Field Peas – field performance in northern farming systems

Steve Moore – University of Sydney Plant Breeding Institute, Narrabri
Take Home Message

• Field pea varieties developed for the northern region now provide a viable pulse alternative for grain growers in the northern region.

• Advanced lines under evaluation indicate significant yield advantages over existing varieties.
Current status – Released Varieties


- Maki (2009) – Green seeded Blue pea suitable for stockfeed or human consumption. Powdery mildew & PsbMv resistant, useful tolerance to bean leaf roll virus, semi-leafless, semi-dwarf, early to medium maturity.
Mean yield S4 sites 2006 to 2009 % Maki

Mean yield Maki (t/ha) 2.28
Mean yield Yarrum (t/ha) 2.00
Mean yield all vars (t/ha) 1.59
Site years 25

Variety

Yield % Maki

- Maki
- Yarrum
- Cressy blue
- Parafield
- Kaspa
Progress of Breeding Program

• Collaborative initiative
• Varieties for pig feed diets is a key objective
• Three breeding nodes
• Selection for region at all nodes
Phenology similarities all Breeding Nodes

![Graph showing CDD (base 0) and Growing season daylight hours for different locations: Moscow USA, Lincoln NZ, Narrabri Aust.]

- **CDD (base 0)**
- **Growing season daylight hours**

Locations:
- Moscow USA
- Lincoln NZ
- Narrabri Aust
Progress of Breeding Program

- Ongoing improvements in grain yield
- Next commercial release in 2011
- Early generation programs at all breeding nodes
- Program focused on stable performance in the northern region
Yield performance advanced lines

Mean yield as % Maki PBIN 2005-2009

Mean yield Maki (t/ha) 2.48
Mean yield Yarrum (t/ha) 2.34
Mean yield all vars (t/ha) 2.09

Potential Releases

<table>
<thead>
<tr>
<th>Variety</th>
<th>Yield % Maki</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRL95</td>
<td>*</td>
</tr>
<tr>
<td>PRL131</td>
<td>*</td>
</tr>
<tr>
<td>PRL417</td>
<td>*</td>
</tr>
<tr>
<td>Maki</td>
<td></td>
</tr>
<tr>
<td>Yarrum</td>
<td></td>
</tr>
<tr>
<td>Kaspa</td>
<td></td>
</tr>
<tr>
<td>Parafield</td>
<td></td>
</tr>
</tbody>
</table>
Yield performance F6 Crosses

Best performing F6 crosses 2008 & 2009

Mean yield Maki (t/ha) 2.69
Mean yield Yarrum (t/ha) 2.91
Mean yield all vars (t/ha) 2.62
Progress of Breeding Program

- Disease resistance a key program component
- Major diseases considered important in the region include powdery & downy mildew and viruses
- Regular field epidemics permit screening at Narrabri
- Parental selection incorporates resistance sources
Impact of Powdery Mildew on grain yield

Susceptible variety

% Yield of reaction classes

- Resistant
- Tolerant
- Mod. Susceptible
- Susceptible

Powdery Mildew Reaction

Yield %

GRDC
Grains Research & Development Corporation
Impact of Viruses on grain yield

Effect on plant growth

Resistant

Susceptible

Resistant

Susceptible
Virus/grain yield interactions

Yield of pea lines with & without Bean Leaf Roll Virus 2009

- **PRL131**: Virus inoculated - 2500 t/ha, Virus protected - 3000 t/ha, % infected - 10%
- **Maki**: Virus inoculated - 2000 t/ha, Virus protected - 2500 t/ha, % infected - 5%
- **Yarrum**: Virus inoculated - 1500 t/ha, Virus protected - 2000 t/ha, % infected - 2%
- **Parafield**: Virus inoculated - 1000 t/ha, Virus protected - 1500 t/ha, % infected - 0%
- **Kaspa**: Virus inoculated - 500 t/ha, Virus protected - 1000 t/ha, % infected - 0%

I&I NSW – Liverpool Plains Field Station 2009
Progress of Breeding Program

The breeding program also remains focused on the incorporation of genetics targeting standability and pod shatter resistance.
Agronomy studies

• Studies focus on row space and plant population.
• Experiments conducted since 2005 have provided basic data to enable recommendations
• Data suggests that a maximum of 33cm row space and a minimum of 60 plants per m²
• Impact of these on final grain yield is seasonally variable
Agronomy studies – row space

33cm rows - September

66cm rows - September
Row space/grain yield interactions

![Bar chart showing yield comparison between 33cm and 66cm row spacings over the years 2005 to 2008.](chart.png)
Plant population/grain yield interactions

Year

Yield t/ha

- 30 pl/m²
- 60 pl/m²
- 90 pl/m²

2005 2006 2007 2008
Phenology Studies

• Time of planting trials conducted at PBIN since 2005.
• Optimal phenology studies for named varieties and advanced lines were commenced in 2009
• Detailed in crop & yield component data collected
• Heat sum & solar radiation data collected
• Development of a formula for flowering date/grain yield
• Formula will be included in Variety Management Packages
Time of planting/yield interactions

![Graph showing yield (t/ha) interactions between different varieties and planting dates.](image-url)
Field pea end-use and markets

• High quality grain suitable for either the feed grain or human consumption markets
• Inherently high in protein (23-25%)
• Acceptable profile and balance of amino acids
• Low levels of anti-nutritional factors (ANF)
• Highly digestible energy source.
Field pea end-use and markets

• If field pea can be supplied to pork producers at an acceptable cost and in sufficient quantity then it has the potential to reach an average of at least 10% of the overall feed ration in the north.
Feed grain requirements for pig rations in Qld south & NSW north

<table>
<thead>
<tr>
<th>Pig type</th>
<th>Sth Qld</th>
<th>Nth NSW</th>
<th>Total</th>
<th>Feed rate (kg/hd/yr)</th>
<th>Total Feed required (tonnes)</th>
<th>Peas required at 10% ration (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaners</td>
<td>952,000</td>
<td>488,000</td>
<td>1,440,000</td>
<td>70</td>
<td>100,800</td>
<td>10,080</td>
</tr>
<tr>
<td>Growers</td>
<td>927,000</td>
<td>476,000</td>
<td>1,403,000</td>
<td>242</td>
<td>339,526</td>
<td>33,953</td>
</tr>
<tr>
<td>Breeders</td>
<td>51,000</td>
<td>26,000</td>
<td>77,000</td>
<td>1,387</td>
<td>106,799</td>
<td>10,680</td>
</tr>
<tr>
<td>Totals</td>
<td>1,930,000</td>
<td>990,000</td>
<td>2,920,000</td>
<td></td>
<td>547,125</td>
<td>54,713</td>
</tr>
</tbody>
</table>
Gross margins vs other pulses

- Ready-reckoner developed through Pork CRC as a guide to break-even points when compared with chickpea in SW Qld
- Two gross margin break-even comparators have been also been developed for NE & NW NSW
- Fixed costs associated with gross margins calculations may need to be adjusted depending on location within the region (E/W & N/S)
### Sample - ready reckoner calculator

<table>
<thead>
<tr>
<th></th>
<th>Yield (t/ha)</th>
<th>Price ($/t)</th>
<th>Costs ($/t)</th>
<th>GM ($/Ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chickpea Average:</strong></td>
<td>1.4</td>
<td>$400 @</td>
<td>$350 less</td>
<td>$210</td>
</tr>
<tr>
<td><strong>Field Pea</strong></td>
<td>2.0</td>
<td>$255 @</td>
<td>$300 less</td>
<td>$210</td>
</tr>
<tr>
<td><strong>Comparisons:</strong></td>
<td>1.5</td>
<td>$340 @</td>
<td>$300 less</td>
<td>$210</td>
</tr>
</tbody>
</table>

Developed by - MCA Goondiwindi Pty Ltd 2009
# NE NSW dryland

<table>
<thead>
<tr>
<th></th>
<th>Av yield 2000-2008 (t/ha)</th>
<th>Price/tonne *1</th>
<th>Variable costs ($/ha) *2</th>
<th>Gross margin $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chickpea</td>
<td>1.8</td>
<td>430</td>
<td>440</td>
<td>334</td>
</tr>
<tr>
<td>Faba bean</td>
<td>2.6</td>
<td>230</td>
<td>391</td>
<td>207</td>
</tr>
<tr>
<td>Field pea break even (chickpea)</td>
<td>2.4</td>
<td>275</td>
<td>331</td>
<td>334</td>
</tr>
<tr>
<td>Field pea break even (faba bean)</td>
<td>2.0</td>
<td>275</td>
<td>331</td>
<td>207</td>
</tr>
</tbody>
</table>

*1 Price/ tonne – Land newspaper suggested selling prices, Moree 11/02/10
*2 Variable costs/ha – NSW DPI farm enterprise budgets 2009
## NW NSW dryland

<table>
<thead>
<tr>
<th></th>
<th>Av yield 2000-2008</th>
<th>Price/tonne *1</th>
<th>Variable costs ($/ha) *2</th>
<th>Gross margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chickpea</td>
<td>1.6</td>
<td>430</td>
<td>396</td>
<td>292</td>
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<tr>
<td>Faba bean</td>
<td>2.2</td>
<td>230</td>
<td>376</td>
<td>130</td>
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<tr>
<td>Field pea break even</td>
<td>2.3</td>
<td>275</td>
<td>328</td>
<td>292</td>
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<tr>
<td>yield vs chickpea</td>
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<tr>
<td>Field pea break even</td>
<td>1.7</td>
<td>275</td>
<td>328</td>
<td>130</td>
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<tr>
<td>yield vs faba bean</td>
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</tbody>
</table>

*1 Price/tonne – Land newspaper suggested selling prices, Moree 11/02/10

*2 Variable costs/ha – NSW DPI farm enterprise budgets 2009
• Graingrowers should be encouraged to try field pea in their rotations

• Local gross margins comparisons should be considered with alternate pulse rotational crops
Acknowledgements

- The University of Sydney
- Pork CRC
- Pulse Australia
- Industry & Investment NSW
- Department of Employment, Economic Development & Innovation Qld
- MCA Goondiwindi Pty Ltd
- Regional grower co-operators

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