type. See label for rates and use pattern.	Light soils 1.2 L/ha, medium soils 1.5 L/ha and heavy soils 1.7 L/ha. Apply and incorporate up to just before sowing. For IBS situations incorporate within 24 hrs of application. For best results in PSI and IBS incorporate as soon as practical after application.	Southern NSW only. Apply up to 24 hrs before sowing. Incorporate well.Canola seed can be placed within the treated band. Use lower rate on lighter soils and higher rate on heavier soils.	Use 1.6 L rate for conventional cultivation and incorporate before sowing or at sowing with full disturbance. Use 2.3 L rate for direct drill and incorporate with full disturbance at sowing. Apply up to 5 days before sowing. Canola should be sown at normal depth of 2–4 cm. See label.	Apply and incorporate immediately prior to sowing or up to 3 weeks before sowing.	Apply at or immediately after planting and before crops and weeds emerge. Apply to moist soil.	Apply at or immediately after planting and before crops and weeds emerge. Apply to moist soil.
Rec water L/ha boom	50 min		50–100	70–450	50–200	50–100	30–100	60 min	60 min
Herbicide group	C		C	D	D	D	J	K	K

a = Add 0.7 L/ha trifluralin for mixed infestations of wild oats and annual ryegrass or wireweed. See label.
c = 1.6–2.0 L/ha Avadex® Xtra + 1.5–2.0 L/ha Triflur® X.

d = Alternatively apply 1.5–2.0 L/ha Triflur® X + 1.6–2.0 L/ha Avadex® Xtra for control using IBS incorporation. When adding Avadex® Xtra incorporate within 6 hrs.
(S) = Suppression.
✓ = Control, refer label for rate.

Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergence.

Table 14. Herbicides for weed control for canola – Early post-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Early post-emergence										
	Propaquizafop 100 g/L **Shogun®**	Clethodim 240 g/L **Status®** a	Butroxydim 250 g/kg **Factor® WG**	Fluazifop-P 128 g/L **Fusilade® Forte**	Haloxyfop-R 520 g/L **Verdict™ 520**	Quizalofop-p-ethyl 200 g/L **Elantra® Xtreme®**	Imazamox 33 g/L + Imazapyr 15 g/L **Intervix®** Clearfield canola only	Atrazine 600 g/L **Gesaprim®** Triazine Tolerant (TT) canola only	Terbuthylazine 750 g/kg **Terbyne®** Triazine Tolerant (TT) canola only	Clopyralid 600 g/L **Lontrel™ Advanced** c	Glyphosate 690 g/kg **Roundup Ready® Herbicide** Roundup Ready® Canola only
Apply at crop growth stage	**Any time until 16 weeks before harvest**	**Before budding**	**Not before 4 Leaf**	**Not after 6 Leaf**	**2 Leaf and prior to bud formation**	**Not before 5 Leaf**	**2–6 Leaf only**		**Early post-emergent**	**2–8 Leaf**	**Cotyledon to 6 leaf (prior to bud formation)**
Weeds controlled	(litres)	(litres)	(grams)	(litres)	(litres)	(litres)	(litres)	(litres)	(kilograms)	(litres)	(kilograms)
amsinckia	–	–	–	–	–	–	–	–	–	–	–
annual phalaris	–	0.15–0.5 m	80 u	0.41	0.05–0.1	–	–	–	0.7–1.4 (S)	–	**0.9 w**
annual ryegrass	0.45	0.15–0.5	80 u	0.41	0.075–0.1	0.15 or 0.19	0.3–0.75 b	✓	0.7–1.4 (S)	–	0.9
barley grass	0.2	0.175–0.5	80 u	0.41	0.05–0.1	0.125	0.3–0.75 b	–	–	–	0.9
bedstraw	–	–	–	–	–	–	0.6–0.75 (S) b	–	–	–	–
brome grass	0.3	0.175–0.5	80 u	0.5	0.05–0.1	0.15 or 0.19	0.3–0.75 b	–	–	–	0.9
capeweed	–	–	–	–	–	–	0.3–0.75 b	–	–	0.15	0.9
cereals – volunteer	0.2 i	0.2–0.5 n	80 u	0.41	0.05–0.1	0.125	–	–	–	–	0.9
charlock	–	–	–	–	–	–	0.6–0.75 b			–	–
chickpea – volunteer	–	–	–	–	–	–	–	–	–	0.125	–
corn gromwell	–	–	–	–	–	–	–	–	–	–	–
deadnettle	–	–	–	–	–	–	–	–	0.7–1.4	–	–
field pea – volunteer	–	–	–	–	–	–	0.3–0.75 b	–	–	0.075	–
fumitory	–	–	–	–	–	–	0.6–0.75 b x	–	–	–	–
lupin – volunteer	–	–	–	–	–	–	0.3–0.75 b	–	–	0.125	–
Mexican poppy	–	–	–	–	–	–	–	–	–	–	–
medics – volunteer	–	–	–	–	–	–	0.3–0.75 b	–	–	0.075	–
mustards	–	–	–	–	–	–	0.3–0.75 b h	✓	–	–	–
Paterson's curse	–	–	–	–	–	–	–	–	–	–	0.9
saffron thistle	–	–	–	–	–	–	–	–	–	0.15	0.9
scotch thistle	–	–	–	–	–	–	–	–	–	–	0.9
shepherd's purse	–	–	–	–	–	–	–	–	–	–	–
skeleton weed	–	–	–	–	–	–	–	–	–	0.15	–
spear thistle	–	–	–	–	–	–	–	–	–	–	0.9
spiny emex	–	–	–	–	–	–	0.6–0.75 (S) b	–	0.7–1.4 (S)	–	–
sub. clover	–	–	–	–	–	–	0.3–0.75 b	–	–	0.075	–
toadrush	–	–	–	–	–	–	–	–	–	–	–
turnips – wild	–	–	–	–	–	–	0.3–0.5	✓	–	–	0.9
variegated thistle	–	–	–	–	–	–	–	–	–	–	0.9
vulpia	–	0.25–0.5 (S)	–	–	–	–	0.6–0.75 (S) b	–	–	–	0.9
wild mustard	–	–	–	–	–	–	–	–	–	–	0.9
wild oats	0.25	0.175–0.5	80 u	0.41	0.0375–0.1 f	0.065 or 0.125	0.3–0.75 b	–	0.7–1.4 (S)	–	0.9
wild radish	–	–	–	–	–	–	0.3–0.575 b	✓	0.7–1.4	–	0.9
winter grass	–	–	–	–	–	–	–	–	–	–	0.9
wireweed	–	–	–	–	–	–	–	–	–	–	–
Rec water L/ha boom	**30–150**	**50 min**	**50–150**	**50–100**	**50–150**	**50–150**	**70 min**	**50–100**	**50 min**	**50 min**	**< 80**
Herbicide group	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**C**	**C**	**I**	**M**

Always add either BS1000® at 200 mL/100 L spray or Hasten™ or Kwickin™ at 500 mL/100 L spray. Correct® can be tankmixed with Sertin® to broaden grass spectrum and improve control. See label. Grass weeds 3-leaf to early tillering.

Add 2 L D-C-Trate® or 1 L Hasten™ or Kwickin™ or 0.5 L Uptake™ oil/100 L spray.

Add Supercharge® at 1 L/100 L or aerial application 1 L/ha. Canola may be sensitive to Factor®. See label.

Add Uptake™ spraying oil at 0.5 L/100 L water. Use a minimum of 250 mL/ha Uptake™. Use wetter only when tank mixing with broadleaf herbicides except Lontrel™ Advanced.

Add non-ionic surfactant at 200 mL/100 L or non-ionic surfactant at 100 mL/100 L + mineral spray oil at 1 L/100 L or Hasten™ at 1 L/100 L. See label.

Add Supercharge® at 0.5 L/100 L spray solution. Tank mixes of Intervix® and Transit® are possible. See label.

Use on triazine-tolerant varieties only. Can be used prior to crop 3-leaf stage and small weeds. Add surfactant. See label for use pattern. **DO NOT** apply this product on raised beds or where furrows have been created in soil for the purposes of holding or channelling water.

Always add Hasten™ at 1% v/v. Do not add any other herbicide or adjuvant.

No additional surfactant required. Sequential application must be at least 14 days apart. See label. No tank mixtures recommended. Be familiar with the Roundup Ready® canola resistance management plan before using.

a = Status® is registered to a higher maximum rate of 500 mL/ha, however under certain scenarios significant crop damage may occur at this maximum rate. See label.
b = See label for tankmix options.
c = Also available as Lontrel™ 750 SG (750 g/kg).
f = Use 0.0375–0.075 L/ha in southern and central NSW and 0.05–0.1 L/ha in northern NSW.
h = Indian hedge mustard only.
i = Volunteer triticale 0.25 L/ha.
m = Use higher rate on *Phalaris paradoxa*.
n = Use higher rate on volunteer barley.
u = Add an effective rate of Fop herbicide for control. See label.
w = Canary grass only.
x = Denseflower fumitory only.
(S) = Suppression.
✓ = Control, refer label for rate.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 15. Herbicides for weed control for safflower

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	pre-sowing						early post-emergence					
	Trifluralin 480 g/L **Triflur® X**		Pendimethalin 330 g/L **Stomp® 330EC f**		Tri-allate 500 g/L **Avadex® Xtra**		Diclofop-methyl 375 g/L **Rhino®**		Propaquizafop 100 g/L **Shogun®**		Metsulfuron-methyl 600 g/kg **Ally® g**	
Incorporation/growth stage application	PSI IBS		PSI IBS		PSI IBS		–		Any time until 20 weeks before harvest		4–6 Leaf	
Weeds controlled	(litres)		(litres)		(litres)		(litres)		(litres)		(grams)	
annual phalaris	1.2–1.7	Apply between 4 weeks and just before sowing and incorporate. See label. Apply 1.2 L/ha on light soils and between 1.5–1.7 L/ha on medium-heavy soils	–	In Northern NSW double incorporate at rate of 2.5–3.0 L/ha. In Southern NSW incorporate by sowing at rate of 2–3 L/ha. See label.	– c	Apply and incorporate immediately prior to sowing or up to 3 weeks before sowing.	–	Add wetting agent.	–	Always add either BS1000® at 200 mL/100 L spray or Hasten™ or Kwikdon™ at 500 mL/100 L water. Can be mixed with Sertin® to broaden and improve grass control. See label.	–	
annual ryegrass	1.2–1.7		2.0–3.0		– c		1.0		0.45		–	
barley grass	–		–		–		–		0.2		–	
brome grass	–		–		–		–		0.3		–	
capeweed	–		–		–		–		–		–	
cereals	–		–		–		–		0.2 e		–	
common barbgrass	–		–		–		1.25		–		–	
deadnettle	–		–		–		–		–		5.0	
field pea – volunteer	–		–		–		–		–		7.0	
fumitory	1.2–1.7 (S)		–		–		–		–		5.0	
Mexican poppy	–		–		–		–		–		–	
medics – volunteer	–		–		–		–		–		5.0	
mustards	–		–		–		–		–		5.0	
saffron thistle	–		–		–		–		–		–	
shepherd's purse	–		–		–		–		–		5.0	
skeleton weed	–		–		–		–		–		7.0 (S)	
subterranean clover	–		–		–		–		–		5.0	
wild oats	1.2–1.7 a		(S)		1.6 dc		1.5–2.0		0.25		–	
wireweed	1.2–1.7		2.0–3.0		c		–		–		5.0–7.0	
Rec water L/ha boom	70–450		50–200		30–100		50–150		30–150		50 L min	
Herbicide group/mode	D		D		J		A		A		B	

a = Tankmix with Avadex® Xtra for improved control.
c = Add 0.7 L/ha trifluralin for mixed infestations of wild oats and annual ryegrass or wireweed. See label.
d = Preferred option for northern NSW only.
e = 0.25 L/ha for volunteer triticale.
f = Pendimethalin also available in 440 g/L. See label for rates.
g = Sironaria, Saffola, Sirothora varieties only.
(S) = Suppression only.

Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergence.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 16. Herbicides for weed control for linseed and linola

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Pre-emergence: Trifluralin 480 g/L Triflur® X Not Linola	Pre-emergence: Tri-allate 500 g/L Avadex® Xtra Not Linola	Early post-emergence: Fluazifop-P 128 g/L Fusilade® Forte Not Linola	Propaquizafop 100 g/L Shogun® Not Linola	Sethoxydim 186 g/L Sertin® Not Linola	Haloxyfop-R 520 g/L Verdict™ 520	Butroxydim 250 g/kg Factor® WG Not Linola	Diclofop-methyl 375 g/L Rhino® Not Linola	Bromoxynil 200 g/L Bromicide® Not Linola	Bromoxynil + MCPA 200 + 200 g/L Bromoxynil MA Not Linola	MCPA 750 g/L Thistle-Killem® 750 Not Linola	Picloram + MCPA 26 + 420 g/L Tordon™ 242
Incorporation/growth stage application	PSI IBS	PSI IBS	Any time until 17 weeks before harvest	Any time until 16 weeks before harvest	Before budding	5 cm to flowering	Not before 4 Leaf	3–6 weeks after sowing	5–15 cm high	5–15 cm high	10–15 cm high and well before budding	8–20 cm high
Weeds controlled	(litres)	(litres)	(litres)	(litres)	(litres)	(litres)	(grams)	(litres)	(litres)	(litres)	(litres)	(litres)
amsinckia	–	–	–	–	–	–	–	–	1.4–2.0	1.4–2.0	–	–
annual phalaris	1.2–1.7	c	0.41	–	0.5–1.0	0.05–0.1	80–180 f	–	–	–	–	–
annual ryegrass	1.2–1.7	c	0.41	0.45	0.5–1.0	0.075–0.1	80–180 f	1.0	–	–	–	–
barley grass	–	–	0.41	0.2	–	0.05–0.1	80–180 f	–	–	–	–	–
black bindweed	–	–	–	–	–	–	–	–	–	1.4–2.0	–	0.67–0.84
brome grass	–	–	0.5	0.3	–	0.05–0.1	80–180 f	–	–	–	–	–
capeweed	–	–	–	–	–	–	–	–	1.4–2.0	1.4–2.0	–	–
cereals	–	–	0.41	0.2 h	1.0 k	0.05–0.1	80–180 f	–	–	–	–	–
charlock	–	–	–	–	–	–	–	–	–	1.4–2.0	0.5–1.0	–
corn gromwell	–	–	–	–	–	–	–	–	1.4–2.0	1.4–2.0	–	–
fumitory	1.2–1.7 (S)	–	–	–	–	–	–	–	2.0	1.4–2.0	–	–
Mexican poppy	–	–	–	–	–	–	–	–	2.0	1.4–2.0	–	–
mustards	–	–	–	–	–	–	–	–	2.0	1.4–2.0	1.0	0.67–0.84
New Zealand spinach	–	–	–	–	–	–	–	–	–	–	–	0.67–0.84 (S)
Paterson's curse	–	–	–	–	–	–	–	–	2.0	1.4–2.0	1.0	–
radish – wild	–	–	–	–	–	–	–	–	2.0	1.4–2.0	0.7–1.0	0.67–0.84
rough poppy	–	–	–	–	–	–	–	–	–	1.4–2.0	0.7–1.0	–
saffron thistle	–	–	–	–	–	–	–	–	1.4–2.0	1.4–2.0	1.1	0.67–0.84
shepherd's purse	–	–	–	–	–	–	–	–	–	1.4–2.0	1.4–2.0	–
skeleton weed	–	–	–	–	–	–	–	–	–	–	–	0.67–0.84
slender thistle	–	–	–	–	–	–	–	–	–	1.4–2.0	1.1	–
spiny emex	–	–	–	–	–	–	–	–	2.0	1.4–2.0	–	0.67–0.84
turnip weed	–	–	–	–	–	–	–	–	2.0	1.4–2.0	1.0	–
variegated thistle	–	–	–	–	–	–	–	–	1.4–2.0	1.4–2.0	1.1	0.67–0.84
wild oats	1.2–1.7 a	1.6 d	0.41	0.25	0.75–1.0	0.0375–0.1 j	80–180 f	1.5–2.0	–	–	–	–
wild turnip	–	–	–	–	–	–	–	–	2.0	1.4–2.0	0.7–1.0	0.67–0.84
wireweed	1.2–1.7	c	–	–	–	–	–	–	2.0	1.4–2.0	–	0.67–0.84 (S)
Comments	Light soils 1.2 L/ha. Medium soils 1.5 L/ha. Heavy soils 1.7 L/ha. Sow 1.3–2.5 cm. Can sow in band. Deeper sowing may result in stand reduction. Apply and incorporate 2–4 weeks before sowing. See label.	Apply and incorporate 1–3 weeks before sowing. See label. Can be tankmixed with trifluralin for control of mixed infestations of wild phalaris, ryegrass and wireweed.		Always add either BS1000® at 200 mL/100 L spray, or Hasten™ or Kwickin™ at 0.5 L/100 L spray. Can be tankmixed with Sertin® to broaden grass weed spectrum and improve control. See label.	Add 1 L/ha DC Tron™ or Uvapron® crop oil.	Add Uptake™ spraying oil at 0.5 L/100 L water. Use a minimum 250 mL/ha Uptake™ or 1 L other oils + wetter per 100 L spray.	Ad Supercharge® at 1 L/100 L, or aerial application 1 L/ha. Canola may be sensitive to Factor®. See label.	Can be used on undersown legumes. Add wetting agent. Do not spray over 25°C.	Can be used on undersown legumes except medics. Apply when weeds are less than six leaves, crop 5–15 cm high. Some damage possible. Boom only. Avoid application when temperature > 20°C or if likely to be within a few days.	Slight crop damage – leaf burning can occur. Spray when 5–15 cm high. Boom only.	Apply 170 L water/ha min. Maximum rate in NSW 730 mL/ha.	Not if legumes to follow crop – one year.
Rec water L/ha boom	70–450	30–100	50–100	50–150	40–40	40–400	50–150	50–150	50–200	220	min 170	50 min
Herbicide group	D	J	A	A	A	A	A	A	C	C + I	I	I

a = Refer to label for details.
c = Add 0.7 L/ha trifluralin for mixed infestations of wild oats, annual ryegrass or wireweed, see label.
d = Preferred option for northern NSW only.
f = Add an effective Fop herbicide for control. See label.

h = 0.25 L/ha for volunteer triticale.
j = Use 0.0375–0.1 L/ha in southern and central NSW and 0.05–0.1 L./ha in northern NSW.
k = Volunteer oats and wheat only.
m = Volunteer wheat, barley, oats and triticale.
(S) = Suppression only.

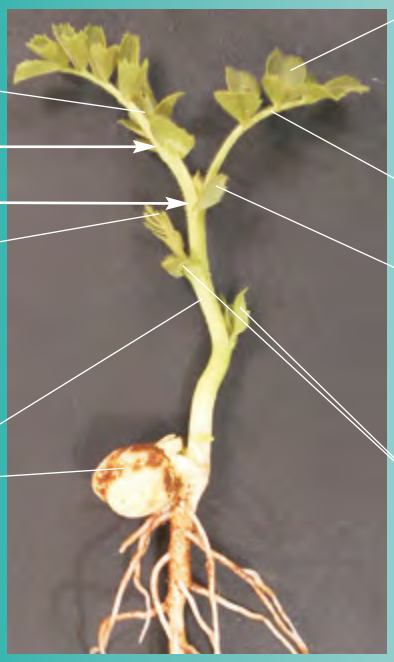
Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergence.

[blue] is a preferred option where NO legumes are to be undersown with the crop. [yellow] is a preferred option where legumes are to be sown with the crop. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Pulse crop growth stages

All pulse species have the same basic structure based on a main stem which can be divided into basic units known as nodes. Two scale leaves appear first and the nodes where they occur are not counted as true nodes. A node is made up of a petiole which has stipules where it joins the stem, and leaflets along its length. In some species it terminates in a simple or more complex tendril.

Chickpea (*Cicer arietinum*)



Growing point

2nd Node

1st Node

Branch
- originate in leaf axil or node

Stem

Cotyledons
- remain underground (hypogeal emergence)

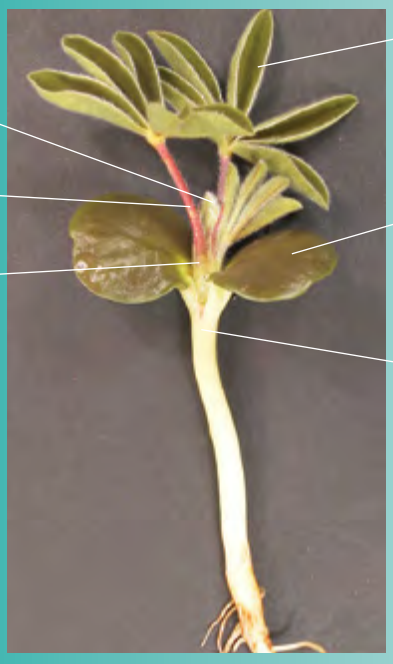
Leaflet
- many pairs of leaflets
- more in older leaves towards the top of plant
- shape varies with variety

Petiole
- small stem that holds the leaflets

Stipule
- in pairs
- each side of the leaf axis where it joins the stem
- smaller than leaflets
- size varies slightly with variety

Scale leaves
- two found at base of plant close to ground level
- not counted as true nodes

Lupin – albus (*Lupinus albus*), pictured, and narrow-leafed (*L. angustifolius*)



Growing point

Petiole
- small stem that holds the leaflets

Stipule
- in pairs
- each side of the leaf axis where it joins the stem

1st Node
- where 1st petiole joins stem
- equivalent to 1st fully open leaf

2nd Node
- where 2nd petiole joins stem
- equivalent to 2nd fully open leaf

Leaflet
- in a whorl on the end of the petiole
- more in older leaves towards the top of plant

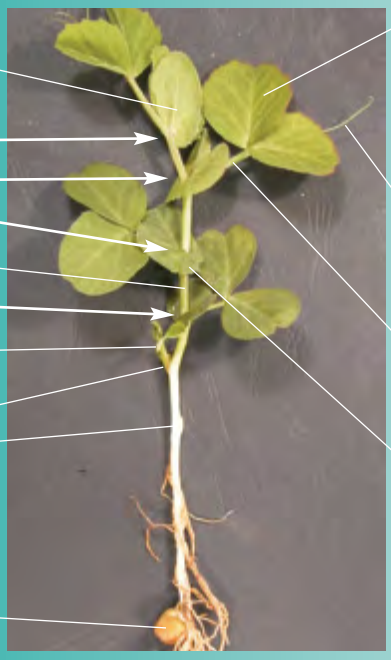
Cotyledons
- are pushed above the ground (epigeal emergence)

Stem

Branch
- originate in leaf axil or node (visible later in growth when stem elongates)

Field pea – conventional leaf type (*Pisum sativum*)

e.g. Dundale, Parafield, Alma.



Growing point
- inside stipules

4th Node

3rd Node

2nd Node

Stem

1st Node

Branch
- originate in leaf axil or node

Scale leaves
- two found at base of plant close to ground level
- not counted as true nodes

Cotyledons
- remain underground (hypogeal emergence)

Leaflet
- 1 to many pairs of leaflets depending on variety
- more in older leaves towards the top of plant
- size and shape varies with variety

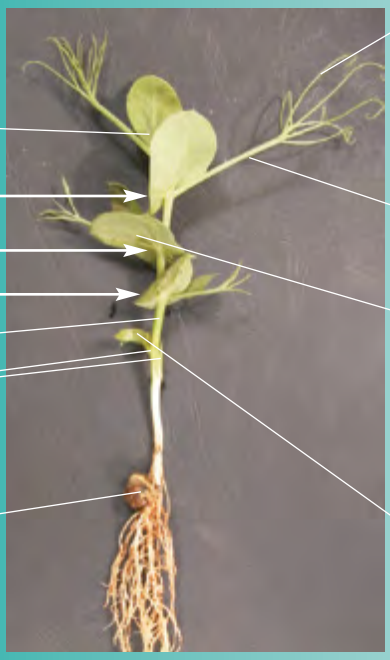
Tendrils
- simple in young leaves, more complex in older leaves towards the top of plant

Petiole
- small stem that holds the leaflets, terminating with a tendril

Stipule
- in pairs
- each side of the leaf axis where it joins the stem
- size varies with variety

Field pea – semi-leafless type (*Pisum sativum*)

e.g. Kaspa, Excell, Snowpeak, Mukta, Morgan.



Growing point
- inside stipules

3rd Node

2nd Node

1st Node

Stem

Scale leaves
- two found at base of plant close to ground level
- not counted as true nodes

Cotyledons
- remains underground (hypogeal emergence)

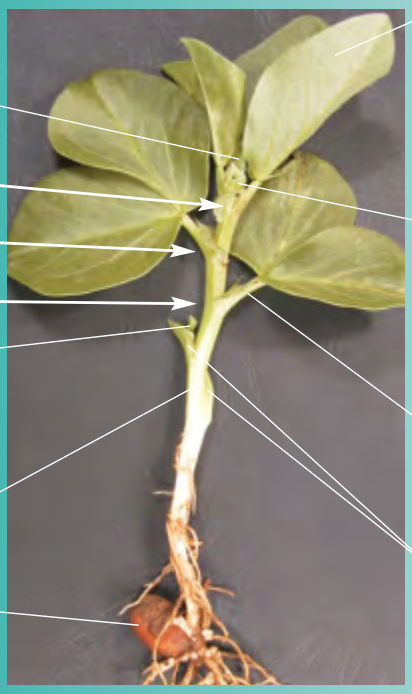
Tendrils
- well developed in semi-leafless field peas
- simple in young leaves, more complex in older leaves towards the top of plant

Petiole
- small stem that terminates with a well developed tendril

Stipule
- in pairs
- each side of the leaf axis where it joins the stem
- size much larger than in conventional leaf types

Branch
- originate in leaf axil or node

Faba bean (*Vicia faba*)



Growing point
- new leaves and flowers

3rd Node

2nd Node

1st Node

Branch
- originate in leaf axil or node

Stem

Cotyledons
- remains underground (hypogeal emergence)

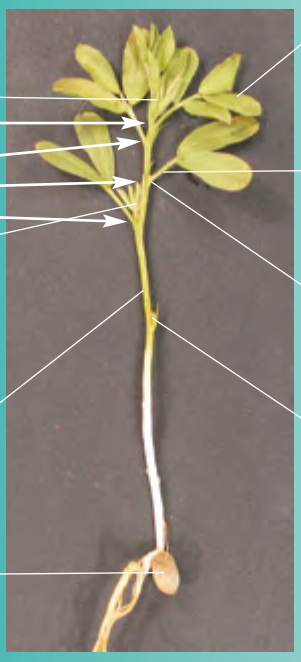
Leaflet
- 1 to 4 pairs of leaflets depending on variety
- more and larger in older leaves towards the top of plant
- size varies with variety

Stipule
- in pairs
- each side of the leaf axis where it joins the stem
- size varies with variety
- some varieties have dark spot

Petiole
- small stem that holds the leaflets, terminating with undeveloped tendril-like wisps

Scale leaves
- two found at base of plant close to ground level
- not counted as true nodes

Lentil (*Lens culinaris*)



Growing point
- new leaves and flowers

4th Node

3rd Node

2nd Node

1st Node

Branch
- originate in leaf axil or node

Stem

Cotyledons
- remains underground (hypogeal emergence)

Leaflet
- 1 to many pairs of leaflets
- more in older leaves towards the top of plant

Petiole
- small stem that holds the leaflets, terminating with undeveloped tendril-like wisps

Stipule
- in pairs
- each side of the leaf axis where it joins the stem

Scale leaves
- two found at base of plant close to ground level
- not counted as true nodes

The Pulse Crop Growth Stages diagrams are reproduced with the permission of Di Holding and Annabel Bowcher, formerly CRC for Australian Weed Management.

Do it once.
Do it well.

BALANCE®

Balance® activates again and again to effectively control a wide range of broadleaf weeds in chickpeas.

- UV stable and can be applied to hot and dry soils.
- Reactivated by rain or irrigation to provide long residual control.
- Excellent residual control of problem weeds such as wild radish, Indian hedge mustard, sowthistle, prickly lettuce and turnip weed.
- Can be applied with simazine for improved grass weed control.

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Bayer CropScience

Table 17. Herbicides for weed control for chickpea

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Dimethenamid-P 720 g/L **Outlook®**		Terbuthylazine 750 g/kg **Terbyne®**		Metribuzin 480 g/L **Sencor® 480** e		Prometryn 900 g/kg **Prometryn 900 DF**		Cyanazine 900 g/kg **Bladex®**		Simazine 500 g /L **Simazine 500** n		Diuron 500 g/L ◆ **Diuron 500** f		Trifluralin 480 g/L **Triflur® X**		Pendimethalin 330 g/L **Stomp® 330 EC** g		Isoxaflutole 750 g/kg **Balance® 750 WG**		Tri-allate 500 g/L **Avadex® Xtra**	
Incorporation/growth stage application	**IBS Knifepoint and Presswheel only**		**IBS**	**PSPE**	**PSPE**		**PSPE**		**PSI, IBS** **PSPE**		**PSI, IBS** **PSPE**		**IBS**	**PSPE**	**PSI** **IBS**		**PSI** **IBS**		**PSPE**		**PSI** **IBS**	
Weeds controlled	**(litres)**		**(kilograms)**		**(litres)**		**(kilograms)**		**(kilograms)**		**(litres)**		**(litres)**	**(litres)**	**(litres)**		**(litres)**		**(grams)**		**(litres)**	
amsinckia	–	Outlook® has demonstrated annual ryegrass control in low weed populations only (<100 plant/m²). Use in higher weed populations will only yield suppression. Apply as late as possible before sowing and sow with a knifepoint and presswheel seeder before weeds germinate. Do not use with disc openers/planting equipment. See label.	–	–	0.28–0.58	Terbyne® can be used IBS or PSPE. Use the lower rate on light soils and the high rate on heavier rate on heavier soils. Sufficient rain is necessary within 2–3 weeks after application.	–	Only spray post-sowing pre-emergence. Chickpea southern NSW only. Chickpea sown at least 5 cm deep. Rate depends on soil type – lower rate on light soils, higher rate on heavy soils.	–	Use higher rate on heavier soils. Where ryegrass or wireweed are a problem add Stomp® 330 EC or trifluralin for control.	–	Apply immediately post-sowing. 20–30 mm rainfall is required within 2–3 weeks for incorporation. Lower rates on alkaline soils, higher rates on red soils. Can be tankmixed with trifluralin (pre-sow), Balance® or prometryn (Gesagard®) to broaden weed control. Simazine also available as 600 g/L formulation in Gesatop® 600 applied at slightly lower rates – see label.	–	–	–	Light soils 1.2–1.5 L/ha. Medium-heavy soils 1.5–1.7 L/ha. Can sow in band. Apply and incorporate from 4 weeks up to just before sowing.	–	In Northern NSW incorporate twice at rate of 2.5–3 L/ha. In Southern NSW incorporate by sowing process (IBS) at rate of 2–3 L/ha. See label.	–	Apply immediately post-sowing. Not on sandy soils with less than 10% clay. Use only where following crops in rotation are cereals or maize. Can be tankmixed with simazine to broaden weed control.	–	Apply and incorporate immediately prior to sowing or up to 3 weeks before sowing. See Label. Can be tankmixed with trifluralin.
annual phalaris	–		–	0.7–1.0 (S)	–		–		–		–		–	–	1.2–1.7 h		–		–		a	
annual ryegrass	0.75–1.0		–	0.7–1.0 (S)	–		–		1.7 or 2.2		1.0–2.0 t		–	–	1.2–1.7 h		2.0–3.0		–		a	
barley grass	–		–	–	–		–		(S)		1.0–2.0 t		–	–	–		–		–		–	
brome grass	–		–	–	–		–		(S) k		1–2 t (S)		–	–	–		–		–		–	
capeweed	–		–	–	0.28–0.58		–		1.7 or 2.2		1.0–2.0 t		1.5–2.0	1.0–1.5	–		–		100		–	
cereals	–		–	–	–		–		–		–		–	–	–		–		–		–	
cockspur – Maltese	–		–	–	–		–		–		1.5–2.0		–	–	–		–		–		–	
corn gromwell	–		–	0.7–1.0	–		–		–		1.0–2.0 t		–	–	–		–		–		–	
crassula	–		–	–	–		–		1.7 or 2.2		–		1.5–2.0	1.0–1.5	–		–		100		–	
deadnettle	–		–	0.7–1.0	0.28–0.58		0.83 j		1.7 or 2.2		–		–	–	–		–		100 w		–	
fumitory	–		–	–	–		–		(S)		1.0–2.0 t		–	–	1.2–1.7 h (S)		–		–		–	
goosefoot – purple	–		–	–	–		0.83 j		–		1.5 –2.0		–	–	–		–		–		–	
lettuce – wild	–		–	0.7–1.0	–		0.83 j		1.7 or 2.2		1.5–2.0 (S)		–	–	–		–		100		–	
medic	–		–	0.7–1.0	–		–		–		–		–	–	–		–		100		–	
mustards	–		–	0.7–1.0	0.28–0.58		0.83 j		1.7 or 2.2		1.5–2.0 t		–	–	–		–		100		–	
Paterson's curse	–		–	–	–		–		–		–		–	–	–		–		–		–	
radish – wild	–		1.0–1.4 (S)	0.7–1.0 (S)	0.28–0.58		–		–		–		1.5–2.0	1.0–1.5	–		–		100		–	
rough poppy	–		–	–	0.28–0.58		–		1.7 or 2.2		1.5–2.0		–	–	–				–		–	
saffron thistle	–		–	–	–		–		–		–		–	–	–		–		100 w (S)		–	
shepherds purse	–		–	0.7–1.0	0.28–0.58		0.83 j		–		1.5– 2.0 S)		–	–	–		–		–		–	
sowthistle	–		–	0.7–1.0	0.28–0.58		–		1.7 or 2.2		1.5–2.0		–	–	–		–		100		–	
spear thistle	–		–	–	–		–		–		–		–	–	–		–		100 w		–	
spiny emex	–		1.0–1.4 (S)	0.7–1.0 (S)	0.28–0.58		–		1.7 or 2.2		–		1.5–2.0	1.0–1.5	–		–		100 w (S)		–	
toad rush	–		–	0.7–1.0	0.28–0.58		–		–		–		1.5–2.0	1.0–1.5	–		–		–		–	
turnip weed	–		–	0.7–1.0	–		0.83 j		1.7 or 2.2		1.5–2.0		–	–	–		–		100		–	
vulpia	–		–	–	–		–		–		–		–	–	–		(S)		100 w		–	
wild oats	–		–	0.7–1.0 (S)	–		–		–		1–2 t (S)		–	–	1.2–1.7 b h		(S)		–		1.6 c	
wild turnip	–		–	0.7–1.0	0.28–0.58		–		1.7 or 2.2		1.0–2.0 t		1.5–2.0	1.0–1.5	–		–		–		–	
winter grass	–		–	–	0.28–0.58		–		–		–		–	–	1.2–1.7 h		–		–		–	
wireweed	–		–	0.7–1.0	–		0.83 j		(S)		1.0–2.0 t		–	–	1.2–1.7 h		2.0–3.0		100 w (S)		a	
Rec water L/ha boom	**70–120**		**50 min**	**50 min**	**50–100**		**50–100**		**80–200**		**50–100**		**50–100**	**50–100**	**70–450**		**50–200**		**50 min**		**30–100**	
Herbicide group/mode	**K**		**C**	**C**	**C**		**C**		**C**		**C**		**C**	**C**	**D**		**D**		**H**		**J**	

a = Add 0.7 L/ha trifluralin for mixed infestations of wild oats.
b = Refer to label.
c = Preferred option northern NSW only.
e = Metribuzin also available as 750 g/kg formulation, see label for rates.
f = Diuron 900 DF is also registered. See label for rates.
g = Pendimethalin also available in 440 g/L. See label for rates.
h = Use low rate when applying immediately prior to sowing, and higher rate when applying to dry soil before the planting rain.
j = Tank mix with 830 g/ha simazine 900 DF for control.
k = Great brome only.
n = Both simazine and prometryn are available in other formulations (WG and DF).
t = Tankmix with 0.8 L/ha 480 g/L trifluralin for control and apply and incorporate presowing.
w = Tankmix with 1.5 L simazine (500 g/L) per ha.
(S) = Suppression only.
◆ = See *What's new in 2014* on page 3.

Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergent.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 17. Herbicides for weed control for chickpea (continued)

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Early post-emergence						
	Fluazifop-P 128 g/L **Fusilade® Forte**	Haloxyfop-R 520 g/L **Verdict™ 520**	Butroxydim 250 g/kg **Factor® WG**	Quizalofop- p-ethyl 200 g/L **Elantra® Xtreme®**	Clethodim 240 g/L **Status®**	Propaquizafop 100 g/L **Shogun®**	Flumetsulam 800 g/kg **Broadstrike™**
Apply at crop growth stage	7 weeks before harvest	2 Leaf to flowering	–	Not before 5 Leaf and up until 12 weeks before harvest	Not beyond full flower	Any time until 12 weeks before harvest	4–6 Leaf
Weeds controlled	(litres)	(litres)	(grams)	(litres)	(litres)	(litres)	(grams)
amsinckia	–	–	–	–	–	–	25
annual phalaris	0.41	0.05–0.1	80–180	–	0.15–0.5 r	–	–
annual ryegrass	0.41	0.075–0.1	80–180	0.15 or 0.19	0.15–0.5	0.45	–
barley grass	0.41	0.05–0.1	80–180	0.125	0.175–0.5	0.2	–
brome grass	0.5	0.05–0.1	80–180	0.15 or 0.19	0.175–0.5	0.3	–
capeweed	–	–	–	–	–	–	–
cereals	0.41	0.05–0.1	80–180	0.125	0.2–0.5 j	0.2 m	–
cockspur – Maltese	–	–	–	–	–	–	–
corn gromwell	–	–	–	–	–	–	–
deadnettle	–	–	–	–	–	–	–
fumitory	–	–	–	–	–	–	–
goosefoot – purple	–	–	–	–	–	–	–
lettuce – wild	–	–	–	–	–	–	–
medic	–	–	–	–	–	–	–
mustards	–	–	–	–	–	–	25
Paterson's curse	–	–	–	–	–	–	–
radish – wild	–	–	–	–	–	–	25 (S)
rough poppy	–	–	–	–	–	–	–
saffron thistle	–	–	–	–	–	–	–
shepherds purse	–	–	–	–	–	–	25
sowthistle	–	–	–	–	–	–	–
spear thistle	–	–	–	–	–	–	–
spiny emex	–	–	–	–	–	–	–
toad rush	–	–	–	–	–	–	–
turnip weed	–	–	–	–	–	–	25
vulpia	–	–	–	–	0.25–0.5 (S)	–	–
wild oats	0.41	0.0375–0.1 f	80–180	0.065 or 0.125	0.175–0.5	0.25	–
wild turnip	–	–	–	–	–	–	25
winter grass	–	–	–	–	–	–	–
wireweed	–	–	–	–	–	–	–
Rec water L/ha boom	50–100	50–150	50 min	50–150	50 min	30–150	50–150
Herbicide group/mode	A	A	A	A	A	A	B

Add Uptake™ spraying oil at 0.5 L/100 L water. Use a minimum of 250 mL/ha Uptake™ or 1 L other oils + wetter per 100 L water.

Factor® has good activity on barley grass and wild oats but weaker on brome grass and volunteer cereals. Adding a Fop herbicide is recommended. See label.

Add non-ionic surfactant at 200 mL/100 L or non-ionic surfactant at 100 mL/100 L + mineral spray oil at 1 L/100 L or Hasten™ at 1 L/100 L. See label.

Add 2 L D-C-Tate® or 1 L Hasten™ or Kwickin™ or 0.5 L Uptake™ oil/100 L spray. Use lower rates on small actively growing weeds.

Always add BS1000® at 200 mL/100 L spray or Hasten™ or Kwickin™ at 500 mL/100 L spray. Can be tankmixed with Sertin® to broaden and improve grass control. See label.

DO NOT use any spray additives or tankmix any other chemicals. May cause transient crop yellowing, reddening and height suppression. Flowering may be delayed resulting in yield suppression. Crop stage 4–6 branches. See label.

d = Volunteer oats and wheat only.
f = Use 0.0375–0.1 L/ha in southern and central NSW and 0.05–0.1 L/ha in northern NSW.
j = Use higher rate on volunteer barley.
m = Volunteer triticale 0.25 L/ha.
r = Use higher rate on *Phalaris paradoxa*
(S) = Suppression only.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 18. Herbicides for weed control for field pea – Pre-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Pre-sowing								Post-sowing–pre-emergence					
	Dimethenamid-P 720 g/L **Outlook®**	Terbuthylazine 750 g/kg **Terbyne®**		Cyanazine 900 g/kg **Bladex®**	Trifluralin 480 g/L **Triflur® X**	Pendimethalin 330 g/L **Stomp® 330 EC** g	Triallate 500 g/L **Avadex® Xtra**	Imazethapyr 700 g/kg **Spinnaker® 700 WDG**	Metribuzin 480 g/L **Sencor® 480 SC**	Metribuzin 750 g/kg **Sencor® 750 WG**	Cyanazine 900 g/kg **Bladex®**	Diuron 500 g/L ◆ **Diuron 500** e	
Incorporation	IBS Knifepoint and Presswheel only	IBS	PSPE	PSI, IBS	PSI, IBS	PSI, IBS	PSI, IBS	PSPE	PSPE	PSPE	PSPE	IBS	PSPE
Weeds controlled	(litres)	(kilograms)		(kilograms)	(litres)	(litres)	(litres)	(grams)	(litres)	(kilograms)	(kilograms)	(litres)	(litres)
amsinckia	–	–	–	–	–	–	–	70–100	0.28–0.58	0.18–0.38	–	–	–
annual phalaris	–	–	0.7–1.0 (S)	–	1.2–1.7 b	–	a	–	–		–	–	–
annual ryegrass	0.75–1.0	–	0.7–1.0 (S)	1.7 or 2.2 k	1.2–1.7 b	1.2–3.0	a	70 f	0.28–0.58 (S)		1.1 or 1.7	–	–
barley grass	–	–	–	(S)	–	–	–	70 f	–		(S)	–	–
capeweed	–	–	–	1.7 or 2.2	–	–	–	70–100	0.28–0.58	0.18–0.38	1.1 or 1.7	1.5–2.0	1.0–1.5
charlock	–	–	–	–	–	–	–	–	0.28–0.58	0.18–0.38	–	–	–
chickweed	–	–	–	1.7 or 2.2	–	–	–	70–100	0.28–0.58	0.18–0.38	1.1 or 1.7	–	–
corn gromwell	–	–	0.7–1.0	–	–	–	–	–	0.28–0.58	0.18–0.38	–	–	–
cotula – common	–	–	–	–	–	–	–	–	0.28–0.58	0.18–0.38	–	–	–
crassula	–	–	–	1.7 or 2.2	–	–	–	–	–	–	1.1 or 1.7	1.5–2.0	1.0–1.5
deadnettle	–	–	0.7–1.0	1.7 or 2.2	–	–	–	70	0.28–0.58	0.18–0.38	1.1 or 1.7	–	–
fumitory	–	–	–	(S)	1.2–1.7 b	–	–	–	0.28–0.58	0.18–0.38	(S)	–	–
mustards	–	–	0.7–1.0	1.7 or 2.2	–	–	–	70 m	0.28–0.58	0.18–0.38	1.1 or 1.7	–	–
Paterson's curse	–	–	–	–	–	–	–	70	–		–	–	–
prickly lettuce	–	–	0.7–1.0	1.7 or 2.2	–	–	–	70–100	–		1.1 or 1.7	–	–
radish – wild	–	1.0–1.4 (S)	0.7–1.0 (S)	(S)	–	–	–	70 h (S)	0.28–0.58	0.18–0.38	(S)	1.5–2.0	1.0–1.5
rough poppy	–	–	–	1.7 or 2.2	–	–	–	–	0.28–0.58	0.18–0.38	1.1 or 1.7	–	–
shepherd's purse	–	–	0.7–1.0	–	–	–	–	70	0.28–0.58	0.18–0.38	–	–	–
sowthistle	–	–	0.7–1.0	1.7 or 2.2	–	–	–	–	0.28–0.58	0.18–0.38	1.1 or 1.7	–	–
spiny emex	–	1.0–1.4 (S)	0.7–1.0 (S)	1.7 or 2.2	–	–	–	70	0.28–0.58	0.18–0.38	1.1 or 1.7	1.5–2.0	1.0–1.5
stinging nettle	–	–	–	1.7 or 2.2	–	–	–	70	–		1.1 or 1.7	–	–
toad rush	–	–	0.7–1.0	–	–	–	–	70	0.28–0.58	0.18–0.38	–	1.5–2.0	1.0–1.5
turnip weed	–	–	0.7–1.0	1.7 or 2.2	–	–	–	70	–		1.1 or 1.7	–	–
vulpia	–	–	–	–	–	2–3 (S)	–	–	–		–	–	–
wild oats	–	–	0.7–1.0 (S)	–	1.2–1.7 c b	(S)	1.6 d	70 f (S)	–		–	–	–
wild turnip	–	–	0.7–1.0	1.7 or 2.2	–	–	–	–	0.28–0.58	0.18–0.38	1.1 or 1.7	1.5–2.0	1.0–1.5
winter grass	–	–	–	–	1.2–1.7 b	–	–	–	0.28–0.58	0.18–0.38	–	–	–
wireweed	–	–	0.7–1.0	(S) k	1.2–1.7 b	1.2–3.0	a	70	0.28–0.58	0.18–0.38	(S)	–	–
Rec water L/ha Boom	70–120	50 min		80–200	70–450	50–200	30–100	50–100	50–100	50–100	80–200	–	–
Herbicide group	K	C		C	D	D	J	B	C	C	C	C	C

Outlook® has demonstrated annual ryegrass control in low weed populations only (<100 plant/m²). Use in higher weed populations will only yield suppression. Apply as late as possible before sowing and sow with a knifepoint and presswheel seeder before weeds germinate. Do not use with disc openers/planting equipment. See label.

Terbyne® can be used IBS or PSPE. Use the lower rate on light soils and the high rate on heavier soils. Sufficient rain is necessary within 2–3 weeks after application.

Use higher rate on heavier soil types. Pre-sowing application: apply between 14 days before and up to sowing.

Spray and incorporate 0–4 weeks before sowing. See label. Apply 1.2 L/ha on light soils and 1.5–1.7 L/ha on medium to heavy soils.

Sow seed under chemical band. See label. Lower rates where fully incorporated and/or northern NSW.

Apply and incorporate immediately prior to or up to 3 weeks before sowing. See label. Can be tankmixed with trifluralin for control of mixed infestations of ryegrass, wild phalaris and wireweed.

Apply immediately post-sowing. Note recropping intervals Table 2. Refer label.

Do not tank mix with other herbicides for field pea. Check label for suitable rate. Rate depends on soil type. Best results with moist soil surface. Use higher rate on heavier soil types. See label.

Do not tank mix with other herbicides for field pea. Check label for suitable rate. Best results with moist soil surface. Use higher rate on heavier soil types. See label.

Use higher rate on heavier soil types. Post-sowing pre-emergence application: apply 1.1 or 1.7 kg/ha from immediately after until 1 week after sowing.

a = Add 0.7 L/ha trifluralin for mixed infestations of wild oats, annual ryegrass or wireweed – see label.
c = Refer to label for details.
d = Preferred option for northern NSW only.
e = Diuron 900 DF is also registered. See label for rates.
f = Eight weeks suppression of grass weeds. For full control of grass weeds a follow up spray with a grass herbicide may be required.
g = Pendimethalin also available as a 440 g/L formulation. See label.
h = A follow up treatment with another product may be needed for control of wild radish under high weed pressure or rainfall conditions.
k = Add trifluralin or Stomp® 330 EC.
m = Indian hedge mustard.
(S) = Suppression only.
◆ = See *What's new in 2014* on page 3.

Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergence.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 19. Herbicides for weed control for field pea – Early post-emergence – Part 1

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Quizalofop-p-ethyl 200 g/L **Elantra® Xtreme®**	Clethodim 240 g/L **Status®**	Propaquizafop 100 g/L **Shogun®**	Haloxyfop-R 520 g/L **Verdict™ 520**	Butroxydim 250 g/kg **Factor® WG**	Fluazifop-p 128 g/L **Fusilade® Forte**	Imazethapyr 700 g/kg **Spinnaker®700 WDG**	Imazamox 700 g/kg **Raptor®**
Apply at crop growth stage	**Up until 9 weeks before harvest**	**Not beyond full flowering**	**Any time until 12 weeks before harvest**	**2 node to before flowering**	**–**	**Any time, until 7 weeks before harvest**	**–**	**Not after 4th node**
Weeds controlled	**(litres)**	**(litres)**	**(litres)**	**(litres)**	**(grams)**	**(litres)**	**(grams)**	**(grams)**
amsinckia	–	–	–	–	–	–	–	–
annual phalaris	–	0.15–0.5 k	–	0.05–0.1	80–180	0.41	–	–
annual ryegrass	0.15 or 0.19	0.15–0.5	0.45	0.075–0.1	80–180	0.41	–	–
barley grass	0.125	0.175–0.5	0.2	0.05–0.1	80–180	0.41	–	45
brome grass	0.15 or 0.19	0.175–0.5	0.3 a	0.05–0.1	80–180	0.5	–	45 (S)
capeweed	–	–	–	–	–	–	–	45
cereals	0.125	0.2–0.5 i	0.2 b	0.05–0.1	80–180	0.41	–	–
charlock	–	–	–	–	–	–	–	45
chickweed	–	–	–	–	–	–	–	–
corn gromwell	–	–	–	–	–	–	–	–
cotula – common	–	–	–	–	–	–	–	–
deadnettle	–	–	–	–	–	–	–	–
dock	–	–	–	–	–	–	70	45
fat hen	–	–	–	–	–	–	–	–
fumitory	–	–	–	–	–	–	–	45
heliotrope	–	–	–	–	–	–	–	–
mustards	–	–	–	–	–	–	70 n	–
Paterson's curse	–	–	–	–	–	–	–	45
radish – wild	–	–	–	–	–	–	–	–
rough poppy	–	–	–	–	–	–	–	–
shepherd's purse	–	–	–	–	–	–	–	45 (S)
skeleton weed	–	–	–	–	–	–	–	–
sorrell	–	–	–	–	–	–	–	45 (S)
sowthistle	–	–	–	–	–	–	–	–
spiny emex	–	–	–	–	–	–	–	–
storksbill	–	–	–	–	–	–	–	45 (S)
toad rush	–	–	–	–	–	–	70	–
turnip weed	–	–	–	–	–	–	–	45
variegated thistle	–	–	–	–	–	–	–	–
wild lettuce	–	–	–	–	–	–	–	–
wild oats	0.065 or 0.125	0.175–0.5	0.25	0.0375–0.1 f	80–180	0.41	–	45
wild turnip	–	–	–	–	–	–	–	45
winter grass	–	–	–	–	–	–	–	–
wireweed	–	–	–	–		–	70	45 (S)
Rec water L/ha Boom	**50–150**	**50 min**	**30–150**	**50–150**	**50 min**	**50–100**	**50–100**	**50 min**
Herbicide group	**A**	**A**	**A**	**A**	**A**	**A**	**B**	**B**

Add non-ionic surfactant at 200 mL/100 L or non-ionic surfactant at 100 mL/100 L + mineral spray oil at 1 L/100 L or Hasten™ at 1 L/100 L. See label.

Add 2 L D-C-Trate® or 1 L Hasten™ or KwikKin™ or 0.5 L Uptake™ oil/100 L spray.

Always add either BS1000® at 200 mL/100 L spray or Hasten™ or KwikKin™ at 500 mL/100 L spray. Can be tankmixed with Sertin® Plus or Sertin® to broaden grass spectrum and improve control. See label.

Add Uptake™ spraying oil at 0.5 L/100 L. Use wetter only when tankmixing with broadleaf herbicides. Products also available containing 130 g/L haloxyfop-R formulation (Asset®).

Factor® has good activity on barley grass and wild oats but weaker on brome grass and volunteer cereals. Adding a Fop herbicide is recommended. See label.

Alma, Dun, Dundale, WrrfGA_varieties only. Weeds cotyledon to 3-leaf stage. Add non-ionic surfactant at 200 mL per 100 L water. See Table 2 for recropping intervals.

Apply only on varieties Alma, Banzee, Dun, Dundale, Glenroy, Laura and Wirrega. Add BS1000® or equivalent at 200 mL/100 L water. Small weeds. See Table 2 for plant-back requirements.

a = Great brome only.
b = Volunteer triticale 250 mL/ha.
e = Volunteer oats and wheat only.
f = Use 0.0375–0.1 L/ha in southern and central NSW and 0.05–0.1 L/ha in northern NSW.
i = Use high rate for volunteer barley.
k = Use high rate on *Phalaris paradoxa*
n = Indian hedge mustard
(S) = Suppression only.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 19. Herbicides for weed control for field pea – Early post-emergence – Part 2

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Flumetsulam 800 g/kg **Broadstrike™**		Metribuzin 480 g/L **Sencor® 480 SC**		Metribuzin 750 g/kg **Sencor® 750 WG**		Cyanazine 900 g/kg **Bladex®**		Diflufenican 500 g/L **Brodal® Options**		Picolinafen 750g/kg **Sniper®**		MCPA 250 g/L (present as sodium salt only) **MCPA 250** a		MCPA 750 g/L **Thistle-Killem® 750**	
Apply at crop growth stage	**2–6 nodes**		**Before 3rd node**		**Before 3rd node**		**After 2 node but before flowering**		**3rd node to flowering**		**3 node to before flowering**		**6 node to before flowering**		**3 node to before flowering**	
Weeds controlled	**(grams)**		**(litres)**		**(grams)**		**(kilograms)**		**(litres)**		**(grams)**		**(litres)**		**(litres)**	
amsinckia	25	Do not add any spray additives. May cause yellowing, reduced height and delayed flowering.	0.28–0.58	Do not tank mix with other herbicides for field pea. Check label for suitable rate and influence of variety and disease. Best results with moist soil surface. Two sunny days before spraying improves crop tolerance. See label.	180–380	Do not tank mix with other herbicides for field pea. Check label for suitable rate and influence of disease and variety. Best results with moist soil surface. Two sunny days before spraying improves crop tolerance. See label.	–	Not on Wirrega field pea post-emergent. Use higher rate on larger weeds.	0.2 (S)	Apply before crop canopy obscures weeds. Caution on alkaline soils.	–	Apply when most wild radish is at the 2–6 leaf stage and capeweeds at 2–4 leaf stage. Maybe some residual control. Not on high pH soils. Not in northern NSW.	–	May delay crop maturity.	–	May delay crop maturity. Apply early post-emergence after the 3rd node stage and before the start of flowering. Weeds 4–6 leaf stage.
annual phalaris	–		–		–		–		–		–		–		–	
annual ryegrass	–		0.28–0.58 (S)		–		0.85 or 1.1		–		–		–		–	
barley grass	–		–		–		– (S)		–		–		–		–	
bedstraw	–		–		–		– (S)		–		–		–		–	
brome grass	–		0.28–0.58		180–380		0.85 or 1.1		–		50 (S)		–		–	
capeweed	–		–		–		–		0.2 (S)		–		–		–	
cereals – volunteer	–		0.28–0.58		180–380		–		–		–		–		–	
charlock	–		0.28–0.58		180–380		0.85 or 1.1		0.2		–		0.9–1.4		0.08–0.1 b	
chickweed	–		0.28–0.58		180–380		–		0.2 (S)		–		–		–	
corn gromwell	–		0.28–0.58		180–380		–		0.2 (S)		–		–		–	
cotula – common	–		0.28–0.58		180–380		0.85 or 1.1		–		–		–		–	
deadnettle	–		0.28–0.58		180–380		–		0.2		–		–		–	
fumitory	–		0.28–0.58		180–380		0.85 or 1.1		–		–		–		–	
lupin – volunteer	25		0.28–0.58		180–380		–		–		–		–		–	
marshmallow	25		0.28–0.58		180–380		–		0.2 (S)		–		–		–	
mustards	25		0.28–0.58		180–380		0.85 or 1.1		0.15–0.2		–		0.9–1.4		–	
mustard – Indian hedge	25		–		–		–		–		–		–		–	
Paterson's curse	–		0.28–0.58		180–380		– (S)		0.2 (S)		33–50		–		–	
prickly – lettuce	–		0.28–0.58		180–380		0.85 or 1.1		0.2		–		–		0.08–0.1 b	
radish – wild	25 (S)		0.28–0.58		180–380		–		0.2		–		–		–	
rough poppy	–		–		–		–		0.2 (S)		–		–		–	
shepherds purse	25		0.28–0.58		180–380		–		0.2 (S)		–		–		–	
skeleton weed	–		0.28–0.58		180–380		0.85 or 1.1		0.2 (S)		–		–		–	
sowthistle	–		0.28–0.58		180–380		0.85 or 1.1		–		–		–		–	
spiny emex	–		0.28–0.58		180–380		–		–		–		–		–	
toad rush	–		0.28–0.58		180–380		–		0.2 (S)		–		–		–	
turnip weed	25		–		–		0.85 or 1.1		0.2		–		–		–	
variegated thistle	–		–		–		–		–		–		–		–	
vulpia	–		–		–		–		–		–		–		–	
wild oats	–		–		–		–		–		–		–		–	
wild turnip	25		0.28–0.58		180–380		0.85 or 1.1		0.15–0.2		–		0.9–1.4		–	
winter grass	–		0.28–0.58		180–380		–		–		–		–		–	
wireweed	–		0.28–0.58		180–380		– (S)		0.2 (S)		–		–		–	
Rec water L/ha Boom	**50–150**		**50–100**		**50–100**		**80–200**		**70–100**		**50 min**		**220–300**		**30–120**	
Herbicide group	**B**		**C**		**C**		**C**		**F**		**F**		**I**		**I**	

a = Label rates will change if a different salt is present. (S) = Suppression only.
b = Add 125–150 mL Agility®.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 20. Herbicides for weed control for lupin – Pre-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Dimethenamid-P 720 g/L **Outlook®**		Terbuthylazine 750 g/kg **Terbyne®**		**Simazine 900 g/kg**		**Simazine 500 g/L**		Trifluralin 480 g/L **Triflur® X**		Pendimethalin 330 g/L **Stomp® 330 EC** i		Tri-allate 500 g/L **Avadex® Xtra** b	
					Light soils **Simazine 900 DF** a b	Loam soils **Simazine 900 DF** a b	Light soils **Simazine 500** a b	Loam soils **Simazine 500** a b						
Incorporation	**IBS Knifepoint and Presswheel only**		**IBS**	**PSPE**	**PSPE**	**PSPE**	**PSPE**	**PSPE**	**IBS, PSI**		**IBS, PSI**		**IBS, PSI**	
Weeds controlled	**(litres)**		**(kilograms)**		**(kilograms)**		**(litres)**		**(litres)**		**(litres)**		**(litres)**	
amsinckia	–	Outlook® has demonstrated annual ryegrass control in low weed populations only (<100 plant/m²). Use in higher weed populations will only yield suppression. Apply as late as possible before sowing and sow with a knifepoint and presswheel seeder before weeds germinate. Do not use with disc openers/planting equipment. See label.	–	–	–	Apply to level seedbed within 2 days after sowing.	–	Apply to level seedbed within 2 days of sowing. Simazine also available as 600 g/L. See appropriate label for rates.	–	Apply to level seedbed within 2 days of sowing. Simazine also available as 600 g/L. See appropriate label for rates.	–	Light soils 1.2 L/ha. Medium-heavy soils 1.5–1.7 L/ha. Can sow in band. Apply and incorporate from 4 weeks up to just before sowing.	–	In Northern NSW double incorporate at 2.5–3 L/ha. In Southern NSW IBS at 2–3 L/ha. See label.	–	Apply and incorporate immediately prior to or up to 3 weeks before sowing.
annual phalaris	–		–	0.7–1.0 (S)	–		–		1.2–1.7		–		– g	
annual ryegrass	0.75–1.0		–	0.7–1.0 (S)	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		1.2–1.7		2.0–3.0		– g	
barley grass	–		–	–	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		–		–		–	
brome grass	–		–	–	0.8–1.1 (S)		1.3–2.2 (S)		1.5–2.0 (S)		2.5–4.0 (S)		–		–		–	
capeweed	–		–	–	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		–		–		–	
cereals	–		–	–	–		–		–		–		–		–		–	
charlock	–		–	–	–		–		–		–		–		–		–	
corn gromwell	–		–	0.7–1.0	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		–		–		–	
deadnettle	–		–	0.7–1.0	–		–		–		–		–		–		–	
fumitory	–		–	–	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		1.2–1.7 (S)		–		–	
mustards	–		–	0.7–1.0	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		–		–		–	
Paterson's curse	–		–	–	–		–		1.5–2.0		2.5–4.0		–		–		–	
radish–wild	–		1.0–1.4 (S)	0.7–1.0 (S)	–		–		–		–		–		–		–	
rough poppy	–		–	–	–		–		–		–		–		–		–	
shepherd's purse	–		–	0.7–1.0	–		–		1.5–2.0		2.5–4.0		–		–		–	
skeleton weed	–		–	–	–		–		–		–		–		–		–	
sowthistle	–		–	0.7–1.0	–		–		–		–		–		–		–	
spiny emex	–		1.0–1.4 (S)	0.7–1.0 (S)	–		–		–		–		–		–		–	
toadrush	–		–	0.7–1.0	–		–		–		–		–		–		–	
turnip weed	–		–	0.7–1.0	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		–		–		–	
wild lettuce	–		–	0.7–1.0	–		–		–		–		–		–		–	
wild oats	–		–	0.7–1.0 (S)	0.8–1.1 (S)		1.3–2.2 (S)		1.5–2.0 (S)		2.5–4.0 (S)		1.2–1.7 d		2.0–3.0 (S)		1.6 e	
wild turnip	–		–	0.7–1.0	0.8–1.1		1.3–2.2		1.5–2.0		2.5–4.0		–		–		–	
winter grass	–		–	–	–		–		1.5–2.0		2.5–4.0		1.2–1.7		–		–	
wireweed	–		–	0.7–1.0	0.8–1.1		1.3–2.2		–		–		1.2–1.7		2.0–3.0		g	
Rec water L/ha boom	**70–120**		**50 min**		**50–100**		**50–100**		**50–100**		**50–100**		**70–450**		**50–200**		**30–100**	
Herbicide group	**K**		**C**		**C**		**C**		**C**		**C**		**D**		**D**		**J**	

a = Simazine and Brodal® can be tankmixed.
b = Trifluralin, Avadex® Xtra can be tankmixed.
d = Refer to label.
e = Preferred option northern NSW only.
g = Add 0.7 L/ha trifluralin for mixed infestations of wild oats, annual ryegrass or wireweed – see label.
i = Pendimethalin also available in 440 g/L. See label for rates.
(S) = Suppression only.

Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergent.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 21. Herbicides for weed control for lupin – Post-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Diclofop-methyl 375 g/L **Rhino®**		Fluazifop-P 128 g/L **Fusilade® Forte** k	Haloxyfop-R 520 g/L **Verdict™ 520**		Quizalofop-P-ethyl 200 g/L **Elantra® Xtreme®**		Butroxydim 250 g/kg **Factor® WG**		Clethodim 240 g/L **Status®**		Propaquizafop 100 g/L **Shogun®**		Metosulam 100 g/L **Eclipse® 100 SC** x		Picolinafen 750 g/kg **Sniper®**		Diflufenican 500 g/L **Brodal® Options**		Paraquat 250 g/L **Gramoxone®**	
Apply at crop growth stage	–		Any time until 17 weeks before harvest	2 Leaf to flowering		Up until 6 weeks before harvest		–		Before 80% flowering		Any time until 15 weeks before harvest		2–10 Leaf		2–6 Leaf		2 Leaf to flowering		Physiological maturity	
Weeds controlled	(litres)		(litres)	(litres)		(litres)		(grams)		(litres)		(litres)		(millilitres)		(grams)		(litres)		(litres)	
amsinckia	–	1.25 L/ha controls common barley grass. Add wetting agent.	–	–	Add 0.5 L Uptake™ spraying oil/100 L water. Use a minimum of 250 mL/ha or other oils at 1 L + wetter/100 L water.	–	Add non-ionic surfactant at 200 mL/100 L or non-ionic surfactant at 100 mL/100 L + mineral spray oil at 1 L/100 L or Hasten™ at 1 L/100 L. See label.	–	Factor® has good activity on barley grass and wild oats but weaker on brome grass and volunteer cereals. Adding a fop herbicide is recommended. See label.	–	Add 2 L D-C-Trate® or 1 L Hasten™ or Kwickin™ or 0.5 L Uptake™ oil/100 L spray. Use lower rates on small actively growing weeds.	–	Always add either BS1000® at 200 mL/100 L water or Hasten™ or Kwickin™ at 500 mL/100 L of spray. Can be tankmixed with Sertin® to broaden grass spectrum and improve control. See label.	–	Apply at 2–10 leaf stage of lupin and weeds up to 8 leaf stage. Do not apply with crop oils, surfactants or wetters. At least 10 days should elapse between application of Eclipse® and grass herbicide. Not on Merrit after 8 leaf stage.	–	Narrow leaf lupin only. Apply at 2–6 leaf stage of crop and 2–8 leaf stage of wild radish. (capeweed 2–4-leaf stage). Not in Northern NSW.	0.2 (S)	Apply from 2-leaf stage of crop and before the start of primary flowering. Young weeds actively growing 4–6 weeks after sowing (up to 4-leaf stage).	–	Spray top ryegrass to reduce seedset when most of the ryegrass heads have emerged and are flowering or just past flowering. 7 days WHP. Ensure crop has reached physiologically mature stage to avoid yield loss. 7 days WHP.
annual phalaris	–		0.41–0.82	0.05–0.1		–		80–180		0.15–0.5 m		–		–		–		–		–	
annual ryegrass	1.0		0.41–0.82	0.075–0.1		0.15 or 0.19		80–180		0.15–0.5		0.45		–		–		–		0.4–0.8	
barley grass	–		0.41–0.82	0.05–0.1		0.125		80–180		0.175–0.5		0.2		–		–		–		–	
brome grass	–		0.41–0.82	0.05–0.1		0.15 or 0.19		80–180		0.175–0.5		0.3		–		–		–		–	
capeweed	–		–	–		–		–		–		–		–		50(S)		0.2 (S)		–	
cereals	–		0.41–0.82	0.05–0.1		0.125		80–180		0.2–0.5 j		0.2 b		–		–		–		–	
charlock	–		–	–		–		–		–		–		–		–		0.2		–	
corn gromwell	–		–	–		–		–		–		–		–		–		0.2 (S)		–	
deadnettle	–		–	–		–		–		–		–		–		–		0.2		–	
fumitory	–		–	–		–		–		–		–		–		–		–		–	
mustards	–		–	–		–		–		–		–		–		–		0.15–0.2		–	
Paterson's curse	–		–	–		–		–		–		–		–		–		0.2 (S)		–	
radish–wild	–		–	–		–		–		–		–		50–70		33–50		0.2		–	
rough poppy	–		–	–		–		–		–		–		–		–		0.2 (S)		–	
shepherd's purse	–		–	–		–		–		–		–		–		–		0.2 (S)		–	
skeleton weed	–		–	–		–		–		–		–		–		–		0.2 (S)		–	
sowthistle	–		–	–		–		–		–		–		–		–		–		–	
spiny emex	–		–	–		–		–		–		–		–		–		–		–	
toadrush	–		–	–		–		–		–		–		–		–		0.2 (S)		–	
turnip weed	–		–	–		–		–		–		–		–		–		0.2		–	
vulpia	–		–	–		–		–		0.25–0.5 (S)		–		–		–		–		–	
wild lettuce	–		–	–		–		–		–		–		–		–		0.2		–	
wild oats	1.5–2.0		0.41–0.82	0.0375–0.1 i		0.065 or 0.125		80–180		0.175–0.5		0.25		–		–		–		–	
wild turnip	–		–	–		–		–		–		–		–		–		0.15–0.2		–	
winter grass	–		–	–		–		–		–		–		–		–		–		–	
wireweed	–		–	–		–		–		–		–		–		–		0.2 (S)		–	
Rec water L/ha boom	50–150		50–100	50–150		50–150		50 min		50 min		30–150		50–100		50 min		70–100		50–100	
Herbicide group	A		A	A		A		A		A		A		B		F		F		L	

b = 0.25 L/ha for volunteer triticale.
h = Volunteer oats and wheat only.
i = Use 0.0375–0.075 L/ha in central and southern NSW and 0.05–0.1 L/ha in northern NSW.
j = Use high rate for volunteer barley.
k = Use the lower rate when grass weeds are actively growing at 2–5 leaf stage before tillering commences. Use the higher rate when grass weeds are growing actively at 5-leaf to early tillering.
m = Use higher rate on *Phalaris paradoxa*.
p = Volunteer wheat, barley and oats only.
x = Jindalee, Kiev, Quilinock and Wonga varieties. Do not apply past 8-leaf in Wonga.
(S) = Suppression only.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 22. Herbicides for weed control for faba bean and lentil – Pre-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	Imazethapyr 700 g/kg **Spinnaker® 700 WDG** Faba bean only		Terbuthylazine 750 g/kg **Terbyne®**			Simazine 600 g/L **Gesatop® 600 SC** Faba bean only		Cyanazine 900 g/kg **Bladex®**		Metribuzin 480 g/L **Sencor® 480** c Faba bean only		Diuron 500 g/L ◆ **Diuron 500** d		Trifluralin 480 g/L **Triflur® X** Lentil only		Pendimethalin 330 g/L **Stomp® 330 EC** e Faba bean only		Triallate 500 g/L **Avadex® Xtra** Faba bean only	
Incorporation	PSPE		IBS	PSPE		PSI, IBS, PSPE		PSI, IBS		PSPE		IBS	PSPE	PSI, IBS		PSI, IBS		PSI, IBS	
Weeds controlled	(grams)		(kilograms)			(litres)		(kilograms)		(litres)		(litres)	(litres)	(litres)		(litres)		(litres)	
amsinckia	70–100	Apply post-sowing pre-emergence to weed-free seedbed. Note recropping intervals on Table 2. Check label.	–	–	Terbyne® can be used IBS or PSPE. Use the lower rate on light soils and the high rate on heavier soils. Sufficient rain is necessary within 2–3 weeks after application.	–	Apply either pre-seeding or immediately post-sowing. Sow crop at least 5 cm deep. Use lower rates on light textured soils.	–	Use higher rates on heavier soil types. Post-emergent application will cause crop damage.	0.28–0.58	Spray post-sowing pre-emergence. Rate depends on soil type	–	–	–	Light soils 0.8 L/ha. Medium-heavy soils 1.2 L/ha. Can sow in band. Apply and incorporate 1–4 weeks before sowing.	–	In Northern NSW double incorporate at 2.5–3.0 L/ha. In Southern NSW incorporate by sowing (IBS) at 2.0–3.0 L/ha. See label.	–	Apply and incorporate immediately prior to sowing or up to 3 weeks before sowing. See label. Can be tankmixed with trifluralin for control of mixed infestations of ryegrass, wild phalaris and wireweed.
annual phalaris	–		–	0.7–1.0 (S)		1.7–2.1		–		–		–	–	0.8–1.2		–		b	
annual ryegrass	70 h		–	0.7–1.0 (S)		0.83–1.25 m		1.7 or 2.2		–		–	–	0.8–1.2		2.0–3.0		b	
barley grass	70 h		–	–		1.7–2.1		(S)		–		–	–	–		–		–	
brome grass	–		–	–		1.7–2.1		(S) f		–		–	–	–		–		–	
capeweed	70–100		–	–		1.7–2.1		1.7 or 2.2		0.28–0.58		1.5–2.0	1.0–1.5	–		–		–	
canola – volunteer	–		–	–		1.7–2.1 g		–		–		–	–	–		–		–	
cereals	–		–	–		–		–				–	–	–		–		–	
corn gromwell	–		–	0.7–1.0		1.7–2.1		–		–		–	–	–		–		–	
crassula	–		–	–		–		1.7 or 2.2		–		1.5–2.0	1.0–1.5	–		–		–	
deadnettle	70		–	0.7–1.0		1.7–2.1		1.7 or 2.2		0.28–0.58		–	–	–		–		–	
fumitory	–		–	–		1.7–2.1		(S)		–		–	–	–		–		–	
goosefoot – purple	–		–	–		–		–		–		–	–	–		–		–	
lettuce – prickly	70–100		–	0.7–1.0		–		1.7 or 2.2		–		–	–	–		–		–	
medics	–		–	0.7–1.0		1.7–2.1		–		–		–	–	–		–		–	
mustards	70 t		–	0.7–1.0		1.7–2.1		1.7 or 2.2		0.28–0.58		–	–	–		–		–	
Paterson's curse	70		–	–		–		–		–		–	–	–		–		–	
radish – wild	70 i (S)		1.0–1.4 (S)	0.7–1.0 (S)		–		(S)		0.28–0.58		1.5–2.0	1.0–1.5	–		–		–	
rough poppy	–		–	–		–		1.7 or 2.2		0.28–0.58		–	–	–		–		–	
saffron thistle	–		–	–		1.7–2.1		–		–		–	–	–		–		–	
shepherds purse	70		–	0.7–1.0		–		–		0.28–0.58		–	–	–		–		–	
soursob	–		–	–		1.7–2.1		–		–		–	–	–		–		–	
sowthistle	–		–	0.7–1.0		–		1.7 or 2.2		0.28–0.58		–	–	–		–		–	
spiny emex	70		1.0–1.4 (S)	0.7–1.0 (S)		–		1.7 or 2.2		0.28–0.58		1.5–2.0	1.0–1.5	–		–		–	
toad rush	70		–	0.7–1.0		–		–		0.28–0.58		1.5–2.0	1.0–1.5	–		–		–	
turnip weed	70		–	0.7–1.0		–		1.7 or 2.2		–		–	–	–		–		–	
vulpia	–		–	–		–		–		–		–	–	–		2.0–3.0 (S)		–	
wild oats	70 h		–	0.7–1.0 (S)		0.83–1.25 m (S)		–		–		–	–	0.8–1.2 b		2.0–3.0 (S)		1.6	
wild turnip	–		–	0.7–1.0		–		1.7 or 2.2		0.28–0.58		1.5–2.0	1.0–1.5	–		–		–	
winter grass	–		–	–		–		–		0.28–0.58		–	–	–		–		–	
wireweed	70		–	0.7–1.0		1.7–2.1		(S)		0.28–0.58		–	–	0.8–1.2		2.0–3.0		b	
Rec water L/ha boom	50–100		50 min			50–100		80–200		50–100		–	–	70–450		50–200		30–100	
Herbicide group/mode	B		C			C		C		C		C	C	D		D		J	

b = Refer to label for details.
c = Metribuzin also available as 750 g/kg formulation, see label for rates.
d = Diuron 900 DF is also registered. See label for rates.
e = 440 g/L pendimethalin also available.
f = Great brome only.
g = Not TT canola volunteers.
h = Eight weeks suppression of grass weeds. For full control a specific grass herbicide may be required.
i = Adequate control may not be obtained under high weed pressure or high rainfall.
m = Where ryegrass, wild phalaris,wireweed or wild oats are the major problem use tankmix of 1–1.5 L Gesatop® + 0.8 L trifluralin 480/ha and incorporate prior to sowing.
t = Indian hedge mustard
(S) = Suppression only.
◆ = See *What's new in 2014* on page 3.

Incorporation
PSI = Pre-sowing incorporated.
IBS = Incorporated by sowing.
PSPE = Post-sowing pre-emergent.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Table 23. Herbicides for weed control for faba bean and lentil – Post-emergence

Rate per hectare Various trade names sometimes available under these concentrations. See specific labels for details.	FluazifopP 128 g/L **Fusilade® Forte** Faba bean only	Haloxyfop-R 520 g/L **Verdict™ 520**	Quizalofop-p-ethyl 200 g/L **Elantra® Xtreme®**	Butroxydim 250 g/kg **Factor® WG**	Clethodim 240 g/L **Status®**	Propaquizafop 100 g/L **Shogun®**	Flumetsulam 800 g/kg **Broadstrike™** Lentil only	Diflufenican 500 g/L **Brodal® Options** Lentil only
Apply at crop growth stage	–	2 Leaf to flowering	Lentils and Faba beans up until 12 weeks before harvest	–	Faba – Not beyond full flowering Lentil – Up to 7 Node–Early branching	Any time until 7 weeks before harvest	4–8 Leaf	3 Leaf to flowering
Weeds controlled	(litres)	(litres)	(litres)	(grams)	(litres)	(litres)	(grams)	(litres)
amsinckia	–	–	–	–	–	–	25	0.2 (S)
annual phalaris	0.41	0.05–0.1	–	80–180	0.15–0.5 p	–	–	–
annual ryegrass	0.41	0.075–0.1	0.15 or 0.19	80–180	0.15–0.5	0.45	–	–
barley grass	0.41	0.05–0.1	0.125	80–180	0.175–0.5	0.2	–	–
brome grass	0.5	0.05–0.1	0.15 or 0.19	80–180	0.175–0.5	0.3	–	–
capeweed	–	–	–	–	–	–	–	0.2 (S)
canola – volunteer	–	–	–	–	–	–	25 a	–
cereals	0.41	0.05–0.1	0.125	80–180	0.2–0.5 j	0.2 n	–	–
corn gromwell	–	–	–	–	–	–	–	0.2 (S)
deadnettle	–	–	–	–	–	–	–	0.2
fumitory	–	–	–	–	–	–	–	–
goosefoot – purple	–	–	–	–	–	–	–	–
lettuce – prickly	–	–	–	–	–	–	–	0.2
medics	–	–	–	–	–	–	–	–
mustards	–	–	–	–	–	–	25	0.15–0.2
Paterson's curse	–	–	–	–	–	–	–	0.2 (S)
radish – wild	–	–	–	–	–	–	25 (S)	0.2
rough poppy	–	–	–	–	–	–	–	0.2 (S)
saffron thistle	–	–	–	–	–	–	–	–
shepherds purse	–	–	–	–	–	–	25	0.2 (S)
soursob	–	–	–	–	–	–	–	–
sowthistle	–	–	–	–	–	–	–	–
spiny emex	–	–	–	–	–	–	–	–
toad rush	–	–	–	–	–	–	–	0.2 (S)
turnip weed	–	–	–	–	–	–	25	0.2
vulpia	–	–	–	–	0.25–0.5 (S)	–	–	–
wild oats	0.41	0.0375–0.1 f	0.065 or 0.125	80–180	0.175–0.5	0.25	–	–
wild turnip	–	–	–	–	–	–	25	0.15–0.2
winter grass	–	–	–	–	–	–	–	–
wireweed	–	–	–	–	–	–	–	0.2 (S)
Rec water L/ha boom	50–100	50–150	50–150	50 min	50 min	30–150	50–150	70–100
Herbicide group/mode	A	A	A	A	A	A	B	F

Add Uptake™ spraying oil at 0.5 L/100 L water. Use a minimum of 250 mL/ha Uptake™ or other oils at 1 L + wetter/100 L spray. Asset® (130 g/L product) also available.

Add non-ionic surfactant at 200 mL/100 L or non-ionic surfactant at 100 mL/100 L + mineral spray oil at 1 L/100 L or Hasten™ at 1 L/100 L. See label.

Factor® has good activity on barley grass and wild oats but weaker on brome grass and volunteer cereals. Adding a fop herbicide is recommended. See label.

Add 2 L D-C-Tate® or 1 L Hasten™ or Kwickin™ or 0.5 L Uptake™ oil/100 L spray. Use lower rate on small actively growing weeds. Do not apply to lentil after the 7 node early-branching crop stage.

Always add either BS1000® at 200 mL/100 L water or Hasten™ or Kwickin™ at 500 mL/100 L spray. Can be tankmixed with Sertin® to broaden grass spectrum and improve control. See label.

Avoid spray overlap. Not on Northfield variety.

a = Not Clearfield canola volunteers.
e = Volunteer oats and wheat only.
f = Use 0.0375–0.075 L/ha in southern and central NSW and 0.05–0.1 L/ha in northern NSW.
j = Use higher rate on volunteer barley.
n = Volunteer triticale 0.25 L/ha.
p = Use higher rate on *Phalaris paradoxa.*
u = Volunteer wheat, barley and oats only.
(S) = Suppression only.

is a preferred option. READ LABEL BEFORE USE. REGISTERED CHEMICALS AS AT March 30, 2014.

Sensitivity to herbicides in winter crop varieties

Some winter crop varieties are more susceptible than others to damage from certain herbicides. Small yield reductions to sensitive varieties caused by herbicide damage may not be easily detected but over large areas can be costly.

Symptoms of crop damage from herbicides do not always lead to lost yield but it is still important to recognise these signs to try and prevent future problems occurring.

For descriptions and pictures of herbicide injury see *Field crop herbicide injury: the Ute Guide* available form the GRDC Bookshop at www.grdc.com.au/Resources/Bookshop/2002/01/Field-Crop-Herbicide-Injury-The-Ute-Guide

In NSW, winter crop varieties are tested for herbicide tolerance at the Wagga Wagga Agricultural Institute. The testing is supported by the Grains Research and Development Corporation and is part of a National Herbicide Tolerance Program.

Results from the NSW program and other States are available from the National Variety Trials website. www.nvtonline.com.au

Tolerance testing methodology

Trial sites are chosen and managed to ensure:

- Minimal weed competition so that herbicide responses are due to varietal sensitivity rather than competitiveness with weeds.
- Representative and uniform soil types within each Australian region.

Trial assessments include:

- Visual observations 2 to 3 weeks after herbicide application and again (2–3 weeks later) or as appropriate.
- Normalised Difference Vegetative Index (NDVI) measurements using a Greenseeker™ approximately 21–30 days after treatment.
- Grain Yield and Climatic data.

Preliminary Evaluation (PE) trials

Wheat and barley lines continuing beyond the first year of National Variety Trials (NVT) are automatically eligible for inclusion in the first stage of cultivar tolerance evaluation, namely Preliminary Evaluation (PE) Trials. Within these trials, commonly used and often damaging herbicides/ tank mixes are applied at high rates in order to highlight cultivar sensitivities.

Within PE trials;

- Treatments are evaluated within very small plot or single row experiments,
- Herbicides/ tank mixes are selected according to the Herbicide Selection Protocol,
- Each cultivar X herbicide combination is evaluated across two seasons, unless the cultivar is discarded by the breeder after year one.
- Any herbicide/cultivar combination that incurs a significant yield penalty in at least one year of trial is progressed to Advanced Evaluation (AE) trials,
- If a herbicide/cultivar combination does not incur yield loss in either of the two seasons of PE testing it is given a safe rating.

Advanced Evaluation (AE) trials

This second stage of evaluation aims to validate and supplement results from PE trials with data on tolerance and safety margins gathered from more detailed experiments.

Within AE trials;

- Treatments are evaluated within replicated, large plot, split strip plot designed experiments,
- Only those herbicide/cultivar combinations which were found damaging within PE trials are evaluated,
- Herbicides are applied at the recommended rate and higher to obtain data on both tolerance at label rates, and safety margin,
- All treatments (cultivar and herbicide) are evaluated across a minimum of two seasons to account for seasonal variation in cultivar response.

Note: Within the pulse, oat and triticale species only AE trials are implemented. Within these trials cultivar selection is based on collaboration with breeders, and herbicide selection is based on discussions with regional agronomists, farmers and herbicide manufacturers.

Herbicide selection protocol

In making the choice of herbicides used in trials, consideration is given to;

1. Existing and widely used herbicides/tank mixtures with known variation in crop/cultivar safety
2. New or previously untested herbicides, New Chemistry trials allow for evaluation of a group of commonly grown varieties, to be tested against new or upcoming herbicides. If a new herbicide is found to be damaging AND there is expected to be significant farmer use, the herbicide is progressed to preliminary evaluation trials.

Results tables

The sensitivity of the variety compared to unsprayed controls of the same variety is summarised in results tables, using the following symbols based on the yield responses across all trials:

– not tested or insufficient data.

√ no significant yield reductions at higher than recommended rates in (z) trials.

N (w/z) narrow margin, significant yield reductions at higher than recommended rate, but not at recommended rate. Significant event occurring w years out of z years tested. Eg. (2/5) = tested for 5 years, 2 returning a significant yield loss.
x% **(1/z)** yield reduction (warning) significant yield reduction at recommended rate in 1 trial only in z years of testing.
x-y% **(w/z)** yield reductions (warning) significant yield reductions at recommended rate in w years out of z years tested.

Research site manager: Peter Lockley, NSW DPI
Research site location: Wagga Wagga, New South Wales
Site soil type : Red Brown earth
Site pH : 4.3–4.5
Site annual average rainfall: 523 mm

Acknowledgements

GRDC
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Table 24. Wheat variety response to herbicides Preliminary Evaluation trials 2008–2012

Herbicide		TriflurX® IBS Trifluralin 480	Boxer Gold® IBS S-Metolachlor	Achieve® Tralkoxydim	Ally® Metsulfuron-methyl	Affinity® + MCPA Carfentrazone + MCPA	Axial® Minoxaden	Glean® Chlorsulfuron	Wildcat® Fenoxaprop-p-ethyl	Hussar® Iodosulfuron-methyl-sodium	Banvel M® MCPA + Dicamba
Variety	Years Tested	2008–2012	2009–2012	2008–2012	2008–2012	2009–2012	2009–2012	2008–2012	2008–2012	2009–2012	2008–2012
AXE	2008–2012	✓(1/5)	N(1/4)	N(1/5)	N(2/5)	N(1/4)	N(1/4)	N(1/5)	N(1/5)	N(1/4)	N(4/5)
BARHAM	2010–2012	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)
BOLAC	2008–2012	N(2/5)	N(1/4)	N(1/5)	✓(5)	N(1/4)	✓(4)	✓(5)	N(2/5)	N(1/4)	N(2/5)
BOUNTY	2012	N(1/1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)
CAPAROI	2010–2012	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	N(2/3)	✓(3)	N(1/3)	✓(3)
CHARA	2010–2012	N(1/3)	N(1/3)	✓(3)	✓(3)	N(1/3)	N(1/3)	✓(3)	✓(3)	✓(3)	N(1/3)
CORACK	2011–2012	N(1/2)	N(1/2)	✓(2)	N(1/2)	N(1/2)	✓(2)	✓(2)	✓(2)	N(1/2)	N(1/2)
CORRELL	2010–2012	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	N(1/3)	✓(3)	N(1/3)
EGA BELLAROI	2008–2012	N(1/5)	N(1/4)	N(1/5)	N(2/5)	N(1/4)	✓(4)	✓(5)	N(2/5)	N(1/4)	✓(5)
EGA BOURKE	2008–2012	N(1/5)	N(1/4)	N(1/5)	N(1/5)	✓(4)	✓(4)	N(1/5)	N(1/5)	N(1/4)	N(5/5)
EGA GREGORY	2008–2010	✓(3)	N(1/2)	N(1/3)	N(1/3)	✓(2)	✓(2)	N(1/3)	N(1/3)	N(1/2)	N(2/3)
EGA STAMPEDE	2010–2012	N(2/3)	✓(3)	✓(3)	N(2/3)	✓(3)	✓(3)	N(2/3)	✓(3)	N(1/3)	N(1/3)
EGA WYLIE	2008–2012	N(2/5)	N(1/4)	✓(5)	✓(5)	✓(4)	✓(4)	N(3/5)	N(1/5)	N(1/4)	N(2/5)
ELLISON	2008–2012	N(1/5)	N(1/4)	✓(5)	N(2/5)	✓(4)	✓(4)	✓(5)	N(1/5)	N(1/4)	N(2/5)
ELMORE CL PLUS	2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)
EMU ROCK	2011–2012	N(2/2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	N(1/2)
ESPADA	2008–2012	N(3/5)	N(1/4)	N(2/5)	N(2/5)	✓(4)	N(1/4)	N(2/5)	✓(5)	N(1/4)	N(3/5)
ESTOC	2010–2012	N(1/3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)
FORREST	2011–2012	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	N(1/2)	✓(2)	✓(2)	N(1/2)
GASCOIGNE	2011–2012	N(2/2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	N(1/2)	N(1/2)	N(2/2)
GBA RUBY	2010–2012	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)
GLADIUS	2008–2012	✓(5)	N(1/4)	N(2/5)	N(2/5)	N(1/4)	N(1/4)	N(1/5)	N(1/5)	✓(4)	N(3/5)
GREGORY	2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)
GRENADE CL PLUS	2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)
HYPERNO	2010–2012	✓(4)	✓(4)	✓(4)	N(1/4)	✓(4)	✓(4)	✓(4)	✓(4)	✓(4)	N(1/4)
JANDAROI	2010–2012	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	N(1/3)	N(2/3)	N(1/3)	N(1/3)	N(1/3)
JANZ	2008–2012	✓(3)	N(1/2)	N(2/3)	N(1/3)	N(1/2)	✓(2)	✓(3)	N(1/3)	N(1/2)	N(2/3)
JUSTICA CL PLUS	2011–2012	N(2/2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	N(1/2)	✓(2)	✓(2)	N(2/2)
KORD CL PLUS	2011–2012	N(2/2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	N(2/2)
LANG	2010–2012	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	N(1/3)
LIVINGSTON	2008–2012	N(2/5)	N(1/4)	✓(5)	N(2/5)	✓(4)	✓(4)	✓(5)	N(2/5)	N(1/4)	N(5/5)
LRPB CRUSADER	2008–2012	✓(5)	N(1/4)	✓(5)	N(2/5)	N(1/4)	✓(4)	✓(5)	✓(5)	N(1/4)	N(3/5)
LRPB DAKOTA	2008–2012	N(2/5)	N(1/4)	✓(5)	N(1/5)	✓(4)	✓(4)	N(1/5)	✓(5)	N(1/4)	N(3/5)
LRPB DART	2011–2012	N(1/2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)
LRPB GAUNTLET	2010–2012	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)
LRPB GAZELLE	2010–2012	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)
LRPB IMPALA	2009–2012	N(3/4)	N(1/4)	N(1/4)	N(2/4)	✓(4)	✓(4)	N(2/4)	✓(4)	N(2/4)	N(2/4)
LRPB LINCOLN	2008–2012	N(1/5)	N(1/4)	✓(5)	N(1/5)	✓(4)	✓(4)	N(1/5)	✓(5)	✓(4)	N(2/5)
LRPB MAGENTA	2010–2012	✓(3)	N(1/3)	✓(3)	N(2/3)	N(1/3)	N(1/3)	✓(3)	✓(3)	N(1/3)	N(2/3)
LRPB MERLIN	2010–2012	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)	N(2/3)
LRPB PHANTOM	2011	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)
LRPB SCOUT	2011–2012	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	N(1/2)
LRPB SPITFIRE	2009–2012	N(1/3)	N(2/3)	✓(3)	N(2/3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)
MERINDA	2008–2012	N(3/5)	N(1/4)	✓(5)	N(1/5)	✓(4)	✓(4)	✓(5)	✓(5)	N(1/4)	N(3/5)
NAPAROO	2008–2009	✓(2)	✓(1)	✓(2)	✓(2)	✓(1)	✓(1)	✓(2)	✓(2)	✓(1)	N(1/2)
ORION	2009–2012	N(2/4)	N(2/4)	✓(4)	N(2/4)	✓(4)	✓(4)	N(2/4)	✓(4)	N(1/4)	N(2/4)
PEAKE	2008–2012	N(1/5)	N(1/4)	N(1/5)	N(2/5)	✓(4)	N(1/4)	✓(5)	N(1/5)	N(1/4)	✓(5)
SHIELD	2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)
STREZELECKI	2008–2012	N(1/3)	N(1/2)	✓(3)	✓(3)	✓(2)	✓(2)	✓(3)	✓(3)	✓(2)	N(2/3)
SUNCO	2010–2012	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	N(1/3)	✓(3)	N(2/3)
SUNGUARD	2009–2012	N(1/4)	N(1/4)	✓(4)	✓(4)	✓(4)	✓(4)	✓(4)	✓(4)	N(2/4)	N(1/4)
SUNSTATE	2010–2012	✓(3)	N(1/3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	N(1/3)	N(2/3)
SUNTOP	2011–2012	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)
SUNVALE	2010–2012	✓(3)	✓(3)	✓(3)	N(2/3)	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)	N(2/3)
SUNVEX	2008–2012	✓(5)	N(1/4)	✓(5)	N(2/5)	✓(4)	✓(4)	✓(5)	✓(5)	✓(4)	N(3/5)
SUNZELL	2010–2012	N(1/3)	✓(3)	✓(3)	N(1/3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	N(1/3)
VENTURA	2008–2012	✓(5)	N(1/4)	✓(5)	N(1/5)	N(1/4)	N(1/4)	✓(5)	N(1/5)	N(1/4)	N(2/5)
WAAGAN	2008–2012	N(1/3)	N(2/2)	✓(3)	✓(3)	✓(2)	✓(2)	N(1/3)	✓(3)	✓(2)	N(2/3)
WAKELIN	2011–2012	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)
WALLUP	2011–2012	N(1/2)	✓(2)	✓(2)	N(1/2)	N(1/2)	✓(2)	N(1/2)	✓(2)	N(1/2)	N(1/2)
WEDGETAIL	2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)
YENDA	2008–2012	N(1/5)	N(1/4)	✓(5)	✓(5)	✓(4)	✓(4)	✓(5)	✓(5)	✓(4)	✓(5)
YITPI	2008–2012	N(1/5)	N(1/4)	✓(5)	N(1/5)	N(3/4)	✓(4)	✓(5)	N(1/5)	N(1/4)	N(3/5)
YOUNG	2008–2009	✓(2)	N(1/1)	✓(2)	✓(2)	✓(1)	✓(1)	✓(2)	✓(2)	✓(1)	N(1/2)
Rates (Product/ha)		3.0 L	5.0 L	0.76 kg	14 g	120g + 1.0 L	600 ml	40 g	1.0 L	400 g	3.4 L
Crop stage at application		IBS	IBS	3 L	3-leaf	3-leaf	3 L	3-leaf	4 L	3-leaf	5-leaf

Table 24. Wheat variety response to herbicides Preliminary Evaluation trials 2008–2012 (continued)

Herbicide		Tigrex® Diflufenican + MCPA	Amicide 625® 2,4-D Amine	Logran® IBS Triasulfuron	Tordon 242® Picloram + MCPA	Hoegrass® Diclofop-methyl	Eclipse® + LVE MCPA Metosulam + LVE MCPA	Diuron + MCPA Diuron + MCPA	Bromicide® Bromoxynil	Broadstrike® + Buctril 200 Flumetsulam + Bromoxynil	Mataven® SST Flamprop-methyl
Variety	Years Tested	2008–2012	2008–2012	2008–2009	2008–2009	2008	2008–2009	2008	2008	2008	2008
AXE	2008–2012	✓(5)	N(2/5)	N(1/2)	N(2/2)	N(1/1)	N(1/2)	✓(1)	✓(1)	✓(1)	N(1/1)
BARHAM	2010–2012	✓(3)	N(1/3)	–	–	–	–	–	–	–	–
BOLAC	2008–2012	N(1/5)	N(3/5)	✓(2)	N(1/2)	✓(1)	N(1/2)	✓(1)	✓(1)	✓(1)	N(1/1)
BOUNTY	2012	✓(1)	N(1/1)	–	–	–	–	–	–	–	–
CAPAROI	2010–2012	✓(3)	✓(3)	–	–	–	–	–	–	–	–
CHARA	2010–2012	N(1/3)	✓(3)	–	–	–	–	–	–	–	–
CORACK	2011–2012	✓(2)	✓(2)	–	–	–	–	–	–	–	–
CORRELL	2010–2012	✓(3)	N(1/3)	–	–	–	–	–	–	–	–
EGA BELLAROI	2008–2012	✓(5)	✓(5)	N(1/2)	N(2/2)	✓(1)	✓(2)	✓(1)	✓(1)	✓(1)	N(1/1)
EGA BOURKE	2008–2012	N(1/5)	N(3/5)	N(1/2)	N(2/2)	✓(1)	N(2/2)	✓(1)	✓(1)	✓(1)	✓(1)
EGA GREGORY	2008–2010	N(2/3)	N(2/3)	N(1/2)	✓(2)	N(1/1)	✓(2)	✓(1)	✓(1)	✓(1)	N(1/1)
EGA STAMPEDE	2010–2012	✓(3)	N(1/3)	–	–	–	–	–	–	–	–
EGA WYLIE	2008–2012	N(1/5)	N(2/5)	N(1/2)	✓(2)	✓(1)	N(1/2)	✓(1)	✓(1)	✓(1)	N(1/1)
ELLISON	2008–2012	N(2/5)	N(2/5)	✓(2)	N(1/2)	N(1/1)	✓(2)	N(1/1)	✓(1)	✓(1)	N(1/1)
ELMORE CL PLUS	2012	✓(1)	✓(1)	–	–	–	–	–	–	–	–
EMU ROCK	2011–2012	✓(2)	✓(2)	–	–	–	–	–	–	–	–
ESPADA	2008–2012	✓(5)	N(1/5)	✓(2)	✓(2)	✓(1)	✓(2)	✓(1)	✓(1)	✓(1)	N(1/1)
ESTOC	2010–2012	N(1/3)	✓(3)	–	–	–	–	–	–	–	–
FORREST	2011–2012	N(1/2)	N(1/2)	–	–	–	–	–	–	–	–
GASCOIGNE	2011–2012	N(1/2)	N(1/2)	–	–	–	–	–	–	–	–
GBA RUBY	2010–2012	✓(3)	✓(3)	–	–	–	–	–	–	–	–
GLADIUS	2008–2012	N(2/5)	N(2/5)	✓(2)	N(1/2)	N(1/1)	✓(2)	N(1/1)	✓(1)	✓(1)	N(1/1)
GREGORY	2012	✓(1)	✓(1)	–	–	–	–	–	–	–	–
GRENADE CL PLUS	2012	✓(1)	N(1/1)	–	–	–	–	–	–	–	–
HYPERNO	2010–2012	✓(4)	✓(4)	–	–	–	–	–	–	–	–
JANDAROI	2010–2012	N(1/3)	N(2/3)	–	–	–	–	–	–	–	–
JANZ	2008–2012	✓(3)	N(1/3)	✓(2)	✓(2)	N(1/1)	✓(2)	✓(1)	✓(1)	✓(1)	✓(1)
JUSTICA CL PLUS	2011–2012	N(1/2)	N(1/2)	–	–	–	–	–	–	–	–
KORD CL PLUS	2011–2012	✓(2)	N(1/2)	–	–	–	–	–	–	–	–
LANG	2010–2012	✓(3)	N(1/3)	–	–	–	–	–	–	–	–
LIVINGSTON	2008–2012	N(2/5)	N(2/5)	✓(2)	N(1/2)	N(1/1)	✓(2)	✓(1)	✓(1)	✓(1)	✓(1)
LRPB CRUSADER	2008–2012	N(1/5)	N(2/5)	✓(2)	N(1/2)	✓(1)	N(1/2)	N(1/1)	✓(1)	✓(1)	✓(1)
LRPB DAKOTA	2008–2012	✓(5)	N(1/5)	✓(2)	✓(2)	✓(1)	✓(2)	✓(1)	✓(1)	✓(1)	N(1/1)
LRPB DART	2011–2012	✓(2)	✓(2)	–	–	–	–	–	–	–	–
LRPB GAUNTLET	2010–2012	N(1/3)	N(1/3)	–	–	–	–	–	–	–	–
LRPB GAZELLE	2010–2012	✓(3)	N(1/3)	–	–	–	–	–	–	–	–
LRPB IMPALA	2009–2012	N(1/4)	N(1/4)	✓(1)	✓(1)	–	✓(1)	–	–	–	–
LRPB LINCOLN	2008–2012	N(1/5)	N(1/5)	✓(2)	N(1/2)	N(1/1)	N(2/2)	✓(1)	✓(1)	✓(1)	N(1/1)
LRPB MAGENTA	2010–2012	N(1/3)	N(1/3)	–	–	–	–	–	–	–	–
LRPB MERLIN	2010–2012	N(3/3)	N(2/3)	–	–	–	–	–	–	–	–
LRPB PHANTOM	2011	✓(1)	✓(1)	–	–	–	–	–	–	–	–
LRPB SCOUT	2011–2012	✓(2)	✓(2)	–	–	–	–	–	–	–	–
LRPB SPITFIRE	2009–2012	✓(3)	N(1/3)	✓(1)	✓(1)	–	✓(1)	–	–	–	–
MERINDA	2008–2012	N(2/5)	N(2/5)	✓(2)	✓(2)	✓(1)	N(1/2)	N(1/1)	✓(1)	✓(1)	N(1/1)
NAPAROO	2008–2009	✓(2)	✓(2)	✓(2)	✓(2)	✓(1)	✓(2)	✓(1)	✓(1)	✓(1)	N(1/1)
ORION	2009–2012	✓(4)	N(1/4)	✓(1)	✓(1)	–	✓(1)	–	–	–	–
PEAKE	2008–2012	N(1/5)	✓(5)	N(1/2)	✓(2)	N(1/1)	N(2/2)	N(1/1)	✓(1)	✓(1)	N(1/1)
SHIELD	2012	✓(1)	✓(1)	–	–	–	–	–	–	–	–
STREZELECKI	2008–2012	✓(3)	N(1/3)	N(1/2)	N(1/2)	✓(1)	✓(2)	✓(1)	✓(1)	✓(1)	✓(1)
SUNCO	2010–2012	✓(3)	✓(3)	–	–	–	–	–	–	–	–
SUNGUARD	2009–2012	✓(4)	N(2/4)	✓(1)	✓(1)	–	✓(1)	–	–	–	–
SUNSTATE	2010–2012	✓(3)	✓(3)	–	–	–	–	–	–	–	–
SUNTOP	2011–2012	✓(2)	✓(2)	–	–	–	–	–	–	–	–
SUNVALE	2010–2012	✓(3)	N(1/3)	–	–	–	–	–	–	–	–
SUNVEX	2008–2012	✓(5)	✓(5)	N(1/2)	✓(2)	N(1/1)	✓(2)	✓(1)	✓(1)	✓(1)	N(1/1)
SUNZELL	2010–2012	N(1/3)	N(2/3)	–	–	–	–	–	–	–	–
VENTURA	2008–2012	N(2/5)	✓(5)	✓(2)	N(2/2)	✓(1)	N(1/2)	✓(1)	✓(1)	✓(1)	N(1/1)
WAAGAN	2008–2012	N(2/3)	N(1/3)	N(1/2)	✓(2)	N(1/1)	N(1/2)	N(1/1)	N(1/1)	✓(1)	✓(1)
WAKELIN	2011–2012	N(1/2)	✓(2)	–	–	–	–	–	–	–	–
WALLUP	2011–2012	N(2/2)	N(1/2)	–	–	–	–	–	–	–	–
WEDGETAIL	2012	✓(1)	✓(1)	–	–	–	–	–	–	–	–
YENDA	2008–2012	N(1/5)	✓(5)	✓(2)	✓(2)	N(1/1)	N(1/2)	✓(1)	✓(1)	✓(1)	N(1/1)
YITPI	2008–2012	✓(5)	N(2/5)	✓(2)	✓(2)	✓(1)	✓(2)	N(1/1)	✓(1)	✓(1)	N(1/1)
YOUNG	2008–2009	N(1/2)	✓(2)	✓(2)	N(1/2)	✓(1)	N(1/2)	N(1/1)	✓(1)	✓(1)	N(1/1)
Rates (Product/ha)		1.5 L	3.4 L	70 g	2.0 L	4.0 L	10 g + 1.0 L	1.0 L + 1.0 L	4 L	40 g + 1.4 L	4.5 L
Crop stage at application		5-leaf	5-6 L	IBS	5 L	4-5 L	3-leaf	3-leaf	3 L	5-leaf	spray-top

Table 25. Wheat variety response to herbicides – Advanced Evaluation trials 2010–2012

Herbicide		TriflurX® IBS Trifluralin 480	Boxer Gold® IBS S-Metolachlor	Achieve® Tralkoxydim	Ally® Metsulfuron-methyl	Affinity® + MCPA Carfentrazone + MCPA	Axial® Pinoxaden	Glean® Chlorsulfuron	Wildcat® Fenoxaprop-p-ethyl	Hussar® Iodosulfuron-methyl-sodium	Banvel M® MCPA + Dicamba	Tigrex® Diflufenican + MCPA	Amicide 625® 2,4-D Amine
Variety	Years Tested	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012
AXE	2010–2012	✓(1)	✓ (2)	N(1/2)	✓ (2)	✓(1)	✓(1)	✓(1)	✓(2)	N(1/2)	10(1/3)	–	N(1/2)
BARHAM	2011–2012	–	–	–	✓(2)	–	–	–	–	–	–	–	–
BOLAC	2010–2012	✓(1)	✓(2)	✓(2)	–	✓(1)	–	–	✓(3)	✓(2)	✓(2)	N(1/2)	6(1/2)
CAPAROI	2011–2012	–	–	–	✓(2)	–	–	N(1/2)	–	✓(2)	–	–	–
CORACK	2012	–	–	–	–	–	–	–	–	✓(1)	–	–	–
DIAMONDBIRD	2010–2012	–	✓(2)	–	–	N(1/2)	✓(2)	–	✓(2)	✓(2)	–	–	–
EGA BELLAROI	2010–2012	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	–	–	✓(2)	–	–	–	–
EGA BURKE	2010–2012	✓(1)	✓(2)	✓(2)	✓(2)	–	–	N(2/2)	✓(1)	✓(2)	9(1/3)	✓(3)	9(1/3)
EGA GREGORY	2010–2012	–	✓(2)	✓(3)	8(1/3)	–	–	9–11(2/3)	✓(3)	N(1/3)	N(2/3)	14(1/3)	12(1/3)
ELLISON	2010–2012	✓(2)	✓(2)	–	✓(3)	–	–	–	✓(2)	N(1/2)	N(1/2)	✓(2)	N(1/2)
EMU ROCK	2012	✓(1)	–	–	–	–	–	–	–	–	–	–	–
ESPADA	2010–2012	✓(1)	✓(2)	–	✓(2)	–	✓(3)	✓(2)	–	–	N(1/1)	–	–
ESTOC	2012	✓(1)	–	–	✓(1)	–	–	–	–	–	–	✓(1)	–
FORREST	2012	–	–	–	–	–	–	–	–	–	–	✓(1)	–
GASCOIGNE	2012	✓(1)	–	–	✓(1)	–	–	–	–	–	N(1/1)	✓(1)	–
GAZELLE	2011–2012	–	–	–	✓(2)	–	–	–	–	24(1/2)	–	–	✓(2)
GLADIUS	2010–2012	–	✓(2)	N(1/2)	6(1/2)	✓(3)	✓(2)	5–11(2/2)	✓(2)	–	9(1/2)	✓(3)	✓(2)
HYPERNO	2011–2012	–	–	–	–	–	–	–	–	–	✓(2)	–	–
JANDAROI	2011–2012	–	–	–	6(1/2)	–	✓(1)	6(1/2)	✓(2)	✓(2)	✓(2)	✓(1)	✓(2)
JUSTICA CL PLUS	2012	✓(1)	–	–	–	✓(1)	–	–	–	–	19(1/1)	✓(1)	–
KORD CL PLUS	2012	✓(1)	–	–	–	–	–	–	–	–	20(1/1)	–	–
LIVINGSTON	2010–2012	✓(3)	✓(2)	–	6(1/2)	–	–	–	✓(3)	✓(2)	N(1/3)	10(1/2)	N(1/3)
LPB CRUSADER	2012	–	–	–	–	✓(1)	–	–	–	–	–	–	–
LPB DAKOTA	2012	✓(1)	–	–	✓(1)	–	–	–	–	✓(1)	N(1/1)	–	–
LPRB GAUNTLET	2012	–	–	–	✓(1)	✓(1)	✓(1)	–	✓(1)	–	N(1/1)	✓(1)	✓(1)
LRPB CRUSADER	2010–2012	–	✓(2)	–	✓(2)	✓(1)	–	–	✓(2)	13(1/2)	N(1/2)	✓(2)	✓(2)
LRPB DAKOTA	2010–2012	7(1/3)	✓(2)	–	✓(2)	N(1/2)	✓(2)	12(1/2)	✓(2)	✓(2)	N(2/3)	10(1/2)	8(1/2)
LRPB DART	2012	✓(1)	–	–	–	–	–	–	–	–	–	–	–
LRPB GAUNTLET	2011	–	–	–	✓(1)	–	–	–	–	–	–	–	–
LRPB IMPALA	2010–2012	✓(1)	✓(2)	–	✓(1)	–	–	✓(1)	–	✓(2)	–	–	–
LRPB LINCOLN	2010–2012	✓(1)	6(1/2)	–	N(1/2)	✓(1)	–	N(2/2)	✓(3)	–	N(2/3)	10(1/3)	5(1/3)
LRPB MAGENTA	2011–2012	–	✓(1)	–	✓(2)	–	✓(1)	–	–	✓(2)	N(2/2)	✓(1)	9(1/2)
LRPB MERLIN	2012	✓(1)	–	–	–	–	–	–	–	–	N(1/1)	✓(1)	–
LRPB PHANTOM	2012	–	–	–	–	–	–	–	–	–	N(1/1)	–	–
LRPB SCOUT	2012	–	–	–	✓(1)	–	–	–	N(1/1)	–	–	–	–
LRPB SPITFIRE	2010–2012	–	✓(2)	–	–	–	–	–	–	–	–	–	–
MERINDA	2010–2012	✓(3)	✓(2)	–	N(1/2)	–	–	–	✓(2)	✓(2)	8(1/2)	N(1/2)	✓(2)
PEAKE	2010–2012	6(1/2)	✓(2)	✓(2)	N(1/2)	–	✓(1)	–	✓(2)	✓(2)	–	✓(2)	–
STREZELECKI	2010–2012	–	–	✓(2)	✓(2)	–	✓(2)	N(1/2)	–	✓(3)	–	–	N(1/2)
SUNGUARD	2011–2012	✓(1)	–	–	–	–	–	–	–	✓(2)	–	–	✓(2)
SUNSTATE	2011–2012	–	✓(1)	–	–	✓(1)	–	–	–	✓(2)	17(1/2)	–	–
SUNTOP	2012	–	–	–	✓(1)	–	–	–	–	–	–	–	–
SUNVALE	2011–2012	–	–	–	✓(2)	–	–	–	–	✓(1)	14(1/2)	–	N(1/2)
SUNVEX	2010–2012	–	✓(2)	–	N(1/2)	–	–	–	✓(1)	–	N(2/3)	✓(3)	✓(1)
SUNZELL	2011–2012	✓(2)	–	–	✓(2)	–	✓(1)	–	–	–	–	✓(2)	✓(2)
VENTURA	2010–2012	–	✓(2)	–	✓(2)	✓(1)	✓(2)	–	✓(1)	✓(3)	N(1/2)	✓(1)	–
WAAGAN	2011–2012	–	–	✓(2)	N(1/2)	–	–	9(1/2)	–	✓(2)	–	–	10(1/2)
WALLUP	2012	–	–	–	✓(1)	✓(1)	–	–	–	–	–	✓(1)	–
YENDA	2010–2012	✓(1)	✓(2)	–	–	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	–	✓(2)	–
YITPI	2010–2012	–	✓(2)	–	✓(2)	✓(3)	–	–	–	–	N(1/2)	–	N(1/2)
Recommended Rates (product/ha)		1.5 L	2.5 L	0.38 kg	7 g	60 g + 0.5 L	300 ml	20 g	0.5 L	200 g	1.7 L	0.75 L	1.7 L
Crop stage at application		IBS	IBS	3 L	3-leaf	3-leaf	3 L	3-leaf	3 L	3-leaf	5-leaf	5-leaf	5-6 L

Table 26. Barley variety response to herbicides Preliminary Evaluation trials 2008–2012

Herbicide		TriflurX® 480 Trifluralin	Achieve WG® Tralkoxydim	Tristar Advance® Diclofop-methyl + Fenoxaprop-p-ethyl	Bromoxynil Bromoxynil	Ally® Metsulfuron	Hotshot® Floroxypyr + Aminopyralid	Glean® Chlorsulfuron	Axial® Pinoxaden	Tigrex® MCPA +Diflufenican	Amicide 625® 2,4-D Amine	Banvel M® Dicamba + MCPA	Tordon 242® Picloram + MCPA
Variety	Years tested	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012	2008–2012
BASS	2009–2012	✓(4)	N(1/4)	N(1/4)	✓(4)	N(1/4)	✓(4)	N(1/4)	✓(4)	✓(4)	N(2/4)	N(1/4)	N(1/4)
BAUDIN	2009–2012	N(1/4)	N(1/4)	N(1/4)	✓(4)	✓(4)	✓(4)	N(1/4)	✓(4)	✓(4)	N(1/4)	✓(4)	✓(4)
BULOKE	2008–2012	N(1/5)	N(1/5)	N(2/5)	N(1/5)	N(1/5)	✓(4)	N(2/5)	✓(4)	✓(5)	N(1/5)	N(1/5)	N(1/5)
COMMANDER	2008–2012	N(2/5)	N(1/5)	✓(5)	N(1/5)	N(2/5)	✓(4)	N(2/5)	✓(4)	✓(5)	✓(5)	N(1/5)	✓(5)
COWABBIE	2009–2012	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)
FAIRVIEW	2009–2012	✓(4)	N(1/4)	N(1/4)	N(1/4)	✓(4)	✓(4)	N(1/4)	N(1/4)	N(1/4)	✓(4)	✓(4)	✓(4)
FATHOM	2011–2012	N(2/2)	N(2/2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	N(1/2)	✓(2)
FINNISS	2010–2012	✓(3)	N(1/3)	✓(3)	N(1/3)	N(1/3)	✓(3)	N(1/3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)
FLEET	2008–2012	✓(5)	N(1/5)	N(1/5)	N(1/5)	N(3/5)	N(1/4)	N(3/5)	N(1/4)	N(3/5)	N(2/5)	N(3/5)	✓(5)
FLINDERS	2011–2012	N(2/2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)
GAIRDNER	2008–2012	N(1/5)	N(1/5)	N(1/5)	✓(5)	N(1/5)	N(1/4)	N(1/5)	✓(4)	N(1/5)	✓(5)	N(1/5)	N(1/5)
GRANGE	2012	N(1/1)	N(1/1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)
HENLEY	2011–2012	N(1/2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)	N(1/2)	✓(2)
HINDMARSH	2008–2012	N(1/5)	N(1/5)	✓(5)	N(1/5)	N(2/5)	✓(4)	N(2/5)	✓(4)	N(1/5)	N(1/5)	N(2/5)	✓(5)
MACQUARIE	2009–2012	N(1/4)	N(1/4)	✓(4)	✓(4)	N(1/4)	N(1/4)	N(2/4)	N(1/4)	✓(4)	✓(4)	✓(4)	✓(4)
NAVIGATOR	2010–2012	✓(3)	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	N(1/3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)
OXFORD	2009–2012	N(1/4)	N(1/4)	✓(4)	✓(4)	N(1/4)	✓(4)	N(1/4)	✓(4)	✓(4)	N(2/4)	✓(4)	✓(4)
SCHOONER	2008–2012	✓(5)	N(2/5)	N(1/5)	N(1/5)	N(3/5)	✓(4)	N(1/5)	✓(4)	✓(5)	N(1/5)	N(2/5)	✓(5)
SCOPE	2010–2012	✓(3)	N(1/3)	N(1/3)	✓(3)	N(1/3)	N(1/3)	N(1/3)	✓(3)	✓(3)	✓(3)	N(2/3)	✓(3)
SHEPHERD	2010–2012	✓(3)	N(1/3)	✓(3)	✓(3)	N(1/3)	✓(3)	N(1/3)	✓(3)	✓(3)	N(2/3)	N(2/3)	✓(3)
SKIPPER	2010–2012	N(1/2)	N(1/2)	✓(2)	✓(2)	N(1/2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)
SY RATTLER	2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)	✓(1)	✓(1)	✓(1)
TULLA	2010	✓(1)	N(1/1)	✓(1)	✓(1)	N(1/1)	✓(1)	N(1/1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)
URAMBIE	2008–2012	✓(5)	N(2/5)	✓(5)	N(1/5)	N(1/5)	✓(4)	N(2/5)	N(1/4)	✓(5)	✓(5)	N(1/5)	✓(5)
WESTMINSTER	2011–2012	N(1/2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)
WIMMERA	2010–2012	N(2/3)	N(1/3)	N(1/3)	N(1/3)	✓(3)	N(1/3)	N(1/3)	N(1/3)	N(1/3)	N(2/3)	N(1/3)	N(2/3)
Rates (product/ha)		3.0 L	0.76 kg	3.0 L	4.0 L	10 g	1.5 L	40–50 g	600 ml	1.5 L	2.6 L	2.8–3.4 L	2.0 L
Crop stage at spraying		IBS	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	5-leaf	5-leaf	5-leaf	5-leaf

Table 27. Barley variety response to herbicides Advanced Evaluation trials 2010–2012

Herbicide		Trifluralin	Tralkoxydim	Diclofop-methyl + Fenoxaprop-p-ethyl	Bromoxynil	Metsulfuron	Floroxypyr + Aminopyralid	Cchlorsulfuron	Pinoxaden	MCPA +Diflufenican	2,4-D Amine	Dicamba + MCPA	Picloram + MCPA
Variety	Years tested	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012	2010–2012
BASS	2010–2012	N(1/1)	✓(2)	✓(3)	–	✓(2)	–	✓(2)	–	–	✓(2)	N(1/3)	–
BAUDIN	2010–2012	✓(1)	–	✓(3)	✓(1)	✓(3)	–	✓(2)	–	–	✓(3)	✓(1)	–
BULOKE	2010–2012	✓(3)	✓(3)	N(1/3)	✓(3)	✓(3)	–	✓(2)	✓(3)	–	✓(3)	✓(3)	7(1/3)
COMMANDER	2010–2012	✓(3)	✓(2)	–	✓(4)	11–11(2/4)	–	19–21(2/4)	–	9(1/3)	✓(4)	✓(4)	11–12(2/4)
COWABBIE	2011	–	–	–	✓(1)	✓(1)	–	–	–	–	–	✓(1)	✓(1)
FAIRVIEW	2011–2012	–	✓(2)	✓(2)	–	–	–	✓(2)	✓(1)	✓(1)	–	–	–
FATHOM	2012	✓(1)	✓(1)	–	–	–	✓(1)	13(1/1)	✓(1)	✓(1)	–	8(1/1)	–
FINNISS	2011–2012	–	✓(2)	–	–	✓(2)	–	✓(2)	✓(2)	–	–	N(1/2)	–
FLEET	2010–2012	–	✓(1)	8(1/2)	✓(3)	N(1/3)	8(1/3)	36(1/3)	✓(2)	13(1/3)	N(1/3)	✓(3)	–
FLINDERS	2012	✓(1)	–	–	–	–	–	–	–	–	–	–	–
GAIRDNER	2010–2012	✓(3)	9(1/2)	✓(2)	✓(1)	✓(2)	N(1/3)	✓(2)	15(1/3)	–	–	13(1/3)	✓(3)
HENLEY	2012	✓(1)	–	–	–	–	–	–	–	–	✓(1)	11(1/1)	–
HINDMARSH	2010–2012	✓(3)	✓(3)	✓(1)	✓(3)	N(1/2)	N(1/3)	✓(2)	✓(3)	10–12(2/3)	✓(3)	N(1/3)	✓(1)
MACQUARIE	2011–2012	✓(1)	✓(2)	–	–	✓(2)	9(1/1)	✓(2)	✓(2)	–	–	–	–
NAVIGATOR	2011–2012	✓(1)	✓(1)	–	✓(1)	10(1/2)	✓(1)	✓(2)	✓(1)	✓(1)	–	✓(1)	–
OXFORD	2011–2012	–	✓(2)	–	–	✓(2)	–	✓(2)	–	–	✓(2)	–	–
SCHOONER	2010–2012	✓(1)	✓(3)	N(1/3)	✓(3)	N(1/3)	✓(3)	38(1/3)	✓(3)	N(1/1)	✓(3)	15(1/3)	✓(3)
SCOPE	2011–2012	–	✓(2)	✓(2)	–	9(1/2)	✓(1)	10(1/2)	–	–	–	✓(2)	–
SHEPHERD	2011–2012	–	✓(2)	–	–	10(1/2)	–	✓(2)	–	–	✓(2)	N(2/2)	–
SKIPPER	2011–2012	✓(1)	✓(2)	✓(2)	✓(1)	N(1/2)	✓(1)	N(1/2)	7(1/2)	✓(1)	✓(1)	✓(2)	–
URAMBIE	2010–2012	–	✓(3)	–	✓(3)	✓(2)	–	13(1/2)	✓(2)	–	–	N(1/3)	–
WESTMINSTER	2012	✓(1)	–	–	–	–	–	✓(1)	–	–	–	15(1/1)	–
WIMMERA	2012–2011	✓(1)	✓(2)	–	–	✓(1)	–	✓(2)	–	–	✓(2)	–	✓(1)
Rates (product/ha)		1.5 L	0.38 kg	1.5 L	2.0 L	5 g	750 ml	20–25 g	300 ml	0.75 L	1.3 L	1.4–1.7 L	1.0 L
Crop stage at spraying		IBS	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	5-leaf	5-leaf	5-leaf	5-leaf

Table 28. Triticale variety response to herbicides Advanced Evaluation trials 1996–2011

Herbicide		**Triflurx®** 480 Trifluralin	**AchieveWG®** Tralkoxydim	**Tristar Advance®** Diclofop-methyl + fenoxaprop-p-ethyl	**Bromoxynil** bromoxynil	**Ally®** metsulfuron	**Hotshot®** Floroxypyr + aminopyralid	**Glean®** chlorsulfuron	**Tigrex®** MCPA +Diflufenican	**Amicide 625® or Amicide 500** 2,4-D Amine	**Banvel M®** Dicamba + MCPA	**Tordon 242®** Picloram + MCPA	**Starane** Fluroxypyr	**Hoegrass®** Diclofop-methyl
Variety	**Years tested**	**2002–2011**	**1996–2011**	**2000–2011**	**2001–2011**	**1998–2011**	**2009**	**1996–2011**	**1997–2011**	**1999–2011**	**2001–2011**	**2001–2011**	**2009**	**1996–1999**
ABACUS	1996–2005	✓(9)	✓(3)	✓(9)	✓(6)	N(2/5)	14(1/6)	10(1/3)	N(1/3)	10(1/3)	N(2/5)	N(1/3)	–	18(1/3)
BERKSHIRE	2008–2010	✓(3)	✓(3)	N(1/3)	✓(3)	20(1/2)	14(1/1)	N(1/3)	✓(3)	N(1/3)	20(1/2)	16(1/2)	✓(1)	–
BREAKWELL	2003–2010	✓(5)	N(1/5)	✓(5)	✓(5)	✓(5)	N(1/5)	9(1/3)	N(4/5)	9(1/3)	✓(5)	N(4/5)	✓(1)	–
CHOPPER	2012	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	–	–
CRACKERJACK	2008–2010	N(1/3)	N(1/3)	✓(3)	✓(3)	N(1/3)	N(1/3)	N(1/3)	17(1/3)	N(1/3)	N(1/3)	17(1/2)	✓(1)	–
CREDIT	1998–2005	✓(8)	✓(3)	✓(7)	N(1/6)	✓(5)	9(1/5)	N(1/6)	N(2/3)	N(1/6)	✓(5)	N(2/3)	–	N(1/2)
CURRENCY	1996–1998	✓(2)	–	N(1/3)	✓(1)	–	N(1/2)	–	–	–	–	–	–	11(1/2)
DUVAL	2003–2005	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	–	–
ELEANOR	2001–2003	✓(1)	✓(1)	✓(1)	✓(1)	9(1/1)	✓(1)	✓(1)	✓(1)	✓(1)	9(1/1)	✓(1)	–	–
ENDEAVOUR	2004–2012	✓(7)	N(1/7)	✓(7)	7(1/3)	✓(7)	N(2/7)	✓(7)	N(1/7)	✓(6)	✓(6)	N(1/6)	✓(1)	–
EVEREST	2000–2005	✓(6)	✓(3)	N(2/5)	✓(4)	✓(5)	9–10(2/3)	✓(5)	N(1/3)	✓(5)	✓(5)	N(1/3)	–	–
FALCON	2005	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	–	–
FUSION	2012	✓(1)	✓(1)	N(1/1)	7(1/1)	N(1/1)	✓(1)	8(1/1)	✓(1)	✓(1)	✓(1)	✓(1)	–	–
GOANNA	2011–2012	✓(2)	7(1/2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	N(1/2)	✓(1)	✓(1)	✓(1)	–	–
HAWKEYE	2008–2010	✓(3)	✓(3)	✓(3)	N(1/3)	N(1/3)	N(2/3)	✓(3)	N(1/3)	✓(3)	N(1/3)	N(1/3)	✓(1)	–
HILLARY	2001	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)	✓(1)	N(1/1)	N(1/1)	N(1/1)	N(1/1)	N(1/1)	–	–
JACKIE	2001–2004	✓(2)	✓(2)	N(1/2)	N(1/2)	N(1/2)	N(1/2)	17(1/2)	12(1/1)	17(1/1)	N(1/2)	12(1/1)	–	–
JAYWICK	2008–2010	N(1/3)	✓(3)	✓(3)	N(1/3)	N(1/3)	N(2/3)	✓(3)	✓(3)	✓(3)	N(1/3)	✓(3)	✓(1)	–
KOSCIUSZKO	2003–2011	✓(5)	✓(5)	✓(5)	✓(5)	N(1/5)	✓(5)	✓(5)	6(1/5)	✓(5)	N(1/5)	6(1/3)	✓(1)	–
MAIDEN	1996–1999	✓(3)	–	✓(4)	✓(2)	–	N(1/3)	✓(1)	–	✓(1)	–	–	–	✓(3)
MUIR	1996–1999	✓(3)	–	✓(4)	✓(2)	–	✓(3)	✓(1)	–	✓(1)	–	–	–	N(1/3)
PRIME322	2001–2004	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	11(1/3)	N(2/2)	11(1/1)	✓(2)	N(2/2)	–	–
RYESUN	1996–1997	✓(1)	–	✓(2)	–	–	✓(1)	–	–	–	–	–	–	–
SPEEDEE	2002–2004	✓(1)	✓(1)	✓(1)	✓(2)	5(1/1)	6(1/1)	7(1/1)	9(1/1)	7(1/1)	5(1/1)	9(1/1)	–	–
TAHARA	1996–1998	✓(2)	–	✓(3)	✓(1)	–	N(1/2)	–	–	–	–	–	–	N(1/2)
TICKIT	2001–2003	✓(1)	9(1/2)	✓(1)	✓(2)	8(1/1)	7(1/1)	N(1/1)	7(1/1)	N(1/1)	8(1/1)	7(1/1)	–	–
TOBRUK	2004–2011	✓(5)	✓(5)	✓(5)	✓(5)	✓(5)	N(2/5)	N(1/5)	N(1/5)	N(1/5)	✓(5)	N(1/5)	✓(1)	–
TREAT	2001–2003	N(1/1)	✓(2)	✓(1)	✓(2)	8(1/1)	8(1/1)	N(1/1)	N(1/1)	N(1/1)	8(1/1)	N(1/1)	–	–
YOWIE	2011–2012	✓(2)	8(1/2)	✓(2)	✓(2)	N(1/2)	✓(2)	✓(2)	✓(2)	✓(1)	✓(1)	✓(1)	–	–
Rates (product/ha)		1.5 L	0.38 kg	1.5 L	2.0 L	5 g	750 ml	20–25 g	0.75 L	1.3L – 1.7 L	1.4–1.7 L	1.0 L	300 ml	2.0 L (375 g/L)
Crop stage at spraying		IBS	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	3-leaf	5-leaf	5-leaf	5-leaf	5-leaf	5-leaf	3-leaf

Table 28. Triticale variety response to herbicides Advanced Evaluation trials 1996–2011 (continued)

Herbicide		**Jaguar®** Diflufenican + Bromoxynil	**Lontrel®** Clopyralid	**Paragon®** Picolinafen + MCPA	Cadence® Dicamba	**Avadex Xtra® IBS** Trialliate	**Glean® IBS** Chlorsulfuron	**Boxer Gold® IBS** Prosulfocarb + S-Metolachlor	**Diuron + MCPA** Diuron + MCPA	**Sakura IBS** Pyroxasulfone	**Amicide® Advance 700** 2,4-D Amine	**Wildcat®** Fenoxaprop -p-ethyl	**Agtryne MA®** Terbutryn + MCPA	**Dual Gold®) PSPE** S-Metolachlor
Variety	**Years tested**	**1996**	**1996–1998**	**2001**	**1998–2000**	**2002–2009**	**2002–2004**	**2009**	**2009**	**2011**	**2011**	**2003–2004**	**2000–2004**	**2004**
ABACUS	1996–2005	✓(1)	✓(3)	✓(1)	11(1/4)	✓(2)	7(1/2)	–	–	–	–	10(1/1)	N(1/2)	–
BERKSHIRE	2008–2010	–	–	–	–	–	–	–	–	–	–	–	–	–
BREAKWELL	2003–2010	–	–	–	–	✓(2)	–	✓(1)	✓(1)	9(1/1)	✓(1)	–	–	–
CHOPPER	2012	–	–	–	–	–	–	–	–	–	–	–	–	–
CRACKERJACK	2008–2010	–	–	–	–	–	–	–	–	–	–	–	–	–
CREDIT	1998–2005	–	✓(1)	✓(1)	✓(4)	N(1/3)	7(1/3)	–	–	–	–	N(1/2)	N(1/3)	✓(1)
CURRENCY	1996–1998	✓(1)	✓(3)	–	✓(1)	–	–	–	–	–	–	–	–	–
DUVAL	2003–2005	–	–	–	–	–	–	–	–	–	–	–	–	–
ELEANOR	2001–2003	–	–	–	–	–	–	–	–	–	–	–	–	–
ENDEAVOUR	2004–2012	–	–	–	–	–	–	–	–	–	–	–	–	–
EVEREST	2000–2005	–	–	✓(1)	✓(2)	✓(3)	7(1/3)	–	–	–	–	6(1/2)	10(1/3)	✓(1)
FALCON	2005	–	–	–	–	–	–	–	–	–	–	–	–	–
FUSION	2012	–	–	–	–	–	–	–	–	–	–	–	–	–
GOANNA	2011–2012	–	–	–	–	–	–	–	–	–	–	–	–	–
HAWKEYE	2008–2010	–	–	–	–	–	–	–	–	–	–	–	–	–
HILLARY	2001	–	–	–	–	–	–	–	–	–	–	–	–	–
JACKIE	2001–2004	–	–	–	–	–	–	–	–	–	–	–	–	–
JAYWICK	2008–2010	–	–	–	–	–	–	–	–	–	–	–	–	–
KOSCIUSZKO	2003–2011	–	–	–	–	N(1/3)	✓(1)	✓(1)	8(1/1)	✓(1)	7(1/1)	✓(1)	9(1/1)	✓(1)
MAIDEN	1996–1999	✓(1)	11(1/3)	–	✓(2)	–	–	–	–	–	–	–	–	–
MUIR	1996–1999	✓(1)	✓(3)	–	✓(2)	–	–	–	–	–	–	–	–	–
PRIME322	2001–2004	–	–	–	–	–	–	–	–	–	–	–	–	–
RYESUN	1996–1997	–	–	–	–	–	–	–	–	–	–	–	–	–
SPEEDEE	2002–2004	–	–	–	–	–	–	–	–	–	–	–	–	–
TAHARA	1996–1998	✓(1)	✓(3)	–	✓(1)	–	–	–	–	–	–	–	–	–
TICKIT	2001–2003	–	–	–	–	–	–	–	–	–	–	–	–	–
TOBRUK	2004–2011	–	–	–	–	✓(2)	–	✓(1)	✓(1)	6(1/1)	6(1/1)	–	–	–
TREAT	2001–2003	–	–	–	–	–	–	–	–	–	–	–	–	–
YOWIE	2011–2012	–	–	–	–	–	–	–	–	–	–	–	–	–
Rates (product/ha)		**1.0 L**	**300 ml**	**375 ml**	**200 g**	**1.6 L**	**20 g**	**2.5 L**	**500 ml+350 ml**	**118 g**	**1.5 L**	**500 ml**	**1.0 L**	**500 ml**
Crop stage at spraying		**3-leaf**	**3-leaf**	**3-leaf**	**3-leaf**	**IBS**	**IBS**	**IBS**	**3-leaf**	**IBS**	**Z31**	**4-leaf**	**3-5 leaf**	**PSPE**

Table 29. Field pea variety response to herbicides Advanced Evaluation trials 1996–2012

Herbicide		Triflur® 480 IBS Trifluralin	Stomp® IBS Pendimethalin	Terbyne® IBS Terbyne	Sencor 750® PSPE Metribuzin	Spinnaker® PSPE Imazethapyr	Brodal® + MCPA Diflufenican + MCPA	Raptor® Imazamox	Broadstrike® Flumetsulam	Brodal® Options Diflufenican
Variety	Years tested	2001–2012	2002–2012	2010–2012	1998–2012	1996–2012	2005, 2008,2012	2001–2012	1996–2012	1997–2000
SW CELINE	2012	N(1/1)	✓(1)	9(1/1)	✓(1)	12(1/1)	✓(1)	N(1/1)	✓(1)	–
CRC WALANA	2012	✓(1)	✓(1)	✓(1)	✓(1)	12(1/1)	✓(1)	✓(1)	✓(1)	–
EXCELL	1997–2010	13–13(3/4)	9(1/4)	✓(1)	11–56(4/7)	N(2/10)	N(1/3)	N(3/6)	19(1/4)	✓(4)
KASPA	2004–2012	N(1/3)	14(1/4)	✓(4)	N(3/6)	13(1/4)	✓(3)	N(2/4)	N(2/3)	–
MAKI	2008	N(1/1)	✓(1)	–	✓(1)	N(1/1)	N(1/1)	N(1/1)	✓(1)	–
MORGAN	1996–2008	N(1/1)	✓(1)	–	✓(3)	N(1/5)	✓(2)	✓(1)	✓(5)	✓(3)
PARAFIELD	1999–2008	11–11(2/3)	N(2/4)	–	9–51(3/6)	N(2/7)	N(1/3)	8(1/4)	15(1/4)	✓(2)
PBA GUNYAH	2010–2012	✓(1)	✓(2)	✓(3)	✓(3)	N(1/3)	✓(1)	✓(1)	✓(1)	–
PBA OURA	2010–2012	✓(1)	N(1/2)	✓(3)	✓(3)	N(1/3)	✓(1)	✓(1)	✓(1)	–
PBA PEARL	2012	✓(1)	✓(1)	✓(1)	✓(1)	25(1/1)	✓(1)	✓(1)	✓(1)	–
PBA PERCY	2010–2012	✓(1)	✓(2)	30(1/3)	17(1/3)	14–29(2/3)	✓(1)	✓(1)	N(1/1)	–
STURT	2005–2012	✓(3)	✓(3)	✓(2)	N(2/3)	16(1/2)	N(1/3)	N(1/3)	✓(3)	–
TWLIGHT	2010–2012	✓(1)	✓(2)	✓(2)	✓(2)	N(1/2)	✓(1)	✓(1)	✓(1)	–
YARRUM	2005–2012	N(1/3)	✓(3)	✓(2)	N(1/3)	N(2/4)	✓(3)	N(1/3)	✓(3)	–
Rates (product/ha)		1.5 L	3.0 L	1.4 kg	380 g	100 g	150 ml + 150 ml	45 g	25 g	200 ml
Crop stage at spraying		IBS	IBS	IBS	PSPE	PSPE	4 node	4 node	4 node	4 node

Table 29. Field pea variety response to herbicides Advanced Evaluation trials 1996–2012 (continued)

Herbicide		MCPA 250 MCPA	Select® Clethodim	Avadex® Xtra IBS Triallate	Bladex® Cyanazine	Igran® Terbutryn flowable	Diuron PSPE Furrows open Diuron	Diuron® 500 IBS Diuron 500 g/L	Sencor® 750 2 node Metribuzin	Terbyne® PSPE Terbyne	Bladex® 900, 2 node Cyanazine
Variety	Years tested	1997	1998–2008	2003–2010	2002,2010	2004+2009	2005	2009–2010	2009	2010	2010
SW CELINE	2012	–	–	–	–	–	–	–	–	–	–
CRC WALANA	2012	–	–	–	–	–	–	–	–	–	–
EXCELL	1997–2010	N(1/1)	✓(4)	✓(3)	✓(1)	14–35(3/4)	N(1/1)	✓(1)	N(1/1)	N(1/1)	✓(1)
KASPA	2004–2012	–	✓(2)	✓(2)	N(1/1)	8–20(3/4)	N(1/1)	22(1/2)	23(1/1)	✓(1)	✓(1)
MAKI	2008	–	–	–	–	–	–	–	–	–	–
MORGAN	1996–2008	✓(1)	✓(2)	–	–	–	–	–	–	–	–
PARAFIELD	1999–2008	–	✓(3)	12(1/2)	✓(1)	N(2/3)	✓(1)	–	–	–	–
PBA GUNYAH	2010–2012	–	✓(1)	–	N(1/1)	–	–	N(1/1)	–	–	–
PBA OURA	2010–2012	–	N(1/1)	–	✓(1)	–	–	N(1/1)	–	–	–
PBA PEARL	2012	–	–	–	–	–	–	–	–	–	–
PBA PERCY	2010–2012	–	N(1/1)	–	✓(1)	–	–	N(1/1)	–	–	–
STURT	2005–2012	–	–	✓(2)	–	N(1/1)	–	N(1/1)	17(1/1)	N(1/1)	N(1/1)
TWLIGHT	2010–2012	–	✓(1)	–	N(1/1)	–	–	N(1/1)	–	–	–
YARRUM	2005–2012	–	–	✓(2)	–	N(1/1)	–	N(1/1)	✓(1)	✓(1)	✓(1)
Rates (product/ha)		1.0 L	375 ml	1.6 L	2.0 kg	850 ml	1.21 L	1.50 L	380 g	1.0 kg	1.1 kg
Crop stage at spraying		6 node	4 node	IBS	PSPE	3 node	PSPE	IBS	2 node	PSPE	2 node

Table 30. Oat variety response to herbicides Advanced Evaluation trials 1996–2012

Herbicide		Agtryne MA® Terbutryn + MCPA	Bromoxynil Bromoxynil	Glean® Chlorsulfuron	Buttress® 2,4-DB	Banvel M® Dicamba + MCPA	Tigrex® MCPA + Diflufenican	Amicide 625® or Amicide 500 2,4-D Amine	Tordon 242® Picloram + MCPA
Variety	Years tested	2002–2012	1996–2012	2000–2012	2001–2012	1998–2012	1996–2012	1996–2012	1997–2012
BANNISTER	2012	✓(1)	N(1/1)	✓(1)	15(1/1)	N(1/1)	11(1/1)	17(1/1)	✓(1)
BARCOO	1999–2003	N(1/4)	✓(3)	✓(3)	N(1/1)	✓(1)	✓(4)	N(2/3)	16(1/2)
BRUSHER	2003–2011	N(2/5)	N(1/5)	✓(5)	✓(5)	N(4/5)	N(1/5)	N(3/5)	6(1/5)
COOLABAH	1996–1998	✓(1)	✓(2)	✓(3)	–	–	✓(2)	N(2/2)	✓(1)
DROVER	2005	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)
DUNNART	2011–2012	N(1/2)	9(1/2)	✓(2)	✓(2)	N(1/2)	14(1/2)	8(1/2)	✓(2)
EURABBIE	1999–2005	N(1/9)	N(1/3)	✓(9)	10(1/2)	9–37(3/6)	10(1/8)	9–56(4/8)	N(1/5)
EURO	1996–2003	8(1/2)	13(1/3)	✓(2)	✓(2)	72(1/2)	✓(3)	✓(3)	5(1/3)
FORESTER	2011	✓(1)	✓(1)	✓(1)	✓(1)	N(1/1)	✓(1)	N(1/1)	✓(1)
GWYDIR	1999–2003	12(1/4)	15(1/3)	N(1/3)	✓(2)	✓(2)	16(1/4)	N(2/3)	19(1/2)
MANNUS	2003–2011	N(1/5)	✓(5)	✓(5)	✓(5)	N(4/5)	N(1/5)	N(3/5)	7(1/2)
MITIKA	2004–2012	N(2/7)	8(1/7)	17(1/7)	10–12(2/7)	9–15(2/3)	N(3/7)	21(1/3)	9(1/3)
MORTLOCK	1996	–	✓(1)	✓(1)	–	–	–	N(1/1)	–
MULGARA	2008–2010	✓(3)	N(1/3)	✓(3)	✓(3)	N(2/3)	N(3/3)	N(2/3)	N(1/3)
POSSUM	2003–2010	22–22(2/4)	8(1/2)	21(1/7)	✓(5)	7–21(4/4)	11–11(2/4)	N(2/7)	N(1/5)
QUOLL	1998–2002	8(1/4)	N(1/3)	✓(4)	N(1/1)	47(1/1)	N(1/4)	N(1/4)	✓(1)
TAMMAR	2011–2012	N(1/2)	N(1/2)	✓(2)	✓(2)	✓(2)	N(2/2)	N(1/2)	✓(2)
TUNGOO	2008–2010	✓(3)	✓(3)	N(1/3)	✓(3)	N(2/3)	N(1/3)	N(2/3)	N(1/3)
WINTAROO	2003–2010	✓(5)	5(1/5)	✓(5)	✓(5)	N(3/5)	N(2/5)	N(2/5)	N(2/5)
WOMBAT	2011–2012	9–13(2/2)	10(1/2)	✓(2)	10–16(2/2)	16(1/2)	13(1/2)	19(1/2)	10(1/2)
YALLARA	2011–2012	✓(2)	N(1/2)	✓(2)	8(1/2)	N(1/2)	8–9(2/2)	19(1/2)	✓(2)
YARRAN	1996–2003	5–6(2/6)	5–6(2/4)	✓(8)	6(1/2)	4–32(3/5)	4–10(2/7)	5–20(2/7)	8(1/6)
YIDDAH	2001–2010	N(2/8)	8(1/6)	✓(8)	N(1/6)	60(1/5)	✓(8)	9–20(2/5)	30(1/3)
Rates (product/ha)		1.0 L	2.0 L	25 g	1.6 L	1.4–1.7 L	0.75 L	1.3 L–1.7 L	1.0 L
Crop stage at spraying		3–5 leaf	3-leaf	3-leaf	3-leaf	5-leaf	5-leaf	5-leaf	5-leaf

Table 30. Oat variety response to herbicides Advanced Evaluation trials 1996–2012 (continued)

Herbicide		MCPA amine MCPA amine	MCPA LVE MCPA LVE	2,4–D LVE 2,4–D LVE estercide 600g/kg	Buctril® MA Bromoxynil + MCPA	Dual Gold®) PSPE S-Metolachlor	Amicide® Advance700 2,4-D Amine	Diuron500 Diuron	Cadence® Dicamba	Lontrel® Clopyralid
Variety	Years tested	1998–2005	2002–2004	2003	2002–2005	2004	2011	2009	1996–1999	1998
BANNISTER	2012									
BARCOO	1999–2003	✓(1)	–	–	–	✓(1)	–	–	✓(2)	–
BRUSHER	2003–2011	–	–	–	–	–	6(1/1)	✓(1)	–	–
COOLABAH	1996–1998	✓(1)	–	–	–	–	–	–	✓(1)	✓(1)
DROVER	2005	–	–	–	–	–	–	–	–	–
DUNNART	2011–2012	–	–	–	–	–	–	–	–	–
EURABBIE	1999–2005	✓(5)	✓(3)	15(1/1)	✓(4)	✓(3)	–	–	✓(2)	–
EURO	1996–2003	–	–	–	–	–	–	–	–	–
FORESTER	2011	–	–	–	–	–	–	–	–	–
GWYDIR	1999–2003	✓(1)	–	–	–	✓(1)	–	–	✓(2)	–
MANNUS	2003–2011	–	–	–	–	–	✓(1)	✓(1)	–	–
MITIKA	2004–2012	–	–	–	–	–	7(1/1)	✓(1)	–	–
MORTLOCK	1996	–	–	–	–	–	–	–	–	–
MULGARA	2008–2010	–	–	–	–	–	–	N(1/1)	–	–
POSSUM	2003–2010	✓(2)	✓(2)	–	10–10(2/2)	✓(2)	–	✓(1)	–	–
QUOLL	1998–2002	N(1/2)	–	–	–	✓(1)	–	–	✓(3)	✓(1)
TAMMAR	2011–2012	–	–	–	–	–	–	–	–	–
TUNGOO	2008–2010	–	–	–	–	–	–	✓(1)	–	–
WINTAROO	2003–2010	–	–	–	–	–	–	N(1/1)	–	–
WOMBAT	2011–2012	–	–	–	–	–	–	–	–	–
YALLARA	2011–2012	–	–	–	–	–	–	–	–	–
YARRAN	1996–2003	✓(3)	✓(1)	7(1/1)	5–10(2/2)	–	–	–	N(1/1)	✓(1)
YIDDAH	2001–2010	✓(2)	✓(2)	–	✓(2)	✓(2)	–	✓(1)	–	–
Rates (product/ha)		2.0 L	1.6 L	500 ml	2.0 L	500 ml	1.5 L	900 ml	200 g	300 ml
Crop stage at spraying		5-leaf	5-leaf	5-leaf	3-leaf	PSPE	Z31	3-leaf	4-leaf	4-leaf

Table 31. Lupin variety response to herbicides

Herbicide		Triflur®480® IBS Trifluralin	Stomp® IBS Pendimethalin	Simazine 500 g/L Simazine	Brodal® 8–0 Leaf Diflufenican	Eclipse® 4 leaf Metosulam	Eclipse® 6–10 leaf Metosulam	Avadex®Xtra IBS Triallate	Terbyne® IBS Terbyne	Terbyne® PSPE Terbyne	Eclipse® + Brodal® 2–6 leaf Metosulam + Diflufenican
Variety	Years tested	2000–2012	1997–2012	1998–2012	1996–2012	1996–2012	1996–2008	2002–2010	2010–2012	2010	2009
COROMUP	2008	✓(1)	✓(1)	N(1/1)	✓(1)	N(1/1)	–	–	–	–	–
JENABILLUP	2010–2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	–	–	8(1/2)	–	–
JINDALEE	1997–2012	✓(8)	✓(8)	N(2/9)	N(1/6)	15(1/6)	N(1/6)	✓(2)	✓(1)	–	–
KALYA	1998–1999	–	–	✓(2)	11(1/1)	N(1/2)	✓(1)	–	–	–	–
KIEV MUTANT	1996–2008	✓(8)	✓(8)	N(5/9)	N(1/6)	✓(7)	✓(8)	✓(2)	–	–	–
LUXOR	2004–2012	✓(4)	✓(5)	N(2/4)	✓(4)	✓(3)	✓(1)	✓(2)	6(1/3)	12(1/1)	N(1/1)
MAGNA	1999	–	–	✓(1)	–	✓(1)	✓(1)	–	–	–	–
MANDELUP	2001–2012	✓(5)	✓(6)	N(2/5)	N(1/4)	N(1/3)	N(1/2)	8(1/3)	9(1/3)	N(1/1)	15(1/2)
MERRIT	1996–1999	–	✓(1)	✓(2)	✓(3)	13(1/4)	14(1/3)	–	–	–	–
MOONAH	2000–2002	✓(1)	–	N(1/1)	✓(1)	✓(3)	N(1/1)	–	–	–	–
MYALLIE	1996–1999	–	–	✓(2)	✓(2)	N(2/3)	19(1/2)	–	–	–	–
PBA GUNYIDI	2010–2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	–	–	✓(1)	–	–
QUILINOCK	2000–2005	✓(7)	✓(6)	N(1/7)	N(1/3)	✓(3)	N(2/5)	✓(2)	–	–	–
ROSETTA	2004–2012	✓(4)	✓(5)	N(1/4)	✓(4)	N(1/3)	✓(1)	✓(2)	N(1/3)	N(1/1)	✓(1)
TANJIL	1998	–	–	✓(1)	✓(1)	N(1/1)	–	–	–	–	–
WONGA	1996–2010	✓(7)	✓(9)	N(2/10)	N(2/7)	8(1/8)	14–24(2/7)	✓(4)	N(1/1)	N(1/1)	16(1/2)
Rates (product/ha)		1.5 L	3.0 L	3.0 L	200 ml	10 g	10 g	1.6 L	1.0 L	1.0 L	7 g + 100 ml
Crop stage at spraying		IBS	IBS	PSPE	8–10 leaf	2–6 leaf	6–10 leaf	IBS	IBS	PSPE	2–6 leaf

Table 31. Lupin variety response to herbicides (continued)

Herbicide		Simazine 4–6 leaf Simazine	Fusion® Fluazifop-p + Butroxydim	Simazine900 + Brodal® 4–6 leaf Simazine + Diflufenican	Simazine + Brodal® 6–10 leaf Simazine + Diflufenican	Targa® Quizalofop-P-ethyl	Eclipse® + Brodal® 4–8 leaf Metosulam + Diflufenican	Verdict®520 Haloxyfop-R	Sertin® Sethoxydim	Select® Clethodim	Simazine + Trifluralin IBS Simazine + Trifluralin
Variety	Years tested	2004	2004–2005	2005	1996	2002	2001	1998–2001	1998–2000	1999	1998
COROMUP	2008	–	–	–	–	–	–	–	–	–	–
JENABILLUP	2010–2012	–	–	–	–	–	–	–	–	–	–
JINDALEE	1997–2012	–	–	N(1/1)	–	✓(1)	✓(1)	✓(3)	✓(2)	–	✓(1)
KALYA	1998–1999	–	–	–	–	–	–	✓(1)	✓(1)	✓(1)	✓(1)
KIEV MUTANT	1996–2008	–	–	N(1/1)	N(1/1)	✓(1)	✓(1)	✓(2)	✓(1)	✓(1)	–
LUXOR	2004–2012	✓(1)	✓(1)	–	–	–	–	–	–	–	–
MAGNA	1999	–	–	–	–	–	–	–	–	✓(1)	–
MANDELUP	2001–2012	✓(1)	✓(1)	–	–	✓(1)	–	–	–	–	–
MERRIT	1996–1999	–	–	–	18(1/1)	–	–	✓(1)	✓(1)	✓(1)	✓(1)
MOONAH	2000–2002	–	–	–	–	–	–	✓(1)	✓(1)	–	–
MYALLIE	1996–1999	–	–	–	N(1/1)	–	–	✓(1)	✓(1)	✓(1)	✓(1)
PBA GUNYIDI	2010–2012	–	–	–	–	–	–	–	–	–	–
QUILINOCK	2000–2005	–	–	N(1/1)	–	✓(1)	✓(1)	✓(2)	✓(1)	–	–
ROSETTA	2004–2012	✓(1)	✓(1)	–	–	–	–	–	–	–	–
TANJIL	1998	–	–	–	–	–	–	✓(1)	✓(1)	–	✓(1)
WONGA	1996–2010	✓(1)	✓(1)	N(1/1)	22(1/1)	N(1/1)	✓(1)	✓(3)	✓(2)	✓(1)	✓(1)
Rates (product/ha)		1.5 L	280 ml–600 ml	1.0 L+150 ml	2.0 L + 200 ml	375 ml	5 g + 100 ml	100 ml	1.0 L	250 ml	1.5 L + 1.5 L
Crop stage at spraying		4–6 leaf	6–leaf	4–6 leaf	8–10 leaf	2–6 leaf	2–6 leaf	6–10 leaf	6 leaf	4 leaf	IBS

Table 32. Herbicide tolerance testing – Other crops

Species	Varieties tested	Years tested	Herbicides tested	Results/comments
Chickpea	Amythest, Bumper|Lassiter	1998	Broadstrike™, Sencor®, Sertin®, Simazine PSPE, Verdict™	Appeared safe for varieties tested
	Amythyst Howzat Jimbour	2002	Sencor®, Simazine PSPE, Stomp®, Triflur™ X, Avadex®, Bladex®	Appeared safe for varieties tested
			Broadstrike™	Yield loss Jimbour at normal rate
	Flipper Genesis 90 Genesis 509	2009 2010	Broadstrike™, Avadex®	Yield loss Genesis 509 at normal rate
			Sencor®	Yield loss Genesis 90 at normal rate
			Bladex®	Narrow safety margin Genesis 90
			Avadex®	Yield loss Flipper at normal rate (1 trial)
			Terbyne®	Appeared safe for varieties tested (1 trial)
Faba bean	Fiesta Barkool Icarus	1998 to 2000	Verdict™, Targa®, Sertin®	Appeared safe for varieties tested
			Sencor®	Narrow safety margin Fiesta, Barkool
			Spinnaker® + Simazine + Sencor®	Narrow for all varieties
			Simazine PSPE	Narrow safety margin Fiesta and Icarus
	Fiesta Manafest Fiord	2002 to 2003	Sencor®	Narrow safety margin all varieties
			Simazine PSPE	Narrow safety margin Fiesta
			Spinnaker® PSPE	Yield loss Fiord at normal rate (1 trial)
			Avadex® IBS	Appeared safe for varieties tested
	Farrah Fiesta Nura	2008 to 2010	Sencor®, Simazine PSPE, Bladex®	Narrow safety margin in 2008
			Avadex® IBS	Narrow margin on Fiesta ('08) and Farrah ('09)
			Terbyne® IBS	Yield loss in one trial only (2010)
Juncea	Dune	2009	Lontrel™ 750SG	Yield reduction at 1X and 2X rate
Lentils	Nugget Northfield	2001 2002 2004	Triflur™ X, Sertin®, Verdict™, Bladex®	Safe for varieties tested. Narrow margin with Bladex®
			Brodal®	Yield loss (1 trial) at normal rate Nugget, Narrow margin for Northfield
			Broadstrike™	Yield loss Northfield at normal rate (1 trial)
	Boomer Nipper Northfield	2008 2009 2010	Bladex®	Narrow safety margin all varieties
			Triflur™ X, Brodal®	Narrow safety margin Boomer
			Broadstrike™, Terbyne®	Narrow safety margin for Nipper and Northfield
Linseed	Glenelg	1993 1994	Trifluralin, Bromoxynil MA	Significant yield loss in one year
			Trifluralin	Reduced germination, seedling vigour and yield
			MCPA. Bromoxynil MA, Tordon™ 242	Reduced yield at recommended rate by 0–15%
			Hoegrass®, Fusilade®, Verdict™	Appeared safe at recommended rates
Lupin	Wonga Jindalee Quilinock Kiev Mutant	1998 1999 2000	Brodal®	Narrow margin Wonga, Kiev Mutant (1 trial)
			Eclipse®	Narrow margin Wonga (2 trials)
			Sertin®, Verdict™	Safe all varieties (2 trials)
			Simazine PSPE	Safe at normal rates, narrow margin for Kiev Mutant, Jindalee and Wonga
			Trifluralin PSI	Safe all varieties (1 trial)
	Jindalee Quilinock Wonga Kiev Mutant	2001 2002 2003	Eclipse®	Yield loss Wonga at normal rates (2 trials) Narrow margin Quilinock (1 trial)
			Simazine PSPE	Narrow margin Kiev Mutant (1 trial)
			Verdict™, Trifluralin IBS, Stomp®, Avadex®	Verdict™, Avadex® safe (1 trial), Sniper® (2 trials) trifluralin, Stomp® safe (3 trials) all varieties
			Targa®	Narrow margin for Wonga
	Jindalee Quilinock Wonga Mandelup Kiev Mutant Rosetta, Luxor	2004 2005 2008 2009 2010	Brodal®, Stomp®, Sniper®	Appeared safe in these years
			Eclipse®	Yield loss Wonga (1 trial) Narrow safety margin Mandelup, Rosetta
			Simazine PSPE	Yield loss Kiev Mutant (1 trial), narrow safety margin all varieties (1 trial) (Luxor 2 trials)
			Terbyne®	Yield loss in Luxor in 1 trial narrow margin for Mandelup, Rosetta, Wonga
			Avadex®	Yield loss Mandelup (1 trial) at normal rates
Safflower	S-317 Devexco, Sirothora, Sironaria	Pre 1998, 2008	Ally®, Triflur™ X, Stomp®	Narrow safety margin Stomp® on S-317 Devexco
			Hoegrass®, Avadex®	Only Sirothora and Sironaria tested, Both appeared safe

Table 33. Winter crop herbicide/insecticide compatibilities

This chart is a guide only. Read both product labels if using a mixture

FORMULATION	ACTIVE	PRODUCT	ACHIEVE®	ALLY®	ALPHA CYPERMETHERIN	AMICIDE® 625	ATLANTIS®	AVADEX®	AXIAL®	BASAGRAN	BIFENTHRIN	BLADEX®	BRAVO®	BROADSTRIKE™	BRODAL®	BROMICIDE® 200	BROMICIDE® MA	BUCTRIL® MA	BUTRESS®	CADENCE®	CHEETAH® GOLD	CHLORPYRIFOS	CONCLUDE™	CORRECT®	CRUSADER™	DECISION®	DELTAMETHRIN	DIMETHOATE	DITHANE™	DIURON
water dispersible granule	tralkoxydim	Achieve® Herbicide		N										C		C				N							C		
suspension concentrate	terbutryn + MCPA as K salt	Agtryne® MA	N	C																										
water dispersible granule	metsulfuron-methyl	Ally® Herbicide	N											C		C	C			C			C		C					C
soluble concentrate	2,4-D as dimethylamine and monomethylamine salts	Amicide® 700																												C
suspension concentrate	mesosulfuron-methyl + mefenpyr-diethyl	Atlantis® OD																C				N					C		
emulsifiable concentrates	tri-allate	Avadex® Xtra																												
emulsifiable concentrates	pinoxaden + cloquintocet-mexyl	Axial®																												
water dispersible granule	isoxaflutole	Balance® 750 Herbicide																												C
water dispersible granule	cyanazine	Bladex® 900 Herbicide																												
emulsifiable concentrates	prosulfocarb +S-metolachlor	Boxer Gold®		C	C	C				C												C					C		
suspension concentrate	chlorothalonil	Bravo® Fungicide																												
water dispersible granule	flumetsulam	Broadstrike™ Herbicide		C											C	C	C		C								C		C
suspension concentrate	diflufenican	Brodal® Options Herbicide	C											C		C											C		
emulsifiable concentrate	bromoxynil noe	Bromicide® 200 Herbicide		C										C	C								C		C		C		
emulsifiable concentrate	bromoxynil + MCPA noe	Bromicide® MA Herbicide	C	C										C									C	N	C		C		
soluble concentrate	2,4-DB dma (amine)**	Buttress®												C										N			C		C
water dispersible granule	dicamba as Na salt**	Cadence® Herbicide	N	C																			C		N				C
emulsifiable concentrates	diclofop-methyl + sethoxydim +fenoxaprop-P-ethyl + others	Cheetah® Gold												C				C											
suspension emulsion	florasulam + MCPA	Conclude™		C												C	C	C		C									
emulsifiable concentrate	propaquizafop	Correct®/Shogun® 100 Herbicide															N		N										
oil dispersible liquid	cloquintocet-mexyl + pyroxsulam	Crusader™		C												C	C			N		N							
emulsifiable concentrates	diclofop-methyl + sethoxydim + mefenpyr-diethyl	Decision®	N	N																										
emulsifiable concentrate	dimethoate	Dimethoate Insecticide	C											C	C	C	C		C										
wettable powder	mancozeb**	Dithane™ M-45® Fungicide																												
suspension concentrate	diuron*	Diuron Liquid Herbicide		C										C					C	C										
emulsifiable concentrates	S-metolachlor	Dual Gold®								C																				
emulsifiable concentrate	oryzalin + trifluralin	Duet® 250 Herbicide																												
water dispersible granule	metosulam	Eclipse® Herbicide	C	C											C	C	C			C	C									C
suspension concentrate	pyraflufen-ethyl	Ecopar®	N	C																										
emulsifiable concentrate	alpha-cypermethrin	Fastac Duo® Insecticide	C												C				C									C	C	
soluble concentrate	imazapic as ammonium	Flame®		C		C														N										
emulsifiable concentrate	picolinafen + bromoxynil + MCPA	Flight® EC		C												C														
emulsifiable concentrate	fluazifop*	Fusilade® Herbicide																												
emulsifiable concentrate	triclopyr	Garlon™ 600																												
suspension concentrate	atrazine*	Gesaprim® 600 Herbicide																		C										C
suspension concentrate	simazine*	Gesatop® 600 Herbicide												C	C															C
wettable powder	chlorsulfuron	Glean® Herbicide		N				C								C	C			C								C		C
emulsifiable concentrate	oxyfluorfen	Goal® Herbicide																												
soluble concentrate	paraquat	Gramoxone® 250 Herbicide						C						C																C
emulsifiable concentrate	triclopyr + picloram + aminopyralid	Grazon™ Extra Herbicide		C																										
emulsifiable concentrates	carfentrazone-ethyl	Hammer®				C																								
water dispersible granule	thifensulfuron-methyl + metsulfuron-methyl	Harmony® M Herbicide	N																											
emulsifiable concentrate	diclofop	Hoegrass® 500 Herbicide		N										C		C	C	C										C		
emulsifiable concentrates	aminopyralid as tipa +fluroxypyr as mhe	Hotshot™		C																					C					
water dispersable granules	iodosulfuron-methyl-Na +mefenpyr-diethyl	Hussar®		N			N							N			N	N				N								
suspension concentrate	terbutryn	Igran® 500 Herbicide		C										C						C				N						
emulsifiable concentrate	phosmet	Imidan® Insecticide	C																C											
soluble concentrate	imazamox as ammonium +imazapyr as ammonium	Intervix®																												
emulsifiable concentrate	bromoxynil octanoate	Jaguar® Herbicide		C		N	C							C					C	C				N				C		

C = Compatible. N = Not compatible. Where there is a blank compatibility is not known, contact the manufacturer. Compatibility is dependent upon use pattern (both crop and weeds), rate, surfactant/compatibility agent and temperature. Water quality also affects compatibility. Mixtures generally require greater agitation. Mixing more than two chemicals affects compatibility and is not recommended.
This chart only indicates which chemicals are compatible in mixtures at the time of compilation (9/05). Read the compatibility and crop safety sections of both labels before mixing. Mixing chemicals is at the user's own risk.
* WG formulations also available; check labels for compatibilities. ** Other formulations also available; check labels for compatibilities. *** **DO NOT** mix with selective grass herbicides.

PRODUCT	ECLIPSE®	FASTAC DUO®	FUSILADE®	TORDON™	GESAPRIM®	GESATOP®	GLEAN®	GOAL®	GRAMOXONE®	GRAZON™	HAMMER®	HARMONY®	HOEGRASS®	HOTSHOT™	HUSSAR® OD	IGRAN®	IMIDAN®	JAGUAR®	KAMBA® 500	KAMBA® M	KARATE®	LE-MAT®	LOGRAN®	LOGRAN® B-POWER	LONTREL™	LORSBAN™	LVE MCPA	MATAVEN®	MCPA 500	MONZA®	OMETHOATE	ONDUTY®	PARAGON®	PROMETRYN 900DF	RAPTOR®	ROUNDUP® CT	ROUNDUP® DRY	ROUNDUP POWERMAX™	SELECT®	SENCOR®	SERTIN®	SNIPER®	SPINNAKER®	SPRAYSEED®	STARANE™	STOMP®	SUPRACIDE®	SURPASS®	TALSTAR®	TARGA®	TERBYNE®	TIGREX®	TOPIK®	TORDON™ 242	TORDON™ 75D	TREFLAN™	TRISTAR® ADVANCE	VERDICT™ 520	WILDCAT®
Achieve® Herbicide	C	C										N					C		N	N					C		C		N																			N				C		N	N				
Agtryne® MA													N																																														
Ally® Herbicide	C						N			C			N	C		C		C	C	C		C			C	C	C	N	C				C			C	C	C						C	C			C				C	C	C	C		N		C
Amicide® 700							C												C																									C															
Atlantis® OD																		C				C			C		C																									C							
Avadex® Xtra																														C						C		C																					
Axial®																																																											
Balance® 750 Herbicide						C			C																															C				C	C											N			
Bladex® 900 Herbicide																																				C	C	C					C	C		C										C			
Boxer® Gold											C										C		C	C												C		C						C			C									C			
Bravo® Fungicide																										C																							C										
Broadstrike™ Herbicide						C			C				C			C		C				C			C	C	C		C												N		C		C	C			C				C	C		C	C	C	C
Brodal® Options Herbicide	C	C				C																C							C										N	C	C		C						C	C			C					N	
Bromicide® 200 Herbicide	C						C						C						C			C	C			C	C		C							C	C	C										C				C							
Bromicide® MA Herbicide	C						C						C						C			C			C	N			C												N																N	N	N
Buttress®		C															C	C				C			C																				C							C							
Cadence® Herbicide	C				C		C									C		C					C			N	C		C							C	C	C						C				C				C							
Cheetah® Gold	C																	C				C			C		C		N																							C							
Conclude™																				C					C		C		C		N														C														
Correct® 100 Herbicide																				N		C					N		N				N						C	N	C							N				N		N	N				
Crusader™														C		N			N	N					C	N	C		N																														
Decision®															N												C																									C							
Dimethoate Insecticide		C					C											C								C			C			C	C		C	C	C	C				C	C					C		C		C		C			C	C	
Dithane™ M-45® Fungicide		C																																															C									C	
Diuron Liquid Herbicide	C				C	C	C		C										C						C	C	C		C														C	C		C		C					N			C			
Dual Gold®					C																		C													C								C															
Duet® 250 Herbicide									C																											C	C	C						C															
Eclipse® Herbicide													C	C		C		C							C		C		C									C				C			C			C				C	C	C	C		C		C
Ecopar®													N										C						C																							N				N		N	
Fastac Duo® Insecticide						C			C									C	C							C	C		C			C	C		C	C	C	C	C			C	C	C				C				C							
Flame®				C	C				C										N																	C		C						C		C													
Flight® EC		C					C						C										C		C		C																										C				C		C
Fusilade® Herbicide																	C	C																					C		C											C							
Tordon™ 600 Herbicide					C																				C	C										C	C	C							C			C											
Gesaprim® 600 Herbicide				C					C										C							C										C	C	C						C	C	C		C							C			C	
Gesatop® 600 Herbicide		C							C									C																C	C	C	C	C				C	C			C		C				C				C		C	
Glean® Herbicide									C				N	C				C	C	C		C			C	C	C	C	C				C			C	C	C						C				C	C			C				C	N		N
Goal® Herbicide									C																											C		C						C															
Gramoxone® 250 Herbicide		C			C	C	C	C								C		C	C	C					C	C			C															C		C		C			C	C				C			
Grazon™ DS Herbicide																																				C									C			C											
Hammer®																							C													C		C						C		C										C			
Harmony® M Herbicide																												N																															C
Hoegrass® 500 Herbicide	C						N										C	C				C			C	C	C				C		C												C							C	C	C					C
Hotshot™	C						C																				C									C		C							C								C						
Hussar®	N						N									N							N	N	C		N			N		N													C							N							
Igran® 500 Herbicide	C																		C	C			C		C		C		C												N						C	C											
Imidan® Insecticide			C						C				C																C				C			C		C						C				C											
Intervix®		C																				C			C														C																				
Jaguar® Herbicide	C	C	C			C	C		C				C					N				C			C	C	C																					N	C	C			C				C	N	C

Herbicide compatibilities

Table 33. Winter crop herbicide/insecticide compatibilities (continued)

This chart is a guide only. Read both product labels if using a mixture

FORMULATION	ACTIVE	PRODUCT	ACHIEVE®	ALLY®	ALPHA CYPERMETHERIN	AMICIDE® ADVANCE 700	ATLANTIS® OD	AVADEX®	AXIAL®	BASAGRAN	BIFENTHRIN	BLADEX®	BRAVO®	BROADSTRIKE™	BRODAL®	BROMICIDE® 200	BROMICIDE® MA	BUCTRIL® MA	BUTRESS®	CADENCE®	CHEETAH® GOLD	CHLORPYRIFOS	CONCLUDE™	CORRECT®	CRUSADER™	DECISION®	DELTAMETHERIN	DIMETHOATE	DITHANE™	DIURON
soluble concentrate	dicamba dma	Kamba® 500 Herbicide	N	C												C	C						C		N					C
soluble concentrate	dicamba dma + MCPA dma	Kamba® M Herbicide	N	C																				N	N					
soluble concentrate	omethoate	Le-Mat® 290 Insecticide		C										C	C	C	C		C					C						
water dispersible granule	triasulfuron	Logran® 750 Herbicide		C				C								C				C										
water dispersable granules	butafenacil + triasulfuron	Logran® B Power																												
soluble concentrate	clopyralid**	Lontrel™ Herbicide	C	C										C		C	C						C		C					C
emulsifiable concentrate	chlorpyrifos*	Lorsban™ 300/500 Insecticide		C								C	C	C		C	N			N			C		N			C		C
emulsifiable concentrate	MCPA ioe (ester)**	LVE MCPA	C	C										C		C				C			C	N	C					C
emulsifiable concentrates	2,4-D as ehe	Estercide Xtra 680		C																										
emulsifiable concentrate	flamprop-M-methyl	Mataven® 90 Herbicide		N																										
soluble concentrate	MCPA dma (amine)**	MCPA 500 Herbicide	N	C										C	C	C	C			C			C	N	N			C		C
emulsifiable concentrates	MCPA + Imazapic + Imazapyr	Midas®																										C		
water dispersable granules	sulfosulfuron	Monza®	N					C												N								N		
emulsifiable concentrate	picolinafen + MCPA ehe (ester)	Paragon® Herbicide		C																				N				C		
emulsifiable concentrates	pyrasulfotole +MCPA as 2-ehe +mefenpyr-diethyl	Precept® 300	C	C		N	C		C												C				C	C		C		
water dispersible granule	prometryn	Prometryn 900DF																												
water dispersible granule	imazamox***	Raptor® Herbicide																										C		
soluble concentrate	glyphosate dual salt**	Weedmaster® DST® Herbicide		C	C	C		C		C												C						C		
water soluble granules	glyphosate mas**	Weedmaster® Argo®		C	C	C		C		C												C						C		
soluble concentrate	glyphosate as K salt**	Roundup Ultra® Max Herbicide		C	C			C		C												C						C		
water soluble granules	pyroxasulfone	Sakura®		C				C												C										C
emulsifiable concentrate	clethodim	Status® Herbicide													N									C						
suspension concentrate	metribuzin*	Sencor® 480 Herbicide													C									N						
water dispersible granule	picolinafen	Sniper® Herbicide																										C		
water dispersible granule	imazethapyr***	Spinnaker® 700 Herbicide										C		C	C													C		C
soluble concentrate	paraquat + diquat	Spray.Seed® 250 Herbicide		C				C												C										C
emulsifiable concentrate	fluroxypyr	Starane™ Herbicide		C										C					C				C							
emulsifiable concentrate	pendimethalin**	Stomp® 330 Herbicide						C						C																C
emulsifiable concentrate	methidathion	Supracide® 400 Insecticide																												
soluble concentrate	2,4-D ipa (amine)**	Surpass® 300 Herbicide	N	C												C				C				N				C		C
emulsifiable concentrate	bifenthrin**	Talstar® 100 Insecticide										C	C	C	C														C	
emulsifiable concentrate	quizalofop**	Targa® Herbicide													C													C		
water dispersible granule	terbuthylazine	Terbyne®																												
emulsifiable concentrate	diflufenican + MCPA ehe (ester)	Tigrex® Herbicide	C	C			C									C			C	C	C	C		N				C		
emulsifiable concentrate	clodinafop	Topik® 240 Herbicide		C										C	C									N						N
soluble concentrate	MCPA + picloram as K salts	Tordon™ 242 Herbicide	N	C										C										N				C		
soluble concentrate	2,4-D + picloram as tipa (amine)	Tordon™ 75D Herbicide	N	C										C										N						
suspension concentrate	clopyralid as mea + florasulam	Torpedo™		C												C	C	C												
emulsifiable concentrate	trifluralin	Treflan™ Herbicide						C				C		C																C
emulsifiable concentrate	diclofop + fenoxaprop	Tristar® Advance Herbicide		N										C														C		
water dispersible granule	flumioxazin	Valor®																												
emulsifiable concentrate	bromoxynil + pyrasulfotole	Velocity® ****		C			C		C												C					C				
emulsifiable concentrate	haloxyfop	Verdict™ 520 Herbicide												C			N											C	C	
emulsifiable concentrate	fenoxaprop + mefanpyr-diethyl	Wildcat® Herbicide		C										C			N	N												

C = Compatible. N = Not compatible. Where there is a blank compatibility is not known, contact the manufacturer. Compatibility is dependent upon use pattern (both crop and weeds), rate, surfactant/compatibility agent and temperature. Water quality also affects compatibility. Mixtures generally require greater agitation. Mixing more than two chemicals affects compatibility and is not recommended.
This chart only indicates which chemicals are compatible in mixtures at the time of compilation (4/13). Read the compatibility and crop safety sections of both labels before mixing. Mixing chemicals is at the user's own risk.
* WG formulations also available; check labels for compatibilities. ** Other formulations also available; check labels for compatibilities. *** DO NOT mix with selective grass herbicides.
**** Check label for compatible mixing rates and effect on weeds.

PRODUCT	ECLIPSE®	FASTAC DUO®	FUSILADE®	TORDON™	GESAPRIM®	GESATOP®	GLEAN®	GOAL®	GRAMOXONE®	GRAZON™	HAMMER®	HARMONY®	HOEGRASS®	HOTSHOT™	HUSSAR®	IGRAN®	IMIDAN®	JAGUAR®	KAMBA® 500	KAMBA® M	KARATE®	LE-MAT®	LOGRAN®	LOGRAN® B-POWER	LONTREL™	LORSBAN™	LVE MCPA	MATAVEN®	MCPA 500	MONZA®	OMETHOATE	ONDUTY®	PARAGON®	PROMETRYN 900DF	RAPTOR®	ROUNDUP® CT	ROUNDUP® DRY	ROUNDUP POWERMAX™	SELECT®	SENCOR®	SERTIN®	SNIPER®	SPINNAKER®	SPRAY.SEED	STARANE™	STOMP®	SUPRACIDE®	SURPASS®	TALSTAR®	TARGA®	TERBYNE®	TIGREX®	TOPIK®	TORDON™ 242	TORDON™ 75D	TREFLAN™	TRISTAR® ADVANCE	VERDICT™ 520	WILDCAT®
Kamba® 500 Herbicide		C			C		C		C							C										N	C		C							C	C	C						C				C											
Kamba® M Herbicide							C		C							C										N																		C															
Le-Mat® 290 Insecticide							C						C					C											C			C			C	C	C	C	C	C	C		C	C				C		C				C				C	
Logran® 750 Herbicide																C										C	C						C			C	C	C						C				C	C			C	N			C			
Logran® B Power																																				C		C						C															
Lontrel™ Herbicide	C			C			C		C				C			C		C									C		C				C			C	C	C			C			C	C			C		C		C		C			C	C	C
Lorsban™ 300/500 Insecticide		C		C	C		C		C				C					C	N	N			C				N		N				N			C	C	C						C	C		C	N				C		N	N	C		C	
LVE MCPA	C	C					C						C	C		C		C	C				C		C	N						C			C	C	C	C			N	C		C	C							C	C				N	C	C
LV Ester 600							C												C				C													C		C						C															
Mataven® 90 Herbicide							C					N																																															
MCPA 500 Herbicide	C	C					C			C						C	C		C			C	C			N									C						N			C	C							C	C	C	C			N	
Midas®		C																													C																												
Monza®													N			N			N			N			C		C									C		C						C								C							
Paragon® Herbicide		C					C						C										C		C	N															N												C				C		C
Precept® 300		C											C		C							C			C					C																		C					C				C		C
Prometryn 900DF						C																																								C										C			
Raptor® Herbicide		C				C											C					C					C		C																			C											
Weedmaster® DST® Herbicide					C	C	C				C								C		C	C	C	C	C	C	C			C															C	C		C								C			
Weedmaster® Argo®					C	C	C				C								C		C	C	C	C	C	C	C			C															C	C		C								C			
Roundup Ultra® Max Herbicide	C				C	C	C							C					C			C	C	C	C	C	C			C															C	C		C								C			
Sakura®		C					C	C	C			C										C	C	C						C					C		C							C			C									C			
Select® Herbicide		C	C																			C																			C	C								C								C	
Sencor® 480 Herbicide																						C																			N	C	C						C							C			
Sniper® Herbicide	C	C	C			C																C					C												C	C									C										
Spinnaker® 700 Herbicide		C				C																C														C	C	C		C				C		C			C							C			
Spray.Seed® 250 Herbicide		C			C		C	C	C								C		C			C	C		C	C	C		C														C			C		C	C		C					C			
Starane™ Herbicide	C			C	C					C			C	C									C		C	C	C		C							C		C										C					C	C	C			C	C
Stomp® 330 Herbicide					C	C			C														C											C		C	C	C					C	C					C										
Supracide® 400 Insecticide																C										C																											C						
Surpass® 300 Herbicide	C	C		C	C	C	C		C	C						C	C		C			C	C		C	N									C	C								C	C							C	N	C	C			N	
Talstar® 100 Insecticide							C											C					C																	C		C	C	C		C						C							
Targa® Herbicide																		C				C			C														C		C											C							
Terbyne®									C																											C	C	C						C												C			
Tigrex® Herbicide	C	C	C			C	C		C				C		N								C		C	C	C		C												N							C	C	C			C		C		C		C
Topik® 240 Herbicide	C												C	C				C					N										C												C		C	N				C		C	N				
Tordon™ 242 Herbicide	C												C									C			C	N	C		C												N				C			C					C						
Tordon™ 75D Herbicide	C				C																					N			C							C	C	C							C			C				C	N					N	
Torpedo™																											C		C																														
Treflan™ Herbicide						C	C		C														C			C								C						C			C	C							C								
Tristar® Advance Herbicide	C			N														C							C		N						C																			C							
Valor®																																				C		C						C															
Velocity® ****																									C		C																										C				C		C
Verdict™ 520 Herbicide					C	C																C			C	C	C		N										C		C				C			N							N				
Wildcat® Herbicide	C						N					C	C	N				C							C		C						C												C							C							

Herbicide compatibilities

Table 34. Fungicide/herbicide compatibility chart for wheat

Product	Fungicides							
Herbicides	Amistar® Xtra 200 g/L azoxystrobin, 80 g/L cyproconazole – Syngenta	Hornet® 430 g/L tebuconazole – Nufarm	Opera®, 85 g/L pyraclostrobin, 62.5 g/L epoxiconazole – Nufarm	Opus® 125, 125 g/L epoxiconazole – Nufarm	Prosaro®, 210 g/L prothioconazole, 210 g/L tebuconazole – Bayer CropScience	Throttle® 500, 500 g/L propiconazole – Nufarm	Tilt®, 250 g/L propiconazole – Syngenta	Tilt® Xtra, 250 g/L propiconazole, 80 g/L cyproconazole – Syngenta
2,4-D LV Estercide Xtra 680, 680 g/L 2,4-D (present as the ethylhexyl ester) – Nufarm	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible with Estercide® Xtra 680. No info on crop safety or efficacy available.	Physically compatible with Estercide® Xtra 680. No info on crop safety or efficacy available.	Physically compatible. May result in adverse crop effects including reduced growth and yield loss through phenoxy herbicide damage, if applied at the incorrect crop growth stage. The use of an adjuvant in the mix is likely to result in increased damage. If using an adjuvant limit Prosaro® rate to 150 mL/ha and adhere to all recommendations on the use of phenoxy herbicides for the crop. Note that generally adjuvants are not recommended with 2,4-D ester.	Physically compatible with Estercide® Xtra 680. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Achieve® WG, 400 g/kg tralkoxydim – CropCare	Physically compatible. No info on crop safety or efficacy available.	–	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible, very good crop safety, with no indication the addition of Prosaro® increased crop effects. Hasten™ was used as the adjuvant. Supercharge® is generally recommended for use with Achieve® but has not been evaluated with Prosaro®. Any adjuvant recommended for use with Prosaro® may be used. Contact Achieve® manufacturer to confirm suitability of alternative adjuvants to Supercharge®.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Agritone® 750 SL, 750 g/L MCPA (as dimethylamine salt) + Hasten™ 1% – Nufarm	Physically compatible with MCPA amine, ester LVE. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible, No info on crop safety or efficacy available. BS1000® @ 0.25% recommended adjuvant.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible with MCPA amine, ester LVE. No info on crop safety or efficacy available.	Physically compatible with MCPA amine, ester LVE. No info on crop safety or efficacy available.
Ally® 7 g/ha, 600 g/kg metsulfuron-methyl (+ BS1000®) – DuPont	–	–	Physically compatible with Associate®. Nufarm recommend including Chemwet® 1000. No info on crop safety or efficacy available.	Physically compatible with Associate®. Nufarm recommend including Chemwet® 1000. No info on crop safety or efficacy available.	Physically compatible. The addition of Prosaro® to Ally® increased crop effects although effects were generally transient and crops recovered. This was done with the addition of Hasten™ adjuvant. The use of a non-ionic surfactant should improve crop safety although the rate required (0.25%) is higher than usually recommended for use with Ally®.	Physically compatible with Associate®. No info on crop safety or efficacy available.	–	–
Amicide® Advance 700, 2,4-D (present as the dimethylamine and monomethylamine salts) – Nufarm	Physically compatible. No info on crop safety or efficacy available.	–	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. May result in adverse crop effects including reduced growth and yield loss through phenoxy herbicide damage, if applied at the incorrect crop growth stage . The use of an adjuvant in the mix is likely to result in increased damage. If using an adjuvant limit Prosaro® rate to 150 mL/ha and adhere to all recommendations on the use of phenoxy herbicides for the crop. Note that generally adjuvants are not recommended with Amicide® 625.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Atlantis® OD, 30 g/L mesosulfuron-methyl + 90 g/L mefenpyr-diethyl – Bayer CropScience	–	–	–	–	Physically compatible. May result in increased crop effects, limiting Prosaro® rate to 150 mL/ha should improve crop safety. BS1000® @ 0.25%,Hasten™ 1% or Rocket® 1% (chose adjuvant depending on weed target for Atlantis® OD.)	–	–	–
Axial® 100 EC, pinoxaden 100 g/L + cloquintocet-mexyl 25 g/L (+ Adigor® 0.5%)	Physically compatible. No info on crop safety or efficacy available.	–	–	–	Physically compatible. May result in adverse crop effects if used late in the season. Limiting Prosaro® rate to 150 mL/ha should improve crop safety. Adhere to the crop stage recommendations for Axial® application.Use Adigor® 0.5% (as required for Axial® use).	–	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Cadence® WG, 700 g/kg (dicamba present as sodium salt) – Syngenta	Not compatible.	–	–	–	Physically compatible. Good crop safety. Typical dicamba wilting effects on the crop are often observed within days of application, these effects have been transient in the trials conducted.	–	Not recommended.	Not recommended.
Hoegrass® 500, 500 g/L diclofop-methyl – Bayer CropScience	Physically compatible. No info on crop safety or efficacy available.	–	–	–	Physically compatible. May result in adverse crop effects if using hasten adjuvant. Limiting Prosaro® rate to 150 mL/ha should improve crop safety and only use non-ionic surfactant (BS1000® @ 0.25%) Adhere to the crop stage recommendations for Hoegrass® application.	–	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Logran® 750 WG, 750 g/kg trisulfuron – Syngenta	Physically compatible. No info on crop safety or efficacy available.	Physically compatible with Nugran®. No info on crop safety or efficacy available.	Physically compatible with Nugran®. No info on crop safety or efficacy available.	Physically compatible with Nugran®. No info on crop safety or efficacy available.	–	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.

Lontrel™ SL, 300 g/L clopyralid (present as triisopropanolamine salt) (+Hasten™) – Dow Agrosciences	–	–	–	–	Physically compatible, very good crop safety.	–	–	–
LVE Agritone®, 570 g/L MCPA (present as the 2-ethylhexyl ester) – Nufarm	Physically compatible with LVE. No info on crop safety or efficacy available.	–	–	–	Physically compatible with MCPA LVE 500 g/L ai. (+Hasten™). Very good crop safety. Any adjuvant recommended for use with Prosaro® may be used.	–	Physically compatible with LVE. No info on crop safety or efficacy available.	Physically compatible with LVE. No info on crop safety or efficacy available.
Mataven® 90, 90 g/L flamprop-M-methyl – Nufarm	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	–	–	Physically compatible. Very good crop safety, negligible increase in crop effects, Hasten™ used as adjuvant. Mataven® label indicates compatibility with Uptake™. This is the preferred adjuvant when mixing with Prosaro®.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Paragon® 500 g/L MCPA (present as the ethylhexyl ester) + 50 g/L picolinafen – Nufarm	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	–	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Tigrex® 250 g/L MCPA as ethylhexl ester + 25 g/L diflufenican – Bayer CropScience	Physically compatible. No info on crop safety or efficacy available.	–	–	–	Physically compatible. Crop safety with Tigrex® is very good even though Hasten™ was used in all trials, against the recommendation for use of Tigrex®. The use of a non ionic-surfactant rather than a crop oil should further improve crop safety.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Topik® 240 EC, 240 g/L clodinafop propargyl + cloquintocet-mexyl 125 mL/ha – Syngenta	Physically compatible. No info on crop safety or efficacy available.	–	–	–	Physically compatible. May result in adverse crop effects if used late in the season. Limiting Prosaro® rate to 150 mL/ha should improve crop safety. Adhere to the crop stage recommendations for Topik® application. Recommended adjuvant Uptake™ 0.5% or D-C-Trate 1%.	–	Physically compatible. No info on crop safety or efficacy available.	Physically compatible. No info on crop safety or efficacy available.
Tordon™ 75-D, 300 g/L 2,4-D (as the triisopropanolamine salt) + 75 g/L picloram (as the triisopropanolamine salt) – Dow Agrosciences	–	–	–	–	Physically compatible. No information on crop safety of the mixture is available. The use of an adjuvant with Tordon™ 75-D is NOT recommended. This may compromise efficacy of Prosaro®.	–	–	–
Tristar® Advance, 250 g/L diclofop-methyl + 13 g/L fenoxaprop-P-ethyl + 7.4 g/L mefenpyr-diethyl – 1.5 L/ha – Bayer CropScience	–	–	–	–	Physically compatible. May result in adverse crop effects if using Hasten™ adjuvant. Limiting Prosaro® rate to 150 mL/ha should improve crop safety and only use non-ionic surfactant. Adhere to the crop stage recommendations for Tristar Advance® application. BS1000® 0.25% recommended adjuvant.	–	–	–
Velocity® bromoxynil (mixed heptanoic and octanoic acid esters) + 37.5 g/L pyrasulfotole + 9.4 g/L mefenpyr-diethyl	–	–	–	–	Physically compatible. Limited data but good crop safety indicated. Use Hasten™ 1% or an alternative crop oil that is recommended for use with both products.	–	–	–
Wildcat® 110 EC, 110 g/L fenoxaprop-P-ethyl, + 30 g/L mefenpyr-diethyl 500 mL/ha – Bayer CropScience	–	–	–	–	Physically compatible. Good crop safety. BS1000® @ 0.25%.	–	–	–

Where there is a blank compatibility is not known, contact the manufacturer. Compatibility is dependent upon use pattern, rates, surfactants, compatibility agents, temperature and water quality. Mixtures generally require constant agitation. Mixing more than two products is not recommended. This chart only indicates which chemicals are compatible in mixtures at the time of compilation March 2012. Read the compatibility and crop safety sections of all labels before mixing. Mixing chemicals is at the user's own risk. See tips for tank mixing page 19.

3 way mixes can cause compatibility problems in some instances. Important to read critical comments on technical sheets and labels as some rates can cause an adverse crop effect. Product compatibility is sourced from technical notes and labels of the fungicide maufacturer. Both products and companies should be consulted prior to undertaking a tank mix. This chart is for wheat, however individual wheat varieties will need to be checked for suitability for use with any particular herbicide or fungicide listed here.

In many cases it is useful to mix a herbicide and fungicide together to save on further application passes within a paddock. This has been more common in recent years with less varietal resistance to stripe rust. Mixing herbicides and fungicides whilst practical, can be risky. Many products may be Physically compatible, however interactions may occur between the herbicide and the fungicide which may reduce the efficacy of either or both products. Crop damage may also be greater when mixing herbicides and fungicides. An adjuvant recommended for one product in a tank mix may have an adverse effect on the other product. The same is true of water quality where solubility for one product might be quite different for the other.

Whilst this table provides the best available information regarding common herbicide and fungicide mixtures, always consult with your advisor and product manufacturers before tankmixing herbicides with fungicides, and check for any updated technical information on such mixes.

Table 35. Cereal foliar fungicides – 2014 currently registered products (NSW) – winter cereals

Various trade names sometimes available under these active ingredients and concentrations. See specific labels for details.

Active and Concentration	Examples of commercial trade names		WHP (weeks) W = wheat B = barley		Cost per Litre[1]	Adjuvant (as per label)	Diseases Controlled[2]									Registered for aerial application
	Product	Manu-facturer	Grazing	Harvest			Stripe Rust	Stem Rust	Leaf Rust	Crown (leaf) Rust	Septoria tritici blotch	Septoria nodorum blotch	Yellow Spot	Barley Scald	Net Blotch	Powdery Mildew	
Azoxystrobin 200 g/L + cyproconazole 80 g/L	Amistar® Xtra	Syngenta	3	6	$40.49	Not Required	400 mL–800 mL (wheat) $16.20–$32.39		200 mL–800 mL (wheat & barley [7]) $8.10–$32.39				400 mL–800 mL (wheat) $16.20–$32.39		200 mL–800 mL (barley) $8.10–$32.39	400 mL–800 mL (wheat & barley) $16.20–$32.39	Yes
Azoxystrobin 120 g/L + tebuconazole 200 g/L	Custodia®	Farmoz	3 +ESI	6	$55.00		315mL–630 mL (wheat) $17.33–$34.65	315mL–630 mL (wheat) $17.33–$34.65	315mL–630 mL (wheat & barley [7]) $17.33–$34.65		630 mL (wheat) $34.65	315mL–630 mL (wheat) $17.33–$34.65	315mL–630 mL (wheat) $17.33–$34.65	315 mL (barley) $17.33	315mL–630 mL (barley) $17.33–$34.65	315mL–630 mL (wheat & barley) $17.33–$34.65	Yes
Epoxiconazole 125 g/L	Opus® 125	Nufarm	6 + ESI	6	$27.39	200 mL/100 L Chemwet may assist in certain conditions	250 mL–500 mL (wheat) $6.85–$13.70		500 mL (wheat) 250 mL–500 mL (barley) $6.85–$13.70			250 mL–500 mL (wheat) $6.85–$13.70		250 mL (barley) $6.85	250 mL–500 mL (barley [6]) $6.85–$13.70	250 mL (wheat & barley) $6.85	Yes
Fenbuconazole 240 g/L	Indar®	Dow AgroSciences	2 + ESI	NR	$27.50	500 mL/100 L Uptake Spraying Oil	150–300 mL (wheat) $4.13–$8.25										No
Flutriafol 250 g/L	Intake® Combi	Crop Care	7-W 10-B	7-W 10-B	$16.06	200 mL/100 L BS1000®	250 mL–500 mL (wheat) $4.02–$8.03		250 mL–500 mL (wheat) $4.02–$8.03		250 mL–500 mL (wheat) $4.02–$8.03	250 mL–500 mL (wheat) $4.02–$8.03				250 mL–500 mL (barley) $4.02–$8.03	Yes
Propiconazole 250 g/L##	Tilt®	Syngenta	1	4	$14.30	Not Required	250 mL–500 mL (wheat)^^^ $3.58–$7.15	500 mL (wheat & oats) $7.15	150 mL–500 mL (wheat) $2.15–$7.15	250 mL–500 mL (oats) $3.58–$7.15	250 mL–500 mL (wheat & oats [4]) $3.58–$7.15	150 mL–500 mL (wheat) $2.15–$7.15	250 mL–500 mL (wheat) $3.58–$7.15	500 mL (barley) $7.15	250 mL–500 mL (barley) $3.58–$7.15	150 mL–500 mL (wheat & barley) $2.15–$7.15	Yes
Propiconazole 435 g/L	PropiMax®	Dow AgroSciences	1	4	$32.18	Not Required	145 mL or 285 mL (wheat) $4.67–$9.17	285 mL (wheat & oats) $9.17	85 mL–285 mL (wheat) $2.74–$9.17	145 mL–285 mL (oats) $4.67–$9.17	145 mL–285 mL (wheat & oats [4]) $4.67–$9.17	145 mL–285 mL (wheat) $4.67–$9.17	145 mL–285 mL (wheat) $4.67–$9.17	285 mL (barley) $9.17	285 mL (barley [5]) $8.75	85 mL–285 mL (wheat & barley) $2.74–$9.17	Yes
Propiconazole 500 g/L	Throttle®500	Nufarm	1	4	$32.59	Not Required	125 mL or 250 mL (wheat) $4.07–$8.15	250 mL (wheat & oats) $8.15	75 mL–250 mL (wheat) 125 mL–250 mL (barley) $2.44–$8.15	125 mL–250 mL (oats) $4.07–$8.15	125 mL–250 mL (wheat & oats [4]) $4.07–$8.15	75 mL–250 mL (wheat) $2.44–$8.15	125 mL–250 mL (wheat) $4.07–$8.15	250 mL (barley) $8.15	125 mL–250 mL (barley) $4.07–$8.15	75 mL–250 mL (wheat & barley) $2.44–$8.15	Yes
Propiconazole 250 g/L + cyproconazole 80 g/L	Tilt® Xtra	Syngenta	3 + ESI	6	$37.32	Not Required	250 mL–500 mL (wheat) $9.33–$18.66	500 mL (wheat) $18.66	150 mL–500 mL (wheat & barley [3]) $5.60–$18.66		250 mL–500 mL (wheat) $9.33–$18.66	150 mL–500 mL (wheat) $5.60–$18.66	250 mL–500 mL (wheat) $9.33–$18.66	500 mL (barley) $18.66	250 mL–500 mL (barley) $9.33–$18.66	150 mL–500 mL (wheat & barley) $5.60–$18.66	Yes
Propiconazole 250 g/L + Tebuconazole 250 g/L	Cogito™	Syngenta	2	5	$25.85		125 mL or 250 mL (wheat) $3.23–$6.46	125–250 mL (wheat) 250 mL (oats) $3.23–$6.46	125 mL–250 mL (wheat & barley) $3.23–$6.46	125 mL–250 mL (oats) $3.23–$6.46	125 mL–250 mL (wheat & oats [4]) $3.23–$6.46	125 mL–250 mL (wheat) $3.23–$6.46	125 mL–250 mL (wheat) $3.23–$6.46	250 mL (barley) $3.23–$6.46	125 mL–250 mL (barley) $3.23–$6.46	125 mL–250 mL (wheat & barley) $3.23–$6.46	Yes
Prothioconazole 210 g/L + tebuconazole 210 g/L	Prosaro® 420	Bayer CropScience	2	5	$77.01	Various(adjuvants required for some diseases) – As per label directions	150 mL–300 mL (wheat & triticale) $11.55–$23.10	150 mL–300 mL (wheat) 300 mL (oats) $11.55–$23.10	150 mL–300 mL (wheat & barley) $11.55–$23.10	300 mL (oats) $23.10		150 mL–300 mL (wheat) $11.55–$23.10	150 mL–300 mL (wheat) $11.55–$23.10	150 mL–300 mL (barley) $11.55–$23.10	150 mL–300 mL (barley) $11.55–$23.10	150 mL–300 mL (wheat & barley) $11.55–$23.10	Yes

Table 35. Cereal foliar fungicides – 2014 currently registered products (NSW) – winter cereals (continued)

Various trade names sometimes available under these active ingredients and concentrations. See specific labels for details.

Active and Concentration	Examples of commercial trade names		WHP (weeks) W = wheat B = barley		Cost per Litre[1]	Adjuvant (as per label)	Diseases Controlled[2]									Registered for aerial application
	Product	Manu-facturer	Grazing	Harvest			Stripe Rust	Stem Rust	Leaf Rust	Crown (leaf) Rust	Septoria tritici blotch	Septoria nodorum blotch	Yellow Spot	Barley Scald	Net Blotch	Powdery Mildew	
Tebuconazole 225 g/L + flutriafol 75 g/L	Impact Topguard®	Ospray	7-W 10-B	7-W 10-B	$13.06	2 L/100 L of Ospray 1000 or 1 L/100 L D-C-Trate	200 mL or 400 mL (wheat) $2.61–$5.22		200 mL or 400 mL (wheat) $2.61–$5.22		200 mL or 400 mL (wheat) $2.61–$5.22	200 mL or 400 mL (wheat) $2.61–$5.22				200 mL or 400 mL (barley) $2.61–$5.22	Yes
Tebuconazole 45 g/kg + sulfur 700 g/kg	Unicorn 745 WG	Sulphur Mills Aust. Limited	2	5	-		1..37 or 2.75 kg/ha	1..37 or 2.75 kg/ha	1..37 or 2.75 kg/ha	1..37 or 2.75 kg/ha		1..37 or 2.75 kg/ha	1..37 or 2.75 kg/ha	1..37 kg/ha		1..37 or 2.75 kg/ha	No
Triadimefon 125 g/L	Triadimefon 125 EC	Ospray	Not stated, see footnote $	4	$6.22	Not required	500 mL or 1,000 mL (wheat)^^^ $3.11–$6.22							1,000 mL (barley) $6.22		1,000 mL (barley) $6.22	Yes
Triadimefon 500 g/kg	Triadimefon 500WG	Ospray	Not stated, see footnote @	4	$17.36	Not required	125 g– 250 g (wheat) $2.17–$4.34		125 g– 250 g (wheat) $2.17–$4.34		125 g– 250 g (wheat) $2.17–$4.34					250 g (barley) 125 g–250 g (wheat) $2.17–$4.34	Yes

Notes:

1 Indicative costs only: significantly lower prices are often obtained for bulk purchases of commonly used products.

2 Body of table shows rate mL/ha, g/ha and associated cost $/ha for registered products.

3 Rate on barley is 250 mL–500 mL.

4 Propiconazole and propiconazole + tebuconazole is registered for suppression of Septoria leaf blotch in oats.

5 Spot form of net blotch.

6 Net form of net blotch only.

7 Rate on barley is 200 mL–800 mL.

8 Prosaro 420 is registered for the control of Fusarium head blight.

Various formulations and active ingredient concentrations of propiconazole and tebuconazle are available.

@ Do not mix leaves treated with this product with feed intended for animal consumption.

$ Feed treated with this product must not be used for animal consumption, poultry feed or mixed with animal feed.

+ ESI Export slaughter interval applies. Do not slaughter animals destined for export within 7 days of consumption of treated cereal forage or straw.

NR Not required when used as directed.

Growers applying a foliar fungicide to control rust or other diseases need to observe the withholding period (WHP). Fungicides applied late, closer to harvest, may produce an excessive, illegal residue if applied within the WHP. For most of the fungicides registered to control diseases in winter cereals, the maximum residue limit (MRL) is set very low, at the limit of detection. A residue above the MRL is illegal under the Pesticides Act and renders the offender liable to prosecution and a fine. Excessive residues also put Australia's export trade at risk. If it is necessary to apply a fungicide late, select a product with a short WHP.

^^^ Permit 12654 – Stripe rust control in triticale – use under permit, tebuconazole 430 g/L, tebuconazole 500 g/L, propiconazole 250 g/L, tridimefon 125 g/L based products, see permit for full use patterns

Table 36. Canola and pulse foliar fungicides – 2014

Foliar fungicides for canola, chickpea, field pea, faba bean and lupin

Example foliar fungicide trade name and manufacturer	Active ingredient	Harvest Withholding Period (WHP) – weeks/days		Rate to apply per hectare (L/ha or kg/ha)	Cost of product per Litre ($)	Size of pack (kg or L – range of pack sizes)	Canola	Chickpea	Field pea	Faba bean	Lupin
		Harvest	Grazing								
Bravo® Weather Stik – Syngenta Barrack® Betterstick – Crop Care	chlorothalonil (720 g/L)	7 days	Do not graze	1.4–2.3 L	15.00	1–1000 L				Chocolate spot Rust	
Barrack® 720 – Crop Care Unite® 720 – Nufarm	chlorothalonil (720 g/L)	14 days	14 days	1.4–2.3 L (faba beans) 1.0–2.0 L (chickpeas)	15.00	1–1000 L		Ascochyta blight		Chocolate spot Rust	
Echo® 900 Fungicide – Sipcam	chlorothalonil (900 g/kg)	7 days	Do not graze	1.2–1.9 kg	13.85	1–20 kg				Chocolate spot Rust	
Rovral® Liquid – Bayer CropScience Iprodione Liquid 250 – Ospray	iprodione (250 g/L)	42 days	42 days	2.0 L	17.75	2–1000 L	Sclerotinia stem rot				
Dithane® Rainshield Neo Tec Fungicide – Dow AgroSciences	mancozeb (750 g/kg)	28 days	14 days	1.0–2.2 kg	8.20	20 kg		Ascochyta blight Botrytis grey mould	Blackspot Ascochyta blight Botrytis grey mould Rust	Ascochyta blight Chocolate spot Cercospora Rust	Botrytis grey mould Anthracnose
Manzate® DF – Sipcam	mancozeb (750 g/kg)	28 days	14 days	1.0–2.2 kg	8.20	20 kg		Ascochyta blight Botrytis grey mould	Ascochyta blight Botrytis grey mould Blackspot Rust	Ascochyta blight Chocolate spot Botrytis grey mould Black spot Rust	Botrytis grey mould Anthracnose
Innova Mancozeb 750 Fungicide – Syngenta	mancozeb (750 g/kg)	28 days	14 days	1.0–2.2 kg	8.20	25 L		Ascochyta blight Botrytis grey mould	Ascochyta blight Botrytis grey mould Blackspot Rust	Ascochyta blight Chocolate spot Rust	Botrytis grey mould Anthracnose
Penncozeb® 420 SC – Nufarm	mancozeb (420 g/L)	28 days	14 days	1.8–3.95 L (chickpeas) 3.5 L (faba beans)	9.20	5–1000 L		Ascochyta blight		Chocolate spot	
Polyram® DF – Nufarm	metiram (700 g/kg)	6 weeks	21 days	1.1–2.2 kg	13.35	15 kg		Ascochyta blight Botrytis grey mould	Ascochyta blight Botrytis grey mould Blackspot Rust	Ascochyta blight Chocolate spot Cercospora Rust	
Fortress® 500 – Crop Care Sumisclex® Broadacre – Sumitomo	procymidone (500 g/L)	Canola not required Faba beans 9 days	9 weeks Not stated	1.0 L (canola) 0.5 L (faba bean)	50.55	1–10 L	Sclerotinia stem rot			Chocolate spot	
Prosaro® 420 SC – Bayer CropScience	prothioconazole (210 g/L) + tebuconazole (210 g/L)	Not required	14 days	375–450 mL/ha	77.00	10 L	Blackleg Sclerotinia stem rot				
Folicur® 430 SC – Bayer CropScience Hornet® – Nufarm	tebuconazole (430 g/L)	3 days	3 days	145 mL	16.80	1–1000 L			Powdery mildew	Cercospora (PER13752, expiry 30/06/16)	
Triad 125 – Farmoz	triadimefon (125 g/L)	14 days	Not stated	500 mL	6.20	5–1000 L			Powdery mildew		

Note: New labelling and rescheduling applies to all procymidone products. Health warnings are in place for pregnant women. Prices quoted are GST Inclusive at 10 February 2014 and approximate only. Prices will vary depending on pack size purchased.

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Table 37. Common retail prices of chemicals used on winter crops

Product name	Chemical name	Company	Price/L or kg (EX GST) ($)	Commonly used rate/ha	Cost ($/ha)
Achieve®	Tralkoxydim	Crop Care	55.90	0.4 kg	22.36
Agritone® 750	MCPA 750 g/L	Nufarm	8.77	0.46 L	4.03
Agtryne® MA	Terbutryn + MCPA	Crop Care	14.52	1.0 L	14.52
Alliance®	Paraquat + Amitrole	Crop Care	13.70	2.0 L	27.39
Ally®	Metsulfuron-methyl	DuPont	68.00	5 g	0.34
Amicide® Advance 700	2,4-D Amine	Nufarm	6.03	0.8	4.82
Atlantis® OD	Mesosulfuron-methyl	Bayer CropScience	80.02	0.33 L	26.41
Atrazine 900 WDG	Atrazine 900 g/kg	Titan	7.25	1.1 kg	7.98
Avadex® Xtra	Triallate	Nufarm/Farmoz	9.27	1.6 L	14.83
Axial®	Pinoxaden 100 g/L+ Cloquintocet-mexyl 25 g/L	Syngenta	139.02	0.2	27.80
Balance®	Isoxaflutole 750 g/kg	Bayer CropScience	368.00	100 g	36.80
Broadside®	Bromoxynil + MCPA + Dicamba	Nufarm	15.77	0.75 L	11.83
Boxer® Gold	Prosulfocarb 800 g/L + S-Metolachlor 120 g/L	Syngenta	14.27	2.5	35.68
Bladex®	Cyanazine	Agnova	50.00	1.5 L	75.00
Broadstrike®	Flumetsulam	Dow AgroSciences	617.00	25 g	15.43
Brodal® Options	Diflufenican	Bayer CropScience	44.02	0.15 L	6.60
Bromocide ® 200	Bromoxynil	Nufarm	12.27	1.4 L	17.18
Bromoxynil MA	Bromoxynil + MCPA	Various	12.85	1.4 L	17.98
Cadence®	Dicamba	Syngenta	41.90	115 g	4.82
Cheetah® Gold	Dichlofop-methyl 200 g/L + Sethoxydim 20 g/L + Fenoxaprop-P-Ethyl 13.6 g/L	Bayer CropScience	23.37	1	23.37
Conclude™	MCPA + Florasulam	Dow AgroSciences	14.85	0.7 L	10.39
Crusader™	Pyroxulam + Cloquintocet-mexyl	Dow AgroSciences	66.00	0.5 L	33.00
Decision®	Diclofop-methyl + Sethoxydim	Bayer CropScience	17.10	1 L	17.10
Diurex® WG	Diuron 900 g/kg	Crop Care	11.85	0.5 kg	5.93
Diuron Liquid	Diuron 500 g/L	Various	8.00	0.9 L	7.20
Dual Gold®	S-Metolachlor 960 g/L	Syngenta	13.87	0.2 L	2.77
Duet® 250 EC	Oryzalin + trifluralin	Farmoz	5.45	1.6 L	8.72
Eclipse® 100SC	Metosulam 100 g/L	Bayer CropScience	197.67	0.05 L	9.88
Ecopar®	Pyraflufen-ethyl 20 g/L	Sipcam	31.12	0.4 L	12.45
Express®	Tribenuron-methyl	DuPont	215.00	25 g	5.38
Flame®	Imazapic	Crop Care	50.98	0.175 L	8.92
Flight® EC	Picolinafen 35 g/L + Bromoxynil 210 g/L + MCPA 350 g/L	Nufarm	27.90	0.54	15.07
Fusilade® Forte	Fluazifop-P 212 g/L	Syngenta	60.25	0.41 L	24.70
Garlon™ 600	Triclopyr 600 g/L	Dow AgroSciences	18.12	0.12 L	2.17
Gesatop® 600 SC	Simazine 600 g/L	Syngenta	7.25	1.7 L	12.33
Glean®	Chlorsulfuron 750 g/kg	DuPont/Nufarm	65.00	20 g	1.30
Goal®	Oxyfluorfen 240 g/L	Dow AgroSciences/Nufarm	21.02	0.075 L	1.58
Gramoxone® 250	Paraquat 250 g/L	Syngenta	6.90	1.0 L	6.90
Grazon™ Extra	Triclopyr 300 g/L + Picloram 100 g/L+ Aminopyralid 8 g/L	Dow AgroSciences	32.13	0.3 L	9.64
Harmony® M	Thifensulfuron + Metsulfuron-methyl	DuPont	406.00	40 g	16.24
Hammer®	Carfentrazone-ethyl 240 g/L	Crop Care	175.00	0.050 L	8.75
Hoegrass® 500	Diclofop methyl 500 g/L	Bayer CropScience	18.95	1 L	18.95
Hotshot®	Aminopyralid + Fluroxypyr	Dow AgroSciences	20.95	0.5 L	10.48
Hussar® OD	Iodosulfuron-methyl-sodium 100 g/L	Bayer CropScience	270.02	100 mL	27.00
Igran®	Terbutryn	Syngenta	17.65	0.85 L	15.00
Intervix®	Imazamox 33 g/L + Imazapyr 15 g/L	Nufarm	42.00	0.3 L	12.60
Jaguar®	Bromoxynil + Diflufenican	Bayer CropScience	12.75	0.75 L	9.56
Kamba® 500	Dicamba 500 g/L	Nufarm	21.28	0.28 L	5.96
Logran®	Triasulfuron	Syngenta	58.50	35 g	2.05
Logran® B-power	Triasulfuron + Butafenacil	Syngenta	144.33	50 g	7.22
Lontrel™	Clopyralid 300 g/L	Dow AgroSciences	26.04	0.3 L	7.81
Lontrel Advanced	Clopyralid 600g/L	Dow AgroSciences	49.22	0.15 L	7.38
Lontrel™ 750 SG	Clopyralid 750 g/kg	Dow AgroSciences	67.25	120 g	8.07
LV Ester 680	2,4-D LV ester 680 g/L	Crop Care	8.45	0.8 L	6.76

Table 37. Common retail prices of chemicals used on winter crops (continued)

Product name	Chemical name	Company	Price/L or kg (EX GST) ($)	Commonly used rate/ha	Cost ($/ha)
Mataven® 90	Flamprop-M-methyl	Nufarm	16.30	2.5 L	40.75
MCPA LVE	MCPA LVE 570 g/L	Various	11.15	0.7 L	7.81
Midas®	MCPA + imazapyr + imazapic	Nufarm	22.15	0.9 L	19.94
Monza®	Sulfosulfuron	Nufarm	950.00	25 g	23.75
Paragon®	Picolinafen + MCPA	Nufarm	31.94	0.25 L	7.98
Pantera®	Quizalofop-P-tefuryl	Crompton	37.00	0.25 L	9.25
Precept® 300 EC	Pyrasulfotole 50 g/L + MCPA 125 g/L	Bayer CropScience	30.03	0.5 L	15.01
Pyresta®	Pyraflufen-Ethyl 2.1 g/L + 2,4-D LV Ester 421 g/L	Sipcam	14.95	0.5 L	7.48
Raptor®	Imazamox 700 g/kg	Crop Care	690.88	45 g	31.09
Reglone®	Diquat	Syngenta	16.25	2.0 L	32.50
Roundup® Attack™	Glyphosate 570 g/L	Nufarm	7.97	0.95	7.57
Glyphosate 450	Glyphosate 450 g/L	Various	5.32	1.0 L	5.32
Sakura® 850 WG	Pyroxasulfone 850 g/kg	Bayer CropScience	325.00	118 g	38.35
Sencor®750	Metribuzin 750 g/kg	Bayer CropScience	27.50	0.28 kg	7.70
Select®	Clethodim	Sumitomo Chemical	12.36	0.3 L	3.71
Sharpen	Saflufenacil	Nufarm	735.00	26g	191.10
Simazine 900	Simazine 900 g/kg	Various	7.10	1.1 kg	7.81
Simazine 500 F	Simazine 500 g/L	Various	5.79	2.0 L	11.58
Spray.seed® 250	Paraquat + Diquat	Syngenta	9.70	1.6 L	15.51
Spinnaker® 700 WDG	Imazethapyr 700 g/kg	Nufarm	147.50	70 g	10.33
Starane™ Advanced	Fluroxypyr 333 g/L	Dow AgroSciences	23.10	0.45 L	10.39
Stomp®	Pendimethalin 440 g/L	Nufarm	10.87	1.4 L	15.22
Targa®	Quizalofop-P-ethyl	Sipcam	17.52	0.25 L	4.38
Thistle-Killem® 750	MCPA amine 750 g/L	Crop Care	8.29	0.96 L	7.96
Tigrex®	MCPA + Diflufenican	Bayer CropScience	12.01	0.5 L	6.01
Topik® 240 EC	Clodinafop-propargyl	Syngenta	56.50	85 mL	4.80
Torpedo™	Clopyralid 300 g/L + Florasulam 50 g/L	Dow AgroSciences	76.21	75 mL	5.72
Triflur® X	Trifluralin 480 g/L	Nufarm	6.19	0.8 L	4.95
Buttress®	2,4-DB 500 g/L	Crop Care/Nufarm	16.91	2.1 L	35.52
Tristar® Advance	Diclofop + Fenoxaprop	Bayer CropScience	10.00	1.5 L	15.00
Tordon™ 242	Picloram + MCPA	Dow AgroSciences	8.04	1.0 L	8.04
Terbyne®	Terbuthylazine 750 g/kg	Sipcam	21.00	1	21.00
Tordon™ 75D	Picloram + 2,4-D	Dow AgroSciences	30.28	0.3 L	9.08
Triathlon®		Farmoz	11.75		0.00
Valor® 500 WG	Flumioxazin 500 g/kg	Sumitomo Chemical	183.33	0.03	5.50
Velocity®	Pyrasulfotole 37.5 g/L + Bromoxynil 210 g/L	Bayer CropScience	30.27	0.5 L	15.14
Verdict™ 520	Haloxyfop-R	Dow AgroSciences	51.02	0.05 L	2.55
Wildcat® 110	Fenoxaprop-P-ethyl 110 g/L	Bayer CropScience	12.76	0.4 L	5.10
2,4-D Amine	625 g/L	Various	5.30	1.2 L	6.35

Common retail prices of adjuvants used on winter crops

Agral 600®	Wetting agent	Syngenta	5.15	0.35 L/100 L	1.80
BS1000®	Wetting agent	Crop Care/Nufarm	6.20	0.2 L/100 L	1.24
Bonza®	Wetting/Spreading	Nufarm	7.04	1.0 L/100L	7.04
Caltex Sprayplus®	Crop oil	Caltex	2.00	2.0 L/100 L	4.00
D-C-Trate®	Petroleum Oil	Caltex	6.29	2.0 L/100 L	39.56
Hasten™	Crop Oil + surfactant	Vic Chemical Co	4.90	1.0 L/100 L	4.90
Liase®	Ammonium Sulfate	Nufarm	1.95	2.0 L/100 L	3.90
LI 700®	Surfactant/Penetrant	Nufarm	6.41	0.25 L/100 L	1.60
Uptake™ Spraying Oil	Crop Oil	Dow AgroSciences	6.72	0.4 L/100 L	2.69
Wetter TX®	Surfactant	Nufarm	11.52	0.2 L/100 L	2.30

Prices are average retail (excluding GST) and are only a guide. They will vary according to location, availability and quantity purchased.

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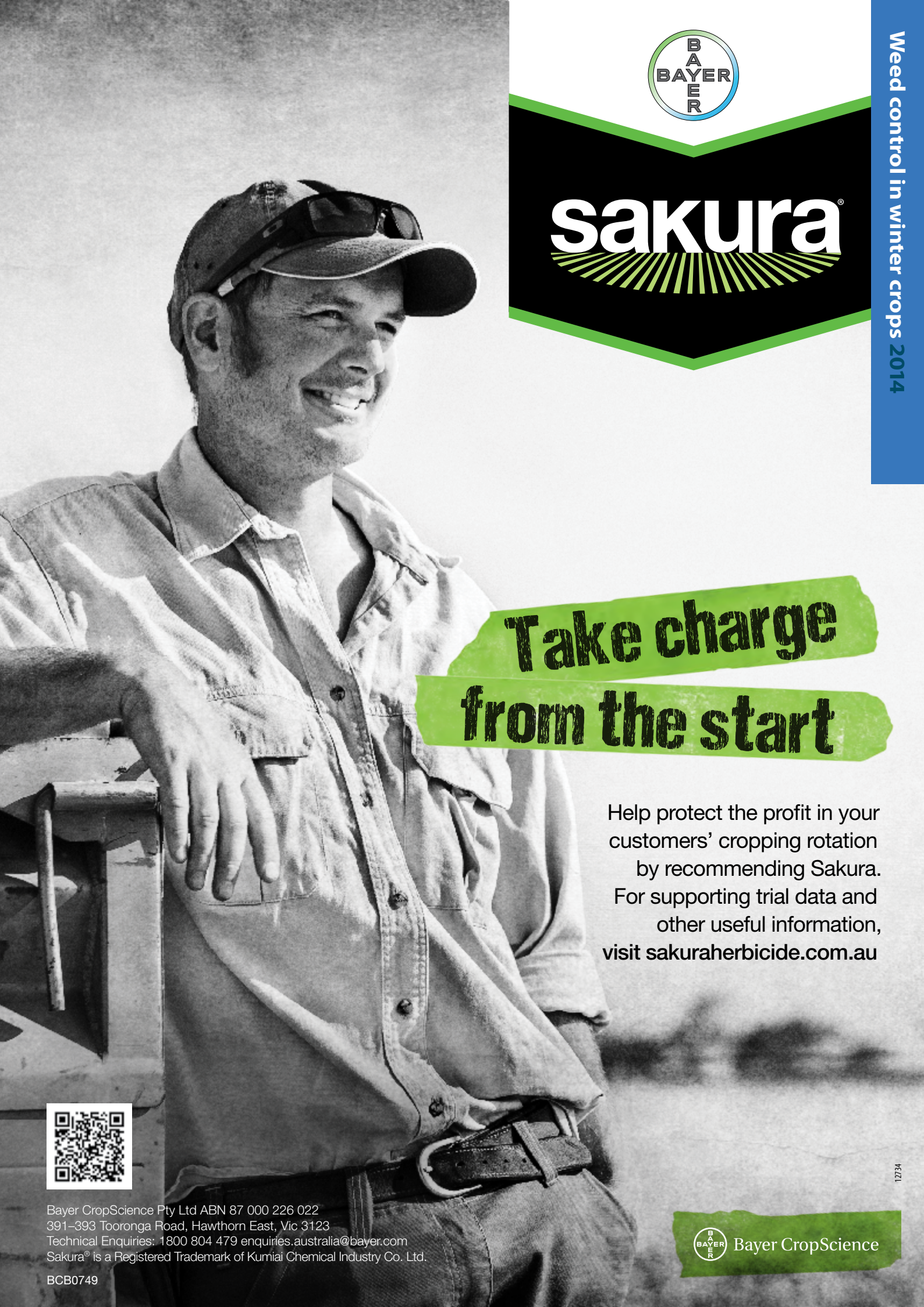
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