PBA Hurricane XT$^{\phi}$
Small red lentil

PBA
PULSE BREEDING AUSTRALIA

Better pulse varieties faster

High yielding, herbicide tolerant lentil

PBA Hurricane XT$^{\phi}$ (left) matures earlier than PBA Herald XT$^{\phi}$ (right)

KEY FEATURES

- Highest yielding small red lentil; 5-12% long term yield advantage over PBA Herald XT$^{\phi}$ and Nipper$^{\phi}$
- Similar herbicide tolerance to PBA Herald XT$^{\phi}$;
  - tolerant to applied imazethapyr at label rates*
  - improved tolerance to applied flumetsulam*
  - improved tolerance to residual levels of sulfonylurea and imidazolinone herbicides*

Note that permits, product label rates, plant-back periods and all label directions for use must be adhered to

- Mid-maturity broadly adapted variety with earlier flowering, improved vigour and increased plant height over PBA Herald XT$^{\phi}$ and Nipper$^{\phi}$
- Moderately Resistant (MR) to ascochyta blight
- Small red lentil with a grey seed coat; slightly larger in size than PBA Herald XT$^{\phi}$ and Nipper$^{\phi}$

MAIN ADVANTAGES

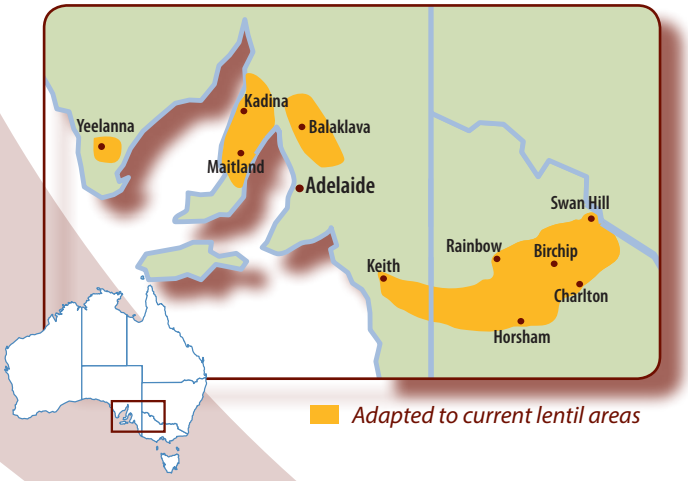
PBA Hurricane XT$^{\phi}$ builds on the success of the first herbicide tolerant lentil, PBA Herald XT$^{\phi}$. It incorporates the same improved tolerance to some Group B herbicides, but with higher grain yields and improved agronomic characteristics.

PBA Hurricane XT$^{\phi}$ and PBA Herald XT$^{\phi}$ are in the process of APVMA permit renewal and registration for imazethapyr use.*

PBA Hurricane XT$^{\phi}$ has resistance to ascochyta blight and higher yields than Nipper$^{\phi}$ and Nugget.

PBA Hurricane XT$^{\phi}$ is lower yielding than PBA Ace$^{\phi}$ and PBA Bolt$^{\phi}$, but may be preferred where more flexible weed control is desired or for marketing reasons.

AREA OF ADAPTATION



SEED PROTECTION & ROYALTIES

PBA Hurricane XT$^{\phi}$ is protected under Plant Breeder's Rights (PBR) legislation. A PBR bag licence applies to the seed and a Seed Technology Royalty applies to the seed price.

Authorised growers can retain seed from production of PBA Hurricane XT$^{\phi}$ for their own seed use.

An End Point Royalty (EPR) of $5.50/t (including GST) applies to this variety when delivered to authorised EPR collectors.

Seed is commercialised by PBSeeds and available from 2014.

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YIELD & ADAPTATION

PBA Hurricane XT$^{\Phi}$ is the highest yielding herbicide tolerant small-seeded red lentil variety. It is broadly adapted, with higher yields than PBA Herald XT$^{\Phi}$ and Nipper$^{\Phi}$ in all lentil growing areas.

PBA Hurricane XT$^{\Phi}$ is earlier flowering and maturing than PBA Herald XT$^{\Phi}$, as well as being taller and more vigorous than it and Nipper$^{\Phi}$.

The level of ascochyta blight resistance in PBA Hurricane XT$^{\Phi}$ will be beneficial in medium to higher rainfall lentil growing regions. However, BGM will need to be managed, particularly in areas where high early plant biomass occurs.

Where the improved herbicide tolerance of PBA Hurricane XT$^{\Phi}$ is not an advantage, its yield is generally less (4-10%) than medium and large seeded red lentils such as PBA Ace$^{\Phi}$, PBA Bolt$^{\Phi}$ and PBA Jumbo$^{\Phi}$.

2005-2012 LONG-TERM YIELD OF LENTIL VARIETIES (Yields expressed as a % of Nugget yield)

	South Australia				Victoria		New South Wales		Western Australia	
	Yorke P	Mid North	Lower EP	South East	Wimmera	Mallee	South East	South West	Zone 1	Zone 4
Small red										
PBA Bounty$^{\Phi}$	103	103	104	99	102	103	97	99	102	101
PBA Herald XT$^{\Phi}$	96	96	92	95	97	96	93	95	90	88
PBA Hurricane XT$^{\Phi}$	**104**	**105**	**104**	**107**	**103**	**104**	**107**	**104**	**103**	**105**
Nipper$^{\Phi}$	99	101	100	102	95	92	93	95	93	88
Northfield	95	93	89	92	90	88	89	89	90	86
Medium red										
PBA Ace$^{\Phi}$	108	111	111	114	111	114	113	111	109	112
PBA Blitz$^{\Phi}$	104	106	107	106	100	99	100	98	101	101
PBA Bolt$^{\Phi}$	104	107	107	111	110	112	111	106	105	108
PBA Flash$^{\Phi}$	106	108	108	112	100	99	97	99	100	101
Nugget	100	100	100	100	100	100	100	100	100	100
Large red										
PBA Jumbo$^{\Phi}$	108	107	107	107	101	101	105	103	102	101
Aldinga	98	98	94	97	94	93	97	95	97	97

Data courtesy of NVT, PBA, SARDI, DEPI Victoria, NSW-DPI

AGRONOMIC AND DISEASE TRAITS OF LENTIL VARIETIES

	Vigour	Flower time	Maturity	Lodging resistance	Pod drop	Shattering	Ascochyta blight		Botrytis grey mould	Boron	Salt
							Foliage	Seed			
Small red											
PBA Bounty$^{\Phi}$	Mod	Mid/Late	Mid	S	R	R	MR	MR	MS	I	MI
PBA Herald XT$^{\Phi}$	Poor/Mod	Mid/Late	Mid/Late	MR	MR	R	R	R	R	I	I
PBA Hurricane XT$^{\Phi}$	**Mod**	**Mid**	**Mid**	**MR**	**MR**	**R**	**MR**	**-**	**MS**	**I**	**I**
Nipper$^{\Phi}$	Poor/Mod	Mid/Late	Mid	MR	MR	MR	MR#	R	R	I	MT
Northfield	Poor/Mod	Mid	Mid/Late	MS/MR	MS/MR	MR	MR	R	S	I	I
Medium red											
PBA Ace$^{\Phi}$	Good	Mid	Mid	MS/MR	R	MS/MR	R	R	MS/MR	I	I
PBA Blitz$^{\Phi}$	Mod/Good	Early	Early	MS/MR	MR	MR	MR	MR	MR	I	I
PBA Bolt$^{\Phi}$	Mod/Good	Early/Mid	Early/Mid	R	R	R	MR	R	S	MI	MI
PBA Flash$^{\Phi}$	Mod	Early/Mid	Early/Mid	MR	MR	MR	MS	MR	MS	MI	MI
Nugget	Mod	Mid	Mid/Late	MS	MR	R	MS/MR	MS	MS/MR	I	I
Large red											
PBA Jumbo$^{\Phi}$	Mod	Mid	Mid	S	MR	MR	MR	R	MS	MI	I
Aldinga	Mod	Mid	Mid	S	R	MR	MR	MS	MS	I	MI

Key: *Mod=moderate, Mid=medium, S=susceptible, MS=moderately susceptible, MR=moderately resistant, R=resistant, I=intolerant, MI=moderately intolerant, MT=moderately tolerant.*

 # 2013 trials on the Yorke Peninsula and in the lower Mid North of SA show that Nipper$^{\Phi}$ is rating similar to Nugget for ascochyta blight (MS/MR) due to possible pathogen virulence changes in high lentil intensity areas.

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DISEASE MANAGEMENT

There are two major diseases of lentil in Australia.

PBA Hurricane XT$^{\Phi}$ has shown a good level of disease resistance to ascochyta blight (AB), but is rated moderately susceptible for botrytis grey mould (BGM).

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

Ascochyta blight (AB)

- PBA Hurricane XT$^{\Phi}$ is rated Moderately Resistant (MR) to foliar AB. Foliar resistance is similar to PBA Blitz$^{\Phi}$ while being significantly better than PBA Flash$^{\Phi}$ and Nugget. Its seed resistance is still to be validated.
- Crops should be monitored in severe disease risk environments and if disease symptoms are detected, fungicides should be applied from the start of podding, prior to rainfall events.

Botrytis grey mould (BGM)

- PBA Hurricane XT$^{\Phi}$ is rated Moderately Susceptible (MS) to BGM.
- In BGM prone areas, monitor crop growth and apply a preventative foliar fungicide 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 Hurricane XT$^{\Phi}$ are similar to other lentil varieties.

PBA Hurricane XT$^{\Phi}$ has the following characteristics;

- Mid-flowering and maturing. Vigour and plant height are improved compared to Nipper$^{\Phi}$ and PBA Herald XT$^{\Phi}$ but less than PBA Bolt$^{\Phi}$.
- Generally good resistance to lodging but can still lodge under conditions of high plant biomass.
- Intolerant to salinity (NaCl), more sensitive than Nipper$^{\Phi}$.
- Intolerant of high soil boron, similar to Nipper$^{\Phi}$.

Sowing

- PBA Hurricane XT$^{\Phi}$ is suitable for sowing times similar to PBA Flash$^{\Phi}$ and Nugget.
- In BGM prone areas PBA Hurricane XT$^{\Phi}$ is not as well suited to early sowing as PBA Herald XT$^{\Phi}$ and Nipper$^{\Phi}$.
- Target plant densities of 120 plants/m^2 adjusting sowing rates for seed size and germination % of the seed used each year.

Herbicide tolerance

- PBA Hurricane XT$^{\Phi}$ has tolerance to imazethapyr (similar to PBA Herald XT$^{\Phi}$) when applied pre- or post-emergence.
- PBA Hurricane XT$^{\Phi}$ has improved tolerance to flumetsulam (e.g. Broadstrike®) 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 Hurricane XT$^{\Phi}$ or PBA Herald XT$^{\Phi}$ (according to label directions) the risk of crop damage and yield loss is minimised.
- PBA Hurricane XT$^{\Phi}$, like PBA Herald XT$^{\Phi}$, 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 Hurricane XT$^{\Phi}$, like PBA Herald XT$^{\Phi}$ and Nipper$^{\Phi}$ 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 topping and harvest

- The maturity timing of PBA Hurricane XT$^{\Phi}$ is similar to Nipper$^{\Phi}$, earlier than PBA Herald XT$^{\Phi}$ and later than PBA Flash$^{\Phi}$, PBA Bolt$^{\Phi}$ and PBA Blitz$^{\Phi}$.
- As with all lentils, correct timing for crop topping, timely harvest and optimum machine setup will optimise yield and seed quality.

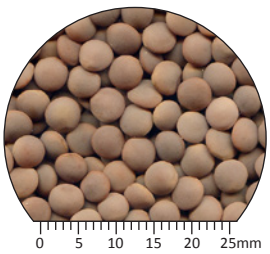
QUALITY

Seed characteristics

PBA Hurricane XT$^{\Phi}$ is a round small red lentil with a grey seed coat. Seed size (as measured by 100 seed weight) is slightly larger than PBA Herald XT$^{\Phi}$ but less than PBA Bounty$^{\Phi}$.

PBA Hurricane XT$^{\Phi}$

PBA Herald XT$^{\Phi}$



Nipper$^{\Phi}$

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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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 Hurricane XT$^{\Phi}$ with green lentils, such as Boomer$^{\Phi}$, as when split the yellow 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 Nugget
Small red					
PBA Bounty$^{\Phi}$	SRP	Round	Grey	Red	90
PBA Herald XT$^{\Phi}$	SRS	Lens	Grey	Red	75
PBA Hurricane XT$^{\Phi}$	**SRP**	**Round**	**Grey**	**Red**	**85**
Nipper$^{\Phi}$	SRP	Round	Grey	Red	75 - 80
Northfield	SRP	Round	Tan	Red	80
Medium red					
PBA Ace$^{\Phi}$	MRS	Lens	Grey	Red	100
PBA Blitz$^{\Phi}$	MRS	Lens	Grey	Red	115 - 120
PBA Bolt$^{\Phi}$	MRS	Lens	Grey	Red	100
PBA Flash$^{\Phi}$	MRS	Lens	Green	Red	100 - 110
Nugget	MRS	Lens	Grey	Red	100
Large red					
PBA Jumbo$^{\Phi}$	LRS	Lens	Grey	Red	120
Aldinga	LRS	Lens	Green	Red	120

Key: *SRS=small red (split), SRP=small red (premium round), MRS=medium red (split), MRD=medium red (dual purpose), LRS=large red (split), LG=large green,*

MARKETING

- PBA Hurricane XT$^{\Phi}$ fits into the human food market for small-sized red lentil, particularly to be consumed whole, as "footballs" (dehulled whole) or split.
- The high level of disease resistance will assist it in achieving high grain quality from receival point to market.
- PBA Hurricane XT$^{\Phi}$ should be segregated for marketing unless otherwise stated.
- PBA Hurricane XT$^{\Phi}$ will be open marketed with an End Point Royalty (EPR) of $5.50/t (including GST),applying upon delivery.

BREEDING

PBA Hurricane XT$^{\Phi}$ (evaluated as CIPAL1101) was developed by conventional mutation plant breeding techniques using the PBA breeding line 96-047L*99R060, and subsequently selected from a cross with PBA Flash$^{\Phi}$. It was developed by the PBA Lentil Program using technology from Agriculture Victoria Services Pty Ltd.

PBA Hurricane XT$^{\Phi}$ is part of a pipeline of varieties that will be released by PBA. PBA formed a commercial partnership with PBSeeds to multiply, manage and release PBA lentil varieties. PBSeeds and PBA are delivering varieties to growers 2-4 years earlier by fast tracking the identification, multiplication and release of new varieties. The Southern Pulse Agronomy program has been integral to this process.

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

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At PBSeeds we are leaders in the production of fine quality seed and grains. We take great care and pride in ensuring we match our customer's requirements. PBSeeds is proud to partner with PBA and invests in the improvement of Australian lentil varieties.

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