PBA Boundary(Φ)
Desi Chickpea

PBA
PULSE BREEDING AUSTRALIA

Better pulse varieties faster

High yielding, Ascochyta resistant chickpea

KEY FEATURES

- **Resistant/Moderately Resistant (R/MR) to Ascochyta blight**
  (resistance is > PBA HatTrick(Φ), < Genesis™ 425).
- **Moderately Susceptible (MS) to Phytophthora root rot**
  (resistance is < Jimbour(Φ) and < PBA HatTrick(Φ)).
- **Very high yielding across all chickpea growing regions of Northern NSW and Southern Qld.**
- **Tall, erect plant type**
  (similar to PBA HatTrick(Φ)).
- **Mid-season maturity**
  (equivalent to PBA HatTrick(Φ)).
- **Medium sized desi seed suited to the direct human consumption market.**
- **Excellent milling quality.**

MAIN ADVANTAGES

PBA Boundary(Φ) represents a further improvement in Ascochyta blight resistance for desi chickpea varieties suited to Northern NSW and Southern Qld.

It is broadly adapted to this region and has shown a consistent and significant yield advantage over recently released varieties.

PBA Boundary(Φ) has similar plant and seed type characteristics to PBA HatTrick(Φ) and Jimbour(Φ).

SEED PROTECTION & ROYALTIES

PBA Boundary(Φ) is protected under Plant Breeder's Rights (PBR) legislation. Growers can only retain seed from their production of PBA Boundary(Φ) for their own seed use.

An End Point Royalty (EPR) of $4.40 per tonne (GST inclusive), which includes breeder royalties, applies upon delivery of this variety.

Seed is available from the commercial partner Seednet.

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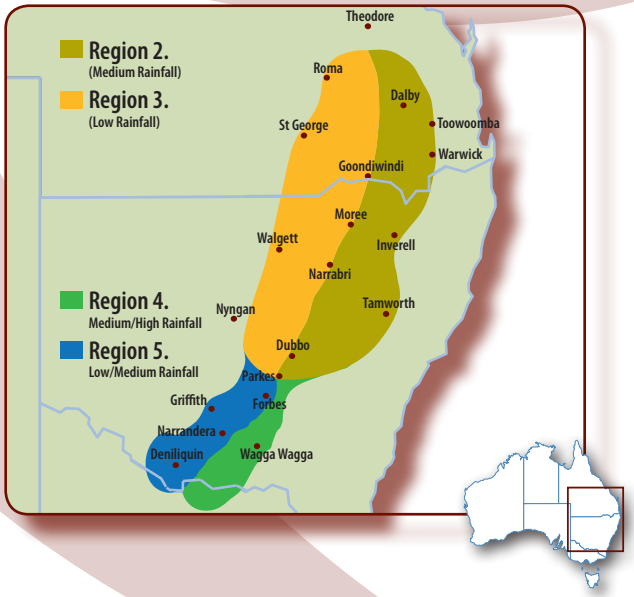
AREA OF ADAPTATION



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YIELD & ADAPTATION

PBA Boundary(Þ) is well adapted to those areas of Region 2 (Central/North-Western Slopes of NSW and Darling Downs of Qld) and Region 3 (Central/North-Western Plains of NSW and Western Downs/Maranoa of Qld) where chickpeas are currently grown.

PBA Boundary(Þ) has a major yield advantage over existing varieties in both wetter (Region 2) and drier (Region 3) parts of the Northern Region.

An increased Ascochyta resistance, coupled with a tall, erect plant type means that it can also be grown in Southern NSW.

A reduced resistance to Phytophthora root rot means that PBA Boundary(Þ) should not be grown in paddocks known to have a history of this disease or which are prone to waterlogging.

PBA Boundary(Þ) is not recommended for Central Qld where yields are lower than currently recommended varieties.

Yield of desi chickpea varieties in north-eastern Australia

Variety	Averaged yields for Regions R2 & R3 expressed as a % of PBA HatTrick(Þ) yield										Sth NSW	
	2010		2009		2008		2007		2006		2003-2010	
	R2	R3	R2	R3	R2	R3	R2	R3	R2	R3	R4	R5
PBA Boundary(Þ) (t/ha)	2.33	2.37	1.85	1.59	2.35	2.06	1.35	1.17	1.98	1.82	1.29	1.78
PBA Boundary(Þ)	109	104	104	102	109	105	106	106	106	109	105	105
PBA HatTrick(Þ)	100	100	100	100	100	100	100	100	100	100	100	100
Jimbour(Þ)	72	78	104	103	99	96	103	102	102	102	96	-
Kyabra(Þ)	78	72	106	105	99	96	105	104	106	-	-	-
Flipper(Þ)	95	86	97	92	96	90	97	86	96	89	92	94
Yorker(Þ)	88	98	100	96	98	89	92	88	94	91	96	-
PBA Slasher(Þ)	-	-	-	-	-	-	-	-	-	-	110	111

Source: Trial results from Pulse Breeding Australia (PBA) and National Variety Trials (NVT) programs.
Region 2 (R2) Central/North-Western Slopes (NSW) and Darling Downs (Qld).
Region 3 (R3) Central/North-Western Plains (NSW) and Western Downs/Maranoa (Qld).
Region 4 (R4) Southern NSW Medium/High rainfall east of the Newell Hwy
Region 5 (R5) Southern NSW Low/Medium rainfall west of the Newell Hwy

Disease resistance rating and yield loss of desi chickpea in north-eastern Australia

Variety	Ascochyta blight (AB)[1]					Phytophthora root rot (PRR)[2]		
	Resistance rating	Yield (t/ha)		% Yield loss		Resistance rating	Yield (t/ha)[3]	% Yield loss
		2009[3]	2010[3]	2009	2010			
PBA Boundary(Þ)	R/MR	1.84	2.32	4	4	MS	0.90	68
PBA HatTrick(Þ)	MR/R	1.71	1.71	8	34	MR	1.06	62
Jimbour(Þ)	S	0.44	0.00	77	100	MS/MR	0.88	68
Kyabra(Þ)	S	-	0.00	-	100	MS	-	-
Flipper(Þ)	MR	1.69	-	9	-	MS	-	-
Yorker(Þ)	MS	1.80	-	5	-	MR	1.42	50
PBA Boundary(Þ) disease free yield.		1.91	2.41	-	-		2.77	-

Source: NSW-DPI and Qld DEEDI Plant Pathology teams.
[1] Ascochyta blight yield loss trial, Tamworth 2009 & 2010 - NSW-DPI
[2] Phytophthora root rot yield loss trial, Warwick 2009 - DEEDI and NSW-DPI.
[3] Yields are in the presence of high disease pressure with no fungicide applications.

Agronomic traits of desi chickpea in north-eastern Australia

Variety	Flowering score#	Maturity score#	Plant height (cm)	Lodging score##
PBA Boundary(Þ)	5.5	5.0	55	2.0
PBA HatTrick(Þ)	4.6	5.1	53	2.0
Jimbour(Þ)	4.8	5.1	52	1.6
Kyabra(Þ)	4.4	5.1	54	1.4
Flipper(Þ)	6.5	6.3	54	1.3
Yorker(Þ)	5.8	6.0	48	1.7

Source: Pulse Breeding Australia trials program 2004-2010.
1 = very early; 9 = very late.
1 = fully erect, 9 = flat on ground.

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DISEASE MANAGEMENT
Ascochyta blight (AB)

Follow the general guidelines for reducing the risk of Ascochyta blight in 'Winter Crop Variety Sowing Guide' from NSW-DPI or 'Chickpea: Ascochyta Blight Management' from Pulse Australia

- Results from yield loss trials and screening nurseries demonstrate that PBA Boundary^{Φ} is significantly more resistant to Ascochyta than PBA HatTrick^{Φ}.
- The Resistant/Moderately Resistant (R/MR) Ascochyta rating means that, for the targeted region of Northern NSW and Southern Qld, disease development will normally be very slow and there will be no or minimal yield loss in most seasons.
- In most seasons there is no cost benefit in applying a fungicide before Ascochyta is detected.
- However, in seasons of high disease pressure, a reactive foliar fungicide spray strategy may be warranted and at least one pod protection spray is likely to be required.
- Monitor the crop 10 – 14 days after each rain event and if Ascochyta is detected, consult your agronomist.

Phytophthora root rot (PRR)

- PBA Boundary^{Φ} is rated as Moderately Susceptible (MS) to Phytophthora (similar to Flipper^{Φ}), based on results from PRR screening nurseries.
- Avoid paddocks that have either a:
  1. history of PRR in chickpea, irrespective of when chickpea was last grown, or
  2. likelihood of prolonged waterlogging following heavy rain.

Botrytis grey mould (BGM)

- Controlled environment testing, confirmed by opportunistic field testing in 2010, indicates that PBA Boundary^{Φ} is Susceptible (S) to BGM, broadly similar to all other regional desi varieties, except for Jimbour^{Φ} which is rated Moderately Susceptible (MS).
- Monitor for BGM in spring as temperatures and humidity rise. Apply a registered fungicide containing either carbendazim or mancozeb once BGM has been identified within the crop.

Virus

- PBA Boundary^{Φ} is rated as Moderately Susceptible (MS) to the suite of viruses, similar to other regional varieties.
- A large number of viruses can affect chickpea, however the incidence of disease affected plants is normally low in most districts and years. The main exception has been the Liverpool Plains district of NSW where significant infection levels (and yield losses) have frequently been observed.
- Retention of cereal stubble, timely sowing and establishment of the recommended plant population (see below) provide the most effective management in virus-prone districts such as the Liverpool Plains.
- There is no evidence to support the use of seed or foliar insecticides to reduce losses caused by viruses in chickpea.

AGRONOMY
Plant characteristics

PBA Boundary^{Φ} is similar in general appearance and maturity to PBA HatTrick^{Φ} and their common parent Jimbour^{Φ}. It is slightly but significantly taller (1-7 cm) than other regional desi varieties and pods are held well above the ground which assists harvest.

PBA Boundary^{Φ} has exhibited a slightly higher tendency to lodge than Jimbour^{Φ} in high yielding situations, however this is not considered a significant problem. It flowers slightly later than PBA HatTrick^{Φ} but has the same harvest maturity.

Sowing

- Target the optimum planting window for your area, but avoid very early sowing (to minimise the risk of lodging).
- Sow high quality seed at rates calculated to achieve a plant population of 25-30 plants/m^2. Typically this is 50 to 65 kg/ha, depending upon germination percentage and planting conditions.
- Inoculate with Group N Chickpea Rhizobium.

Tolerance of physical stresses

- Moderately intolerant of salt, but slightly less intolerant than PBA HatTrick^{Φ}, Flipper^{Φ} and Jimbour^{Φ}.
- PBA Boundary^{Φ} has not shown any sensitivity to a range of recommended pre and post-emergent herbicides when applied according to label directions.
- There is no evidence of increased sensitivity to frost compared to other desi chickpea varieties.

REFER TO DETAILED INFORMATION AT www.pulseaus.com.au
Ute guides, crop and disease management bulletins

PULSE VMP Pulse Variety Management Package

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SEED QUALITY

PBA Boundary^{Ф} is a standard 'Indian' type desi chickpea and has been assessed as suitable for both splitting and direct consumption use by traders in India and the Middle East. It is almost identical in size, shape and colour to PBA HatTrick^{Ф} and differs from Jimbour^{Ф} mainly in having a slightly darker seed coat.

PBA Boundary^{Ф} has excellent milling quality, as measured by dhal yield (%) and is better than most other varieties (except PBA HatTrick^{Ф}) commonly grown in north-eastern Australia. The dhal is similar in shape and size to that of Jimbour^{Ф} and has the distinct dimpling required by Indian markets to differentiate it from field pea dhal.

Dhal colour of PBA Boundary^{Ф} is very similar to that of other varieties.

Variety	Seed weight (g/100)	Dhal yield (%)
PBA Boundary^{Ф}	19.5	64.7
PBA HatTrick^{Ф}	20.1	65.1
Jimbour^{Ф}	19.8	64.2
Kyabra^{Ф}	25.3	64.9
Flipper^{Ф}	18.1	62.4
Yorker^{Ф}	21.2	62.9

Source: Pulse Breeding Australia.

PBA Boundary^{Ф}

PBA HatTrick^{Ф}

BREEDING

PBA Boundary^{Ф} (evaluated as CICA0511) was developed by the PBA chickpea program, led by NSW-DPI from a cross between Jimbour^{Ф} and the Ascochyta resistant Iranian landrace ICC3996.

PATHOLOGY

Disease management information has been compiled from experiments conducted by NSW-DPI through the GRDC project DAN00110 'More Profitable Chickpeas through Disease Management and Disease Screening - Northern Region' and by DEEDI through the GRDC project DAQ00154 'Northern Integrated Disease Management'.

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PBA is an unincorporated joint venture between the GRDC, University of Adelaide, SARDI, DPI Victoria, NSW-DPI, DEEDI, DAFWA and Pulse Australia.
It aims to deliver better pulse varieties faster.

FOR MORE INFORMATION

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Seednet's mission is:

"To deliver high performance seed based genetics to Australian grain growers and end user customers via superior product and service delivery channels".

Seednet is proud to partner with Pulse Breeding Australia and invest in the improvement of Australian desi chickpea varieties.

AGRONOMIC ENQUIRIES

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