

# PBA Highland XT<sup>Ⓟ</sup>

## Medium red lentil



# PBA

PULSE BREEDING AUSTRALIA

*Better pulse varieties faster*

## Early maturing herbicide tolerant lentil



### MAIN ADVANTAGES

PBA Highland XT<sup>Ⓟ</sup> is a herbicide tolerant red lentil variety which will complement other tolerant varieties such as PBA Hallmark XT<sup>Ⓟ</sup> and PBA Hurricane XT<sup>Ⓟ</sup>. It is an early-mid maturing variety as a point of difference to other Group B tolerant lines and has performed well in drier regions such as the Victorian Mallee and in South Australia. It also has improved resistance to ascochyta blight and maintains this level of resistance against an increasingly prevalent pathogen isolate that is virulent on other Group B tolerant varieties. These features together with its high yielding capability, particularly in drier seasons, will make PBA Highland XT<sup>Ⓟ</sup> a good alternative herbicide tolerant medium sized lentil variety.

### SEED PROTECTION & ROYALTIES

PBA Highland XT<sup>Ⓟ</sup> is protected under Plant Breeder's Rights (PBR) legislation. A PBR bag licence applies to the seed. Authorised growers can retain seed from production of PBA Highland XT<sup>Ⓟ</sup> for their own seed use. An End Point Royalty (EPR) of \$5.94/t (including GST) applies to this variety when delivered to authorised EPR collectors, which includes breeder royalties and also the \$0.44/t (including GST) herbicide technology royalty to Agriculture Victoria Services Pty Ltd. Seed is commercialised by PBSeeds and available from 2020.

### KEY FEATURES

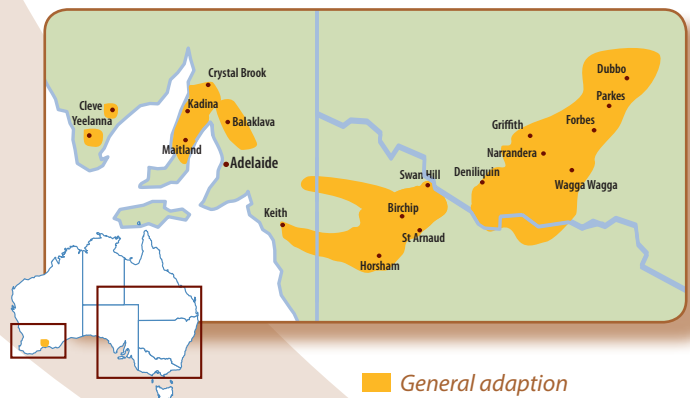
- High yielding herbicide tolerant lentil; 6-17% long term yield advantage over PBA Hurricane XT<sup>Ⓟ</sup> in Victorian Mallee and most of South Australia
- PBA Highland XT<sup>Ⓟ</sup> and PBA Hallmark XT<sup>Ⓟ</sup> have similar herbicide tolerance
  - Tolerant to applied imazamox and imazapyr according to APVMA permit number PER87417\*
  - Improved tolerance to applied flumetsulam\*
  - Improved tolerance to residual levels of sulfonyleurea and imidazolinone herbicide\*

*\*note that permits, product label rates, plant back periods and all label directions for use must be adhered to*

- High early vigour
- Early flowering
- Early to Mid maturity
- Moderately resistant to ascochyta blight (MR)\*\*
- Moderate resistance to botrytis grey mould (MR/MS)

*\*\* note provisional rating*

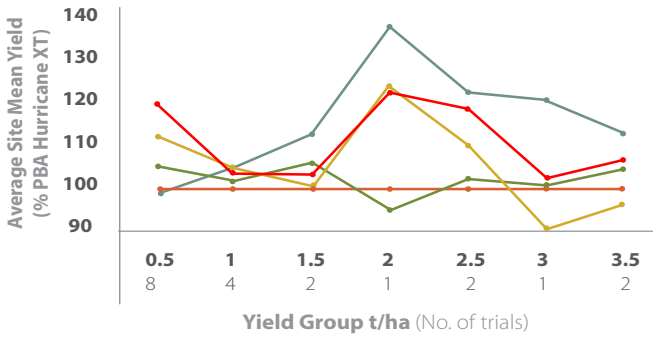
### AREA OF ADAPTATION



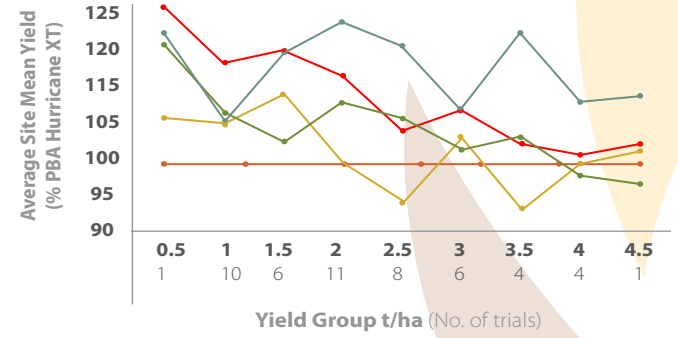
■ General adaption

### YIELD & ADAPTATION

#### Victorian Mallee



#### South Australia



■ PBA Highland XT<sup>Ⓟ</sup>
■ PBA Hallmark XT<sup>Ⓟ</sup>
■ PBA Hurricane XT<sup>Ⓟ</sup>
■ PBA Bolt<sup>Ⓟ</sup>
■ PBA Jumbo2<sup>Ⓟ</sup>

2014-2018 NVT Meta - analysis Yield of Highland XT<sup>Ⓟ</sup> by average site mean yield group as % of Hurricane XT<sup>Ⓟ</sup> (Lower Eyre Peninsula Data not included)\*\*

#### 2014-2018 LONG TERM YIELD OF LENTIL VARIETIES (expressed as % of PBA Hurricane XT<sup>Ⓟ</sup> yield)

Variety	Market Class	SOUTH AUSTRALIA					VICTORIA		NSW		WA		
		Yorke P	Mid North	Lower EP	Murray Mallee	South East	Mallee	Wimmera	South East	South West	Ag zone1	Ag zone4	Ag zone5
Site mean yield (t/ha)		2.26	1.77	2.00	0.80	1.57	1.19	1.70	1.61	1.21	0.66	0.44	1.41
<b>HERBICIDE TOLERANT VARIETIES</b>													
PBA Highland XT <sup>Ⓟ</sup>	M	109	106	94	117	111	110	106	105	108	95	106	109
PBA Hallmark XT <sup>Ⓟ</sup>	M	104	105	96	109	104	103	106	109	107	106	114	105
PBA Hurricane XT <sup>Ⓟ</sup>	S	100	100	100	100	100	100	100	100	100	100	100	100
<b>CONVENTIONAL VARIETIES</b>													
PBA Jumbo2 <sup>Ⓟ</sup>	L	118	113	104	100	105	115	108	114	115	91	93	99
PBA Jumbo <sup>Ⓟ</sup>	L	104	100	94	73	80	94	94	91	98	87	68	80
PBA Ace <sup>Ⓟ</sup>	M	104	106	100	95	95	106	104	105	105	125	107	100
PBA Bolt <sup>Ⓟ</sup>	M	101	98	98	106	103	103	98	94	98	104	99	105
PBA Blitz <sup>Ⓟ</sup>	M	109	99	92	85	92	98	94	91	100	58	60	84
PBA Flash <sup>Ⓟ</sup>	M	105	101	103	92	97	105	97	95	99	96	84	96
Nipper <sup>Ⓟ</sup>	S	95	91	94	64	76	78	88	86	90	55	55	70

Data courtesy of NVT, PBA, SARDI, Agriculture Victoria, NSW-DPI; note: Data not available for PBA Highland XT<sup>Ⓟ</sup> for trials grown in 2014\*\*  
 Market class key: S=small red; M=medium red; L=large red

#### AGRONOMIC AND DISEASE TRAITS OF LENTIL VARIETIES

Variety	Vigour	Flower time	Maturity	Lodging resistance	Pod drop	Shattering	Ascochyta blight			Botrytis grey mould	Boron	Salt
							AB Foliar (SA)	AB Foliar (VIC/NSW/WA)	AB Seed			
<b>HERBICIDE TOLERANT VARIETIES</b>												
PBA Highland XT <sup>Ⓟ</sup>	Mod/Good	Early	Early/Mid	MR	MR	MR	MR*	MR*	MR*	MR/MS	I	MI
PBA Hallmark XT <sup>Ⓟ</sup>	Mod/Good	Mid	Mid	MR	MR	R	MR/MS	MR	MR	R/MR	I	MI
PBA Hurricane XT <sup>Ⓟ</sup>	Mod	Mid	Mid	MR	MR	R	MR/MS	MR	MR*	MR/MS	I	I
<b>CONVENTIONAL VARIETIES</b>												
PBA Jumbo2 <sup>Ⓟ</sup>	Mod/Good	Mid	Mid	MS/MR	MR	R	R	R	R/MR	R/MR	MI	I
PBA Jumbo <sup>Ⓟ</sup>	Mod	Mid	Mid	S	MR	MR	MR/MS	MR/MS	S	MS	MI	I
PBA Ace <sup>Ⓟ</sup>	Good	Mid	Mid	MS/MR	R	MS/MR	R/MR	R/MR	MR	MR/MS	I	I
PBA Blitz <sup>Ⓟ</sup>	Mod/Good	Early	Early	MS/MR	MR	MR	MR	MR	MR	MR	I	I
PBA Bolt <sup>Ⓟ</sup>	Mod/Good	Early/Mid	Early/Mid	R	R	R	MR	MR	R/MR	S	MI	MI
PBA Flash <sup>Ⓟ</sup>	Mod	Early/Mid	Early/Mid	MR	MR	MR	MS	MS	MS	MR/MS	MI	MI
Nipper <sup>Ⓟ</sup>	Poor/Mod	Mid/Late	Mid	MR	MR	MR	MR/MS	MR	MR	R/MR	I	MT

Key: S=susceptible, MS=moderately susceptible, Mod=moderate, MR=moderately resistant, R=resistant, I=intolerant, MI=moderately intolerant, MT=moderately tolerant.  
 \*provisionally rated and subjected to changes once more data become available

PBA Highland XT<sup>®</sup> is a competitively yielding herbicide tolerant red lentil variety. It is broadly adapted across the major lentil growing regions in the Victorian Mallee and most of South Australia with 6-17% higher yield than PBA Hurricane XT<sup>®</sup>. Its early flowering and early to mid-maturing characteristics will make it a preferred herbicide tolerant, high yielding lentil variety in the Mallee environments.

PBA Jumbo2<sup>®</sup> is still the highest yielding lentil in most regions where the herbicide tolerance of PBA Highland XT<sup>®</sup> is not an advantage.

PBA Highland XT<sup>®</sup> has a improved ascochyta blight resistance compared to PBA Hallmark XT<sup>®</sup> and moderate resistance to botrytis grey mould. These characteristics will support disease management in favourable seasons.

## DISEASE MANAGEMENT

There are two major diseases of lentil in Australia.

PBA Highland XT<sup>®</sup> has shown a higher level of disease resistance to ascochyta blight (AB) and is moderately resistant to moderately susceptible to botrytis grey mould (BGM).

A fungicide seed dressing is beneficial for the early control of seedling root rots and foliar fungal diseases.

### Ascochyta blight (AB)

PBA Highland XT<sup>®</sup> is provisionally rated Moderately Resistant (MR) to foliar AB in South Australia, a significant improvement from PBA Hallmark XT<sup>®</sup>. Importantly it maintains this rating against a newly identified PBA Hurricane XT<sup>®</sup> virulent pathogen isolate, giving this variety the same rating in all regions. As with all other lentil varieties, PBA Highland XT<sup>®</sup> should be monitored for AB and growers should plan to spray to protect pods ahead of rain events should symptoms be detected.

### Botrytis grey mould (BGM)

- PBA Highland XT<sup>®</sup> is rated Moderately Resistant to Moderately Susceptible (MR/MS) to BGM. This is similar to PBA Hurricane XT<sup>®</sup>, PBA Ace<sup>®</sup>, and PBA Flash<sup>®</sup>
- In BGM prone areas, crops should be monitored, and preventative foliar fungicide applied just prior to canopy closure. Further monitoring and sprays may be required in areas with long growing seasons and when plant growth is high and/or prolonged wet spring conditions occur.

## AGRONOMY

### Agronomic characteristics

Paddock selection and basic requirements for growing PBA Highland XT<sup>®</sup> are similar to other lentil varieties.

PBA Highland XT<sup>®</sup> has the following characteristics;

- Moderately good vigour
- Early flowering and early to mid-maturing.
- Generally good resistance to lodging, similar to PBA Hallmark XT<sup>®</sup>, but can still lodge under conditions of high plant biomass.
- Moderately intolerant to salinity (NaCl), an improvement over PBA Hurricane XT<sup>®</sup> but still more sensitive than Nipper<sup>®</sup>.
- Intolerant of high soil boron, similar to PBA Hurricane XT<sup>®</sup> and Nipper<sup>®</sup>.

### Sowing

- Target plant densities of 120 plants/m<sup>2</sup> adjusting sowing rates for seed size and germination percentage of the seed used each year.

### Herbicide tolerance

- PBA Highland XT<sup>®</sup> has tolerance to applied imazamox and imazapyr according to APVMA permit number PER87417\*
- PBA Highland XT<sup>®</sup> has improved tolerance to flumetsulam (e.g. Broadstrike<sup>®</sup>) applied in crop.
  - In conventional lentil varieties flumetsulam (applied according to label directions) may cause height reduction, crop discolouration, delayed flowering and yield loss.
  - When flumetsulam is applied to PBA Highland XT<sup>®</sup> or PBA Hallmark XT<sup>®</sup> (according to label directions) the risk of crop damage and yield loss is minimised.
- PBA Highland XT<sup>®</sup>, like PBA Hallmark XT<sup>®</sup> and PBA Hurricane XT<sup>®</sup>, shows reduced sensitivities to some sulfonylurea and imidazolinone herbicide residues from previous crop applications.
- Growers must adhere to permits, product label rates, plant-back periods and all label directions for use.
- Preliminary evaluation in screening nurseries suggests that PBA Highland XT<sup>®</sup>, like PBA Hallmark XT<sup>®</sup>, PBA Hurricane XT<sup>®</sup> and Nipper<sup>®</sup>, is more sensitive to Group C herbicides (e.g. metribuzin and simazine) than other lentil varieties. However, label rates of metribuzin have been used on most lentil evaluation trials. When applying herbicides, follow all label guidelines and avoid application under conditions that would increase the risk of plant damage.

### Crop desiccation and harvest

- The maturity timing of PBA Highland XT<sup>®</sup> is similar to PBA Bolt<sup>®</sup> and earlier than PBA Hallmark XT<sup>®</sup> and PBA Hurricane XT<sup>®</sup>.
- As with all lentils, correct timing for crop desiccation, timely harvest and optimum machine setup will optimise yield and seed quality.

# PBA Highland XT<sup>Ⓛ</sup>

## Medium red lentil



### QUALITY

#### Seed characteristics

PBA Highland XT<sup>Ⓛ</sup> is a lens shaped medium red lentil variety with a grey seed coat. Seed size (as measured by average 100 seed weight) is slightly smaller than PBA Hallmark XT<sup>Ⓛ</sup> and bigger than PBA Hurricane XT<sup>Ⓛ</sup>. As with all other lentil varieties, seasonal variations may occur.

#### Quality assurance

Seed purity is very important in lentils with a restriction of 1% for varieties not of the same type. Prevent seed contamination when changing varieties, particularly where cotyledon or seed coat colour differs.

Be particularly careful to avoid contamination of PBA Highland XT<sup>Ⓛ</sup> with green lentils, such as PBA Giant<sup>Ⓛ</sup> or PBA Greenfield<sup>Ⓛ</sup>, as when split the yellow kernel of the green lentil seeds will contaminate and reduce the value of the red lentil product.

Variety	Market category	Seed shape	Seed coat colour	Cotyledon colour	Seed size (%) relative to PBA Bolt <sup>Ⓛ</sup>
<b>Small red</b>					
PBA Hurricane XT <sup>Ⓛ</sup>	SRP	Round	Grey	Red	75-80
Nipper <sup>Ⓛ</sup>	SRP	Round	Grey	Red	70-75
<b>Medium red</b>					
<b>PBA Highland XT<sup>Ⓛ</sup></b>	<b>MRS</b>	<b>Lens</b>	<b>Grey</b>	<b>Red</b>	<b>85-90</b>
PBA Hallmark XT <sup>Ⓛ</sup>	MRS	Lens	Grey	Red	90-95
PBA Ace <sup>Ⓛ</sup>	MRS	Lens	Grey	Red	100-105
PBA Blitz <sup>Ⓛ</sup>	MRS	Lens	Grey	Red	115-120
PBA Bolt <sup>Ⓛ</sup>	MRS	Lens	Grey	Red	100
PBA Flash <sup>Ⓛ</sup>	MRS	Lens	Grey	Red	105-110
<b>Large red</b>					
PBA Jumbo2 <sup>Ⓛ</sup>	LRS	Lens	Grey	Red	110-120
PBA Jumbo <sup>Ⓛ</sup>	LRS	Lens	Grey	Red	115-120

Key: SRP=small red (premium round), MRS=medium red (split), LRS=large red (split)

### MARKETING

- PBA Highland XT<sup>Ⓛ</sup> fits into the medium sized lentil class for the human food market.
- The good level of disease resistance will assist in achieving high grain quality from receipt point to market.
- PBA Highland XT<sup>Ⓛ</sup> should be segregated for marketing unless otherwise stated.
- PBA Highland XT<sup>Ⓛ</sup> will be open marketed with an End Point Royalty (EPR) of \$5.94/t (including GST), applying upon delivery.

### Breeding

PBA Highland XT<sup>Ⓛ</sup> (evaluated as CIPAL 1621) was developed by conventional plant breeding techniques and selected from a cross with PBA Bolt<sup>Ⓛ</sup> and 04-299L-05HG1001-05HSHI2006. It was developed by the PBA lentil breeding program using technology from Agriculture Victoria Services Pty Ltd. The Southern Pulse Agronomy program has also been an integral part of the evaluation process. PBA lentils formed a commercial partnership with PBSeeds to multiply, manage and release the PBA Highland XT<sup>Ⓛ</sup> lentil variety.

Pulse Breeding Australia (PBA) is an unincorporated joint venture between the GRDC, University of Adelaide, University of Sydney, SARDI, Agriculture Victoria, NSW DPI, and QLD DAF. It aims to breed and drive the adoption of improved pulse varieties for Australian growers.

### MORE INFORMATION

**Lentil Grownotes, Lentils Ute Guide, Pulse Breeding Australia**  
www.grdc.com.au

#### PBA Lentils

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### SEED ENQUIRIES

#### NATIONAL:

#### PBSEEDS – HEAD OFFICE

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**PBSeeds are leaders in the production of fine quality seed and grains, with a strong history and passion for the pulse industry.**

We take great care and pride in ensuring we meet our customer's requirements. PBSeeds aims to distribute seed locally to growers via a national network of over 200 members. PBSeeds is proud to partner with PBA and invests in fast tracking the delivery of improved pulse varieties to growers and industry.

### AGRONOMIC ENQUIRIES

#### NATIONAL

#### PBSEEDS

Janine Sounness, 0407 827292  
Rob Launder, 0467 844231

#### VICTORIA

Jason Brand, Agriculture Victoria, 03 4344 3341

#### SOUTH AUSTRALIA

Penny Roberts, SARDI, 08 8841 2401

#### NEW SOUTH WALES

Mark Richards, NSW DPI, 02 6938 1831

#### WESTERN AUSTRALIA

Mark Seymour, DPIRD, 08 9083 1143

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