Better pulse varieties faster

High yielding disease resistant red lentil

KEY FEATURES
- High yielding red lentil variety (average yield 9-13% higher than PBA Jumbo
- Higher yielding replacement for PBA Jumbo and Aldinga in all areas
- Mid-maturing, broadly-adapted variety
- Resistant to ascochyta blight and botrytis grey mould
- Suitable for early sowing to maximise yield
- Improved early vigour and improved lodging resistance over PBA Jumbo and Aldinga
- Improved tolerance to soil boron, similar to PBA Jumbo, PBA Flash and PBA Bolt
- Large red lentil similar in size to PBA Jumbo and Aldinga
- High quality grain with a grey seed coat
- Well suited to the removal of small broadleaf weed seeds from the harvested sample

MAIN ADVANTAGES
PBA Jumbo2 is the highest yielding lentil variety available in Australia, outperforming all other current varieties in medium-rainfall lentil growing regions. It is a broadly adapted large red variety which now outclasses the other two large red types, PBA Jumbo and Aldinga. It has combined resistance to the major diseases of lentils in Australia, ascochyta blight and botrytis grey mould. This will assist in achieving consistent high grain quality for the market.

SEED PROTECTION & ROYALTIES
PBA Jumbo2 is protected under Plant Breeder’s Rights (PBR) legislation. A PBR bag licence and licence fee applies to the seed. Authorised growers can retain seed from production of PBA Jumbo2 for their own seed use but not sell seed to other growers.

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

Seed is commercialised through PBEseeds and available from 2014.

AREA OF ADAPTATION

PBA Jumbo2
Large red lentil

High yielding disease resistant red lentil

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AREA OF ADAPTATION
YIELD & ADAPTATION

PBA Jumbo² has a long term average yield advantage of 18% over Nugget in key medium-rainfall lentil growing regions (Wimmera, Yorke Peninsula and Mid-North of South Australia). In these regions, PBA Jumbo² also yields significantly better than PBA Jumbo on average (9% higher in SA and 13% higher in Victoria).

The high level of disease resistance in this variety will be beneficial in medium to higher rainfall lentil growing regions and in areas where early sowing is required. The yield potential of PBA Jumbo² will be best realised in favourable years where moisture is not limiting. In drier, shorter seasons, varieties such as PBA Bolt may be better adapted.

#2007-2013 LONG-TERM YIELD OF LENTIL VARIETIES (#Yields expressed as a percentage of Nugget’s yield)

<table>
<thead>
<tr>
<th>Variety</th>
<th>South Australia</th>
<th>Victoria</th>
<th>New South Wales</th>
<th>Western Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Region Yield (t/ha)</td>
<td>Yorke P</td>
<td>Mid North</td>
<td>Lower EP</td>
<td>Murray Mallee</td>
</tr>
<tr>
<td>Small red</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBA Bounty</td>
<td>102</td>
<td>102</td>
<td>105</td>
<td>105</td>
</tr>
<tr>
<td>PBA Hurricane XT</td>
<td>90</td>
<td>92</td>
<td>92</td>
<td>102</td>
</tr>
<tr>
<td>Medium red</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBA Ace</td>
<td>107</td>
<td>111</td>
<td>105</td>
<td>123</td>
</tr>
<tr>
<td>PBA Jumbo²</td>
<td>108</td>
<td>110</td>
<td>112</td>
<td>126</td>
</tr>
<tr>
<td>Large red</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBA Jumbo²</td>
<td>119</td>
<td>117</td>
<td>118*</td>
<td>129*</td>
</tr>
<tr>
<td>PBA Jumbo²</td>
<td>114</td>
<td>111</td>
<td>114*</td>
<td>113*</td>
</tr>
<tr>
<td>Green lentils</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBA Greenfield</td>
<td>102</td>
<td>102</td>
<td>101</td>
<td>97</td>
</tr>
</tbody>
</table>

#Data courtesy of NVT, PBA, SARDI, DEPI Victoria, NSW-DPI. Includes up to seven years of data, where available. *Note, these average yields based on <3 years of data.

AGRONOMIC AND DISEASE TRAITS OF LENTIL VARIETIES

<table>
<thead>
<tr>
<th>Variety</th>
<th>Vigour</th>
<th>Flower time</th>
<th>Maturity</th>
<th>Lodging resistance</th>
<th>Pod drop</th>
<th>Shattering</th>
<th>Ascochyta blight (foliar)</th>
<th>Botrytis Grey Mould</th>
<th>Boron</th>
<th>Salt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small red</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBA Bounty</td>
<td>Mod</td>
<td>Mid/Late</td>
<td>Mid</td>
<td>S</td>
<td>R</td>
<td>R</td>
<td>MR/MS</td>
<td>MS</td>
<td>I</td>
<td>Mi</td>
</tr>
<tr>
<td>PBA Hurricane XT</td>
<td>Mod/Poor</td>
<td>Mid/Late</td>
<td>Mid/Late</td>
<td>MR/MS</td>
<td>MR</td>
<td>MR</td>
<td>R</td>
<td>R</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Medium red</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBA Ace</td>
<td>Good</td>
<td>Mid</td>
<td>Mid</td>
<td>MR/MS</td>
<td>R</td>
<td>MR/MS</td>
<td>R</td>
<td>MR/MS</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>PBA Jumbo²</td>
<td>Mod/Good</td>
<td>Mid/Late</td>
<td>Early</td>
<td>Early</td>
<td>MR</td>
<td>MR</td>
<td>MR</td>
<td>MR</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Large red</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBA Jumbo²</td>
<td>Mod</td>
<td>Mid</td>
<td>Mid</td>
<td>MR/MS</td>
<td>MR</td>
<td>MR</td>
<td>MR</td>
<td>MS</td>
<td>Mi</td>
<td>Mi</td>
</tr>
<tr>
<td>PBA Jumbo²</td>
<td>Mod/Good</td>
<td>Mid</td>
<td>Mid</td>
<td>MR/MS</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>Mi</td>
<td>I</td>
</tr>
</tbody>
</table>

Key: Mod=moderate, S=susceptible, MS=moderately susceptible, MR=moderately resistant, R=resistant, I=intolerant, Mi=moderately intolerant, MT=moderately tolerant.
Pulse Breeding Australia

**Disease Management**

PBA Jumbo2® has shown high levels of disease resistance to the two major diseases of lentil (ascochyta blight and botrytis grey mould). Its high level of disease resistance will mean that fungicides may not be required in many seasons, therefore reducing production costs, however seasonal monitoring is still required.

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

**Ascochyta blight (AB)**
- PBA Jumbo2® is rated as resistant (R) to foliar AB. Foliar resistance is better than Nipper® and similar to PBA Ace® and PBA Herald XT®. Seed resistance to AB is still to be validated.
- Crops should be monitored in severe disease risk environments and if disease symptoms are detected, fungicide should be applied from the start of podding, prior to subsequent rainfall events.

**Botrytis Grey Mould (BGM)**
- PBA Jumbo2® is rated resistant (R) to BGM which will assist in the management of this disease.
- In BGM prone areas, monitor crop growth and apply a preventative fungicide just prior to canopy closure. Further monitoring and sprays may be required when prolonged wet spring conditions occur and in areas with long growing seasons.

**Virus Management**

Virus management is important to avoid grain blemishes, infected seed and yellow stunted plants.
- For viral diseases a threshold of <0.1% seed infection is recommended for sowing in high risk areas, and <0.5% seed infection for sowing in low risk areas. Use virus free seed where possible. Avoid keeping sowing seed from areas of the crop containing plants with virus symptoms.
- The spread of virus can be managed by controlling summer weed hosts for virus; ensuring the crop covers the ground quickly ( sow early and avoid low sowing rates), the early application of insecticide to control aphids, and monitoring and control of aphids during the season.

**Agronomy**

**Agronomic characteristics**

Paddock selection and basic requirements for growing PBA Jumbo2® are similar to other lentil varieties.

PBA Jumbo2® has the following specific characteristics:
- Mid-flowering and maturing.
- Intolerant to salinity (NaCl) and is more sensitive than PBA Bolt®, PBA Flash® and Nipper®.

**Seed characteristics**

PBA Jumbo2® is a large-sized red lentil with a grey seed coat. Seed size is 20% larger than PBA Ace® and Nugget (as measured by 100 seed weight). It is similar in size to Aldinga and PBA Jumbo®. Seed size of any lentil variety may vary between seasons and locations.

Quality testing has found that PBA Jumbo2® has good milling characteristics (dehulling and splitting efficiencies), similar to PBA Jumbo® and PBA Flash®. Cooking times for the split lentil product have been found to be similar to those of the variety Aldinga.

**Herbicide tolerance**

PBA Jumbo2® has not shown sensitivity to any registered herbicides different to label advice and applied according to label directions.

PBA Jumbo2® is not tolerant to imazethapyr herbicide. PBA Hurricane XT® and PBA Herald XT® are the only current lentil varieties tolerant of imazethapyr.

**Crop topping and harvest**

PBA Jumbo2® matures at a similar time to PBA Hurricane XT®, PBA Ace®, PBA Jumbo® and Aldinga, but later than PBA Bolt®, PBA Flash® and PBA Blitz®.

- As with all lentils, correct timing for crop topping, timely harvest and optimum machine setup will optimise yield and seed quality.
- Due to its large seed size, PBA Jumbo2® is well suited to screening for the removal of small broadleaf weed seeds from the harvested sample.

**Quality**

Refer to detailed information at www.pulseaus.com.au

Ute guides, crop and disease management bulletins
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 Jumbo2 with green lentils, such as PBA Giant, PBA Greenfield and Boomer, as when split the yellow seeds will contaminate and reduce the value of the red lentil split product.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Market category</th>
<th>Seed shape</th>
<th>Seed coat colour</th>
<th>Cotyledon colour</th>
<th>Seed size (%) relative to Nugget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small red</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBA Bounty</td>
<td>SRP</td>
<td>Round</td>
<td>Grey</td>
<td>Red</td>
<td>85%</td>
</tr>
<tr>
<td>PBA Herald X</td>
<td>SRS</td>
<td>Lens</td>
<td>Grey</td>
<td>Red</td>
<td>75%</td>
</tr>
<tr>
<td>PBA Hurricane X</td>
<td>SRP</td>
<td>Round</td>
<td>Grey</td>
<td>Red</td>
<td>85%</td>
</tr>
<tr>
<td>Nipper</td>
<td>SRP</td>
<td>Round</td>
<td>Grey</td>
<td>Red</td>
<td>75-80%</td>
</tr>
<tr>
<td>Northfield</td>
<td>SRP</td>
<td>Round</td>
<td>Tan</td>
<td>Red</td>
<td>80%</td>
</tr>
<tr>
<td>Medium red</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBA Acre</td>
<td>MRS</td>
<td>Lens</td>
<td>Grey</td>
<td>Red</td>
<td>100%</td>
</tr>
<tr>
<td>PBA Blitz</td>
<td>MRS</td>
<td>Lens</td>
<td>Grey</td>
<td>Red</td>
<td>115-120%</td>
</tr>
<tr>
<td>PBA Bolt</td>
<td>MRS</td>
<td>Lens</td>
<td>Grey</td>
<td>Red</td>
<td>100%</td>
</tr>
<tr>
<td>PBA Flash</td>
<td>MRS</td>
<td>Lens</td>
<td>Green</td>
<td>Red</td>
<td>100-110%</td>
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<tr>
<td>Nugget</td>
<td>MRS</td>
<td>Lens</td>
<td>Grey</td>
<td>Red</td>
<td>100%</td>
</tr>
<tr>
<td>Large red</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBA Jumbo</td>
<td>LRS</td>
<td>Lens</td>
<td>Grey</td>
<td>Red</td>
<td>120%</td>
</tr>
<tr>
<td>PBA Jumbo2</td>
<td>LRS</td>
<td>Lens</td>
<td>Grey</td>
<td>Red</td>
<td>120%</td>
</tr>
<tr>
<td>Aldinga</td>
<td>LRS</td>
<td>Lens</td>
<td>Green</td>
<td>Red</td>
<td>120%</td>
</tr>
<tr>
<td>Green lentils</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBA Greenfield</td>
<td>MG</td>
<td>Lens</td>
<td>Green</td>
<td>Yellow</td>
<td>130%</td>
</tr>
<tr>
<td>PBA Giant</td>
<td>LG</td>
<td>Lens</td>
<td>Green</td>
<td>Yellow</td>
<td>170%</td>
</tr>
<tr>
<td>Boomer</td>
<td>LG</td>
<td>Lens</td>
<td>Green</td>
<td>Yellow</td>
<td>150%</td>
</tr>
</tbody>
</table>

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

MARKETING
- PBA Jumbo2 fits into the human food market for large-sized red lentil, particularly to be consumed whole or split. It is well placed to suit export markets which have traditionally bought the PBA Jumbo and Aldinga varieties.
- The disease resistance of this variety will assist it achieve high grain quality from receipt point to market.
- PBA Jumbo2 should be segregated for marketing unless otherwise stated.
- PBA Jumbo2 will be open marketed with an End Point Royalty (EPR) of $5.50/tonne (incl. GST), applied upon delivery.

BREEDING
PBA Jumbo2 (evaluated as CIPAL1203) was developed by conventional plant breeding techniques, selected from a cross of the variety Boomer with two PBA breeding lines, CIPAL205 and CIPAL401.

PBA Jumbo2 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.

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

FOR MORE INFORMATION
Pulse Breeding Australia

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Fax 03 5383 2208
info@pbseeds.com.au
www.pbseeds.com.au

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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Version August 2014