Herbicide tolerance to enhance pulse contribution to the farming system

Larn McMurray, Dili Mao, Christopher Preston, Tim Sutton, Simon Michelmore, Shi Ying Yang, Christine Walela, Kristy Hobson, Jason Brand, Mathew Rodda, Sarah Day, Jeff Paull
Group B (AHAS Inhibitors) herbicide residues

Sulfonylurea residue

PBA Jumbo 2

PBA Hurricane XT
XT Lentils - Improved Group B (AHAS Inhibitors) tolerance

- Some imidazolinone in-crop herbicide options
  - Some residual sulfonylurea tolerance
  - Residual imidazolinone tolerance
PBA Hurricane XT lentil over 50% of Australian receivals
TWO years after release – J. Sourness PB Seeds

Data from: PIRSA Crop estimates
http://www.pir.sa.gov.au/primary_industry/crops_and_pastures/crop_and_pasture_reports
Weed issues – other herbicides + pulse crops
Weed issues – other residuals: Group I
Broad approach required for effective weed control and pulse fit in the farming system

GRDC Pulse Herbicide tolerance projects
(DAS00107 & DAS00131)

- Improving herbicide options
- Multiple Herbicide groups + dual tolerance
- Strengthening pulses in the system – residual tolerance
Lentil – Metribuzin Group C Tolerance

– Pinery, SA. 2015

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<tr>
<td>M009</td>
<td>Ala251Thr</td>
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<tr>
<td>M043</td>
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Sequence Analysis
PsbA GENE

Metribuzin Group C Photosystem II
Effect of post emergent metribuzin (g/ha) on grain yield of four lentil varieties at two sites in SA 2015
2x Imazapyr/Imazamox (Group B) +3x Metribuzin (Group C) applied PE
Faba Bean – Group B tolerance

**Sequence Analysis**

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**4x Imazapyr, Hart, SA. 2016**

**Imazapyr**
Group B
ALS inhibitor
Imidazolinone family
Faba Bean – Group B tolerance
Field Validation of trait usefulness - Pinery, SA. 2015

Sulfonylurea residues
Sulfonamides
Imidazolinones

Grain yield (t/ha)

Nil
metsulfuron
triasulfuron
chlorosulfuron
Mesosulfuron
Flumetsulam
Imazamox x1
Imazamox x2
Imazapyr

[Bar graph showing grain yield for various treatments]
Chickpea – Group B tolerance

Sequence Analysis

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<td>D15PAHI002</td>
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Group I Mutagenesis techniques
– Development of herbicide tolerance traits

Group I
Synthetic auxin
Pyridine family

PBA HatTrick

14PAHCL002
Summary and where to:

- **New Traits**
  - **Group B**
    - Lentil – commercially available
    - Faba bean – NVT evaluation
    - Chickpea requires validation, PBA incorporation
  - **Group C**
    - Lentil (PsbA and metabolism tolerance) - breeding incorporation
    - Faba bean (metabolism tolerance) – breeding incorporation
  - **Group I**
    - Chickpea, lentil, faba bean – early stage breeding incorporation

- **Dual tolerant germplasm created** (Group B + Group C), (Group B + I)

- **Further understanding of first reported Novel traits (Group I and C)**
  - Mechanisms of tolerance
  - Fitness penalties
  - Value of trait in adapted backgrounds

- **Pathway to market and registrations**
  - GRDC commissioned status review August 2016

- **Opportunities for peas** and roll out missing gaps in other crops above
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- University of Adelaide
  - Weeds Group: P Botsalis, R Lenorage, G Velappan
  - PBA Faba Bean: S Yang, I Roberts, S Cass, P Swain
- PBA Breeders - M Rodda & K Hobson
- Michael Materne
- Farmer co-operators
  - M Schilling, P Winchester, Parkinso
- Plus Alice Mcmurray (my daughter)