PBA Hallmark XT$^{\phi}$
Medium red lentil

PBA
PULSE BREEDING AUSTRALIA

Better pulse varieties faster

High yielding herbicide tolerant lentil

KEY FEATURES

- Highest yielding herbicide tolerant lentil; 5-12% long term yield advantage over PBA Hurricane XT$^{\phi}$
- PBA Hallmark XT$^{\phi}$ and PBA Hurricane XT$^{\phi}$ have similar herbicide tolerance
  - Tolerant to applied imazethapyr at label rates*
  - Improved tolerance to applied flumetsulam*
  - Improved tolerance to residual levels of sulfonylurea 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
- Mid flowering
- Mid maturity
  (maturity slightly later than PBA Hurricane XT$^{\phi}$)
- High resistance to botrytis grey mould (R/MR)
- Moderate resistance to ascochyta blight

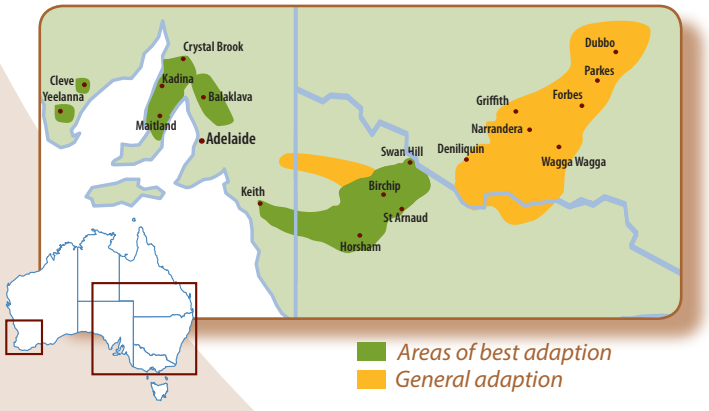
MAIN ADVANTAGES

PBA Hallmark XT$^{\phi}$ builds on the success of the other herbicide tolerant red lentils, PBA Herald XT$^{\phi}$ and PBA Hurricane XT$^{\phi}$. It incorporates the same improved tolerance to some Group B herbicides, but with higher grain yields than PBA Hurricane XT$^{\phi}$ and improved agronomic characteristics. PBA Hallmark XT$^{\phi}$ has greater early vigour, similar ratings to ascochyta blight and improved ratings to BGM when compared to PBA Hurricane XT$^{\phi}$. These features, combined with its herbicide tolerance, will make PBA Hallmark XT$^{\phi}$ a preferred variety in many cropping regions.

PBA Hallmark XT$^{\phi}$ is in the process of APVMA permit and registration for imazethapyr use*.

PBA Hallmark XT$^{\phi}$ is a medium red lentil so this variety can provide an alternative market class option to the popular small red lentil PBA Hurricane XT$^{\phi}$.

AREA OF ADAPTATION



SEED PROTECTION & ROYALTIES

PBA Hallmark XT$^{\phi}$ 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 Hallmark XT$^{\phi}$ 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 2019.

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YIELD & ADAPTATION

PBA Hallmark XT(ф) is the highest yielding herbicide tolerant red lentil variety across Australia. It is broadly adapted, with 5-6% higher yields than PBA Hurricane XT(ф) across the main lentil production regions in Victoria and South Australia. Where the improved herbicide tolerance of PBA Hallmark XT(ф) is not an advantage, its yield is competitive against the medium sized PBA Ace(ф) lentil though not against PBA Bolt(ф) in mallee environments where earlier maturity is preferable. PBA Hallmark XT(ф) has similar flowering to PBA Hurricane XT(ф) with slightly later maturity.

PBA Jumbo2(ф) is still the highest yielding lentil in most regions where the herbicide tolerance of PBA Hallmark XT(ф) is not an advantage.

The moderate level of ascochyta blight resistance in PBA Hallmark XT(ф) will support production in medium to higher rainfall lentil growing regions. Furthermore, it has been rated as resistant to moderately resistant to botrytis grey mould, a distinct improvement over PBA Hurricane XT(ф). This will support its management in favourable seasons.

2013-2017 LONG-TERM YIELD OF LENTIL VARIETIES (Yields expressed as a % of Hurricane XT(ф) yield)

	South Australia					Victoria		New South Wales		Western Australia		
	Yorke P	Mid North	Lower EP	Murray Mallee	South East	Wimmera	Mallee	South East	South West	Agzone1	Agzone4	Agzone5
Site mean yield (t/Ha)	**2.52**	**2.04**	**1.81**	**1.00**	**1.76**	**1.90**	**1.34**	**1.59**	**1.29**	**0.83**	**0.44**	**1.56**
Small Red												
PBA Hurricane XT(ф)	100	100	100	100	100	100	100	100	100	100	100	100
PBA Herald XT(ф)	86	85	86	66	78	85	69	82	86	96	77	83
PBA Bounty(ф)	108	104	109	99	95	96	100	95	97	97	79	95
Nipper(ф)	96	89	95	66	76	85	69	80	82	93	61	79
Northfield	88	88	85	75	78	86	77	83	94	96	81	86
Medium Red												
PBA Hallmark XT(ф)	**105**	**106**	**96**	**105**	**106**	**105**	**105**	**109**	**112**	**105**	**116**	**106**
PBA Ace(ф)	105	107	99	97	100	100	106	108	120	113	110	103
PBA Blitz(ф)	112	106	91	101	86	95	92	89	101	82	76	93
PBA Bolt(ф)	101	103	100	113	103	102	111	102	106	98	106	105
PBA Flash(ф)	107	105	106	103	97	98	104	98	103	98	87	98
Nugget	98	96	100	85	87	90	90	90	98	101	79	90
Large Red												
PBA Jumbo2(ф)	120	117	103	108	106	107	109	113	119	105	107	106
PBA Jumbo(ф)	108	103	97	87	84	91	90	91	105	97	75	90
Aldinga	97	95	92	91	89	94	89	90	96	93	88	93

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

AGRONOMIC AND DISEASE TRAITS OF LENTIL VARIETIES

							Ascochyta blight					
	Vigour	Flower time	Maturity	Lodging resistance	Pod drop	Shattering	AB Foliar (SA)	AB Foliar (VIC/NSW/WA)	AB Seed	Botrytis grey mould	Boron	Salt
Small red												
PBA Hurricane XT(ф)	Mod	Mid	Mid	MR	MR	R	MR*	MR	MR	MR/MS	I	I
PBA Herald XT(ф)	Poor/Mod	Mid/Late	Mid/Late	MR	MR	R	R	R	R	R	I	I
PBA Bounty(ф)	Mod	Mid/Late	Mid	S	R	R	MR	MR	MR	MS	I	MI
Nipper(ф)	Poor/Mod	Mid/Late	Mid	MR	MR	MR	MR/MS	MR	MR	R/MR	I	MT
Northfield	Poor/Mod	Mid	Mid/Late	MS/MR	MS/MR	MR	MR	MR	R	S	I	I
Medium red												
PBA Hallmark XT(ф)	**Mod/Good**	**Mid**	**Mid**	**MR**	**MR**	**R**	**MR/MS**	**MR**	**MR**	**R/MR**	**I**	**MI**
PBA Ace(ф)	Good	Mid	Mid	MS/MR	R	MS/MR	R/MR	R/MR	MR	MR/MS	I	I
PBA Blitz(ф)	Mod/Good	Early	Early	MS/MR	MR	MR	MR	MR	MR	MR	I	I
PBA Bolt(ф)	Mod/Good	Early/Mid	Early/Mid	R	R	R	MR	MR	R/MR	S	MI	MI
PBA Flash(ф)	Mod	Early/Mid	Early/Mid	MR	MR	MR	MS	MS	MS	MR/MS	MI	MI
Nugget	Mod	Mid	Mid/Late	MS	MR	R	MR/MS	MR/MS	MR/MS	MR/MS	I	I
Large red												
PBA Jumbo2(ф)	Mod/Good	Mid	Mid	MS/MR	MR	R	R	R	R/MR	R/MR	MI	I
PBA Jumbo(ф)	Mod	Mid	Mid	S	MR	MR	MR/MS	MR/MS	S	MS	MI	I
Aldinga	Mod	Mid	Mid	S	R	MR	MR	MR	MS	MS	I	MI

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

Hurricane XT(ф) is likely to be downgraded to MR/MS in SA in the near future with an increasing number of Hurricane XT(ф) virulent isolates occurring in SA

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DISEASE MANAGEMENT

There are two major diseases of lentil in Australia.

PBA Hallmark XT$^{\phi}$ has shown a moderate level of disease resistance to ascochyta blight (AB) and has high resistance 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)

- **South Australia:** PBA Hallmark XT$^{\phi}$ is rated Moderately Resistant to Moderately Susceptible (MR/MS) to foliar AB in South Australia, similar to PBA Hurricane XT$^{\phi}$. Although PBA Hurricane XT$^{\phi}$ is currently rated MR to AB, it is likely to be downgraded in the near future to MR/MS as well, due to accumulating evidence of a more prevalent PBA Hurricane XT$^{\phi}$ virulent AB isolate on the Yorke Peninsula and lower mid-north regions of South Australia. Crops in these regions should be monitored for AB and growers should plan to spray to protect pods ahead of rain events should symptoms be detected.
- **Victoria, NSW, WA:** PBA Hallmark XT$^{\phi}$ is currently rated Moderately Resistant (MR) to foliar AB in Victoria, New South Wales and Western Australia, the same as PBA Hurricane XT$^{\phi}$. In any areas where there are more intense lentil rotations, prevalence of lentil crops and conditions favouring disease development, growers should be aware that the AB isolates can change over time, changing a variety's level of resistance. Crops should always be monitored to check for this disease, and preventative fungicides applied to protect pods ahead of rain events should there be evidence of AB.
- 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 Hallmark XT$^{\phi}$ is rated Resistant to Moderately Resistant (R/MR) to BGM. This is a significant improvement over PBA Hurricane XT$^{\phi}$, is better than all other medium red lentils, and equivalent to PBA Jumbo2$^{\phi}$.
- In BGM prone areas, crops should still 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.

PBAHallmarkXT$^{\phi}$

PBA Hurricane XT$^{\phi}$

AGRONOMY

Agronomic characteristics

Paddock selection and basic requirements for growing PBA Hallmark XT$^{\phi}$ are similar to other lentil varieties.

PBA Hallmark XT$^{\phi}$ has the following characteristics;

- Mid-flowering and mid-maturing (maturity slightly later than PBA Hurricane XT$^{\phi}$).
- Vigour and plant height are improved compared to PBA Hurricane XT$^{\phi}$ and is equivalent to PBA Bolt$^{\phi}$.
- Generally good resistance to lodging, similar to PBA Hurricane XT$^{\phi}$, but can still lodge under conditions of high plant biomass.
- Moderately intolerant to salinity (NaCl), an improvement over PBA Hurricane XT$^{\phi}$ but still more sensitive than Nipper$^{\phi}$.
- Intolerant of high soil boron, similar to PBA Hurricane XT$^{\phi}$ and Nipper$^{\phi}$.

Sowing

- In BGM prone areas PBA Hallmark XT$^{\phi}$ should perform similarly to PBA Jumbo2$^{\phi}$ in regard to early sowing.
- Target plant densities of 120 plants/m2 adjusting sowing rates for seed size and germination % of the seed used each year.

Herbicide tolerance

- PBA Hallmark XT$^{\phi}$ has tolerance to imazethapyr (similar to PBA Hurricane XT$^{\phi}$) when applied pre- or post-emergence.
- PBA Hallmark 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 Hallmark XT$^{\phi}$ or PBA Hurricane XT$^{\phi}$ (according to label directions) the risk of crop damage and yield loss is minimised.
- PBA Hallmark XT$^{\phi}$, like PBA Hurricane XT$^{\phi}$and 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 Hallmark XT$^{\phi}$, like PBA Hurricane XT$^{\phi}$, 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 dessication and harvest

- The maturity timing of PBA Hallmark XT$^{\phi}$ is later than PBA Blitz$^{\phi}$, PBA Bolt$^{\phi}$ and PBA Flash$^{\phi}$, slightly later than PBA Hurricane XT$^{\phi}$, PBA Jumbo2$^{\phi}$, PBA Ace$^{\phi}$ and earlier than Nugget and PBA Herald XT.$^{\phi}$
- As with all lentils, correct timing for crop dessication, timely harvest and optimum machine setup will optimise yield and seed quality.

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QUALITY

Seed characteristics

PBA Hallmark XT$^{\phi}$ is a lens shaped medium red lentil with a grey seed coat. Seed size (as measured by average 100 seed weight) is slightly larger than PBA Ace$^{\phi}$ and PBA Bolt$^{\phi}$ but less than PBA Flash$^{\phi}$ and PBA Blitz$^{\phi}$. As with all 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 Hallmark XT$^{\phi}$ with green lentils, such as PBA Giant$^{\phi}$ or PBA Greenfield$^{\phi}$, 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 Nugget
Small red					
PBA Hurricane XT$^{\phi}$	SRP	Round	Grey	Red	85
PBA Herald XT$^{\phi}$	SRS	Lens	Grey	Red	75
PBA Bounty $^{\phi}$	SRP	Round	Grey	Red	90
Nipper $^{\phi}$	SRP	Round	Grey	Red	75-80
Northfield	SRP	Round	Tan	Red	80
Medium red					
PBA Hallmark XT $^{\phi}$	**MRS**	**Lens**	**Grey**	**Red**	**105**
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 Jumbo2 $^{\phi}$	LRS	Lens	Grey	Red	120
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), LRS=large red (split)

MARKETING

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

BREEDING

PBA Hallmark XT$^{\phi}$ (evaluated as CIPAL1422) was developed by conventional plant breeding techniques and selected from a cross with PBA Herald XT$^{\phi}$ and PBA Bolt$^{\phi}$. It was developed by the PBA Lentil Program using technology from Agriculture Victoria Services Pty Ltd. The Southern Pulse Agronomy program has also been integral to the evaluation process. PBA Lentils formed a commercial partnership with PBSeeds to multiply, manage and release the PBA Hallmark XT$^{\phi}$ lentil variety.

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Better pulse varieties faster

Pulse Breeding Australia (PBA) is an unincorporated joint venture between the GRDC, University of Adelaide, University of Sydney, SARDI, DEDJTR 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
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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.

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