

# COGGO

Council of Grain Grower Organisations Limited  
ACN 091 122 039

## Final Report

COGGO Research Fund for 2014 projects

**A project completion report covering the project. The acceptance of a satisfactory report against the objectives of the project, and agreement on the sharing of any commercial returns and/or IP will trigger payment within 4 weeks, by COGGO for any outstanding payments.**

This Final Report should be completed with reference to the Research and Intellectual Property Agreement (the Research Agreement) signed between the proponent and COGGO Pty Ltd.

### 1. Project information

Project title	<b>Development of an imidazolinone-tolerant oat breeding line</b>
Commencement Date	January 2014
Completion Date	January 2016

Name of Proponent	South Australian Research & Development Institute (SARDI)
ACN/Legal Name or ABN	53 763 159 658
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Project Supervisor/Principal Researcher	Dr. Pamela Zwer
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#### COGGO Use Only

Project Number	
Date Received	

### 2. Project results

This section provides a final report against the Project Aim and the Planned Outputs for the Project.

<b>Achievement of the Project Aim</b>	Brief statement of achievement in relation to the aim of the project
<p>Introduce imidazolinone tolerance via mutagenesis in Williams (WA2332).</p> <p>Six mutant Williams plants survived the recommended rate of Intervix in the M<sub>2</sub> generation at Turretfield, SA. Seed was harvested from the plants and a rate experiment was conducted at the Waite Campus with Dr. Chris Preston, the University of Adelaide. Progeny from three of the mutants MP<sub>1</sub>, MP<sub>2</sub>, MP<sub>3</sub>, were tolerant to 1/8 recommended rate of Intervix. MP<sub>1</sub> had 12 plants tolerant to 1/4 recommended rate, and MP<sub>3</sub> had 1 plant that survived 1/2 recommended rate of Intervix.</p>	

<b>Project Outputs</b>	Please provide a report on the achievement, or otherwise, of the project outputs as per the planned outputs provided in the Project Proposal.	
1	-	Output 1 (from Project proposal) Determine natural tolerance of Williams to soil residues of GROUP B herbicides.
		Comment: Williams had no tolerance to the GROUP B herbicide, Intervix.
2	-	Output 2 (from Project proposal) Create a mutant population and identify tolerant mutants in Williams
		Comment: M <sub>2</sub> generation was sown at Turretfield Research Centre into 2 ha. Intervix was sprayed on the seedlings at the 3 <sup>rd</sup> leaf stage with the label recommended rate. Six plants survived the spray and were transplanted into pots and grown in the glasshouse. Progeny from the six plants were sown in pots for a dose response using 0, 1/8, 1/4, 1/2, 1, 2, and 4 times the recommended rate. This experiment failed as all seedlings were susceptible. The experiment was repeated and it succeeded.
3	-	Output 3 (from Project proposal) Develop diagnostic markers for introgression of tolerance into breeding lines in the National Oat Breeding Program.
		Comment: An appropriate mutation was found, but needs validation.

<b>Project results</b>	Please provide brief statements on the results of the Project
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Six mutant Williams plants in a 2 ha paddock survived the recommended rate of Intervix, a group B herbicide. Seed was harvested from the mutant plants. A dose response experiment was conducted at the Waite campus by Dr. Chris Preston's technical officer. The rates were 0, 1/8, 1/4, 1/2, 1, 2, 4 times the recommended rate. The experiment failed as all seedlings died. The reason for the failure is not known. There was sufficient seed for five of the mutant plants, so the experiment was repeated. A new source of Intervix was purchased. The results showed that all seedlings from the five mutant plants were tolerant to the 1/8 rate. Mutant plant 1 (MP<sub>1</sub>) had 12 seedlings tolerant to 1/4 rate, and 1 plant from MP<sub>3</sub> was tolerant to the 1/2 rate. No seedlings survived 1, 2 or 4 times the recommended rate. The seedlings were sprayed 17 August 2016 and this photo was taken 5 September 2016. The final seedling survival count was done 26 September 2016.



Western Australia (WA) produces the largest oat tonnage in Australia for human consumption in domestic and export markets as well as sharing the highest production of export hay with South Australia. WA growers will benefit by having a new crop rotation option with an oat variety tolerant to imidazolinone soil residues following Clearfield™ wheat or canola varieties. Williams is a popular new oat variety in WA, so it was selected to develop the mutant population. However, through classical breeding, the tolerance will be transferred to hay varieties and emerging improved milling and hay varieties.

The first step in developing molecular markers was to isolate a partial acetohydroxy acid synthase (AHAS) gene sequence from oat cultivar Williams using an expressed sequence tag found in public databases. This isolated gene sequence was used to screen for mutations in the AHAS gene that would likely confer resistance in the six putative resistant lines. An appropriate mutation was found, needing validation, but it is likely that the isolated sequence being worked with represents only one copy from the oat genome and isolation of further gene copies and sequencing will occur to follow up. It is important to know gene copy number as the mutated protein displays reduced efficacy. Once the complement of expressed oat AHAS sequences is determined, mutant lines will be screened again for the appropriate sequence mutations.

Tissue was harvested from the M3 lines used in the initial unsuccessful imidazolinone screening but were not processed. Tissue will be collected from the second successful experiment and used as an initial guide to confirm the effectiveness of any AHAS mutation found.

Seed will be increased for all mutant plants, so field trials can be conducted for grain yield, grain quality, and disease resistance. It may be necessary to make some additional crosses between Williams and the mutant Williams to recover an imidazolinone tolerant Williams. This will become evident after field evaluation.

<b>3. Project resources</b>	This section describes use of the funding listed in the initial plan and any refunds due to COGGO
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<b>Expenditure of funds requested from COGGO</b>	\$ Total funds budgeted	\$ Total funds expended (actual)	\$ Total funds requested from COGGO*	\$ Total COGGO funds expended	\$ Refund due to COGGO of any unexpended COGGO funds
Salary/Contractors	69,984	69,984	34,500	34,500	0
Operating costs	17,000	17,000	17,000	17,000	0
Capital					
<b>TOTAL</b>	<b>86,984</b>	<b>86,984</b>	<b>51,500</b>	<b>51,500</b>	<b>0</b>

\*Funding provided by COGGO.

IMPORTANT: Return of unused funds to COGGO is required as per *Clause 3.3* of the Research Agreement.

<b>4. Commercialisation</b>	<p>Insert details of the proposed commercialisation process, as applicable, with reference back to the planned commercialisation plan in the project proposal) for any outputs from the project.</p> <p>This should include recommendations for the commercialisation of the results of the project and the registration or other protection of Project IP and Project Confidential Information as per the Research Agreement.</p>
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A commercial partner, Heritage, was selected to commercialise oat varieties from the DAFWA node until 2019.

It is understood that this may require further discussion and agreement with COGGO via its' agent GIWA, as per the undertakings given and terms agreed, in the project proposal. This can be the subject of an appended letter and attachments. In all cases such discussion and subsequent agreements need to be governed by *Section 8 Project IP, Improvements and Project Confidential information* of the Research Agreement.

<b>5. Communication/ Extension</b>	<p>Insert details of how the communication and extension of the project outcomes has been achieved to date and recommendations for future activities to disseminate and promote adoption of the results of the Project.</p>
<p>Brochures of the new variety with information about yield, quality, disease resistance, and herbicide tolerance will be distributed at field days and by the commercial partner. The Oat Newsletter distributed to more than 150 growers nationwide will trace the progress of the project and the final outcomes. A field day to demonstrate the imidazolinone tolerance and launch the new variety will be organized.</p>	

Note: As per *Clause 7.3 (b) (ii)* of the Research Agreement COGGO may require the Researcher to produce an edition of the Final Report in a form suitable for general distribution. If so required by COGGO, the Researcher must produce a non-confidential version of the Final Report within 28 days of receiving a request to that effect from COGGO.

## 6. Certification

The Project Supervisor and the Research Organisation certify that all information contained in, and forming part of, this final project report is complete and accurate. The project supervisor and research organisation further warrant that the project complied with all the relevant guidelines affecting the conduct of research, for example in relation to ethics, bio-safety, environmental legislation, GMAC or National Health and Medical Research Council Codes.

Project Supervisor's signature \_\_\_\_\_

Name (in Capitals)

Dr Pamela Zwer

Date:

Research Organisation signature \_\_\_\_\_

Name and title of authorised signatory (in Capitals)

Dr Kathy Ophel Keller

A/Executive Director SARDI

Date:

### Completed Final Project reports

Email to [coggoresearchfund@giwa.org.au](mailto:coggoresearchfund@giwa.org.au) or mail to  
COGGO Research Fund, GIWA, PO Box 1081, Bentley DC, WA 6983

For any further enquiries please email questions to [coggoresearchfund@giwa.org.au](mailto:coggoresearchfund@giwa.org.au)

Or phone (08) 6262 2128

### COGGO representative

For the purpose of this Project agreement contract, COGGO will be represented by Grains Industry Association of Western Australia (GIWA), or such other representative that is nominated by COGGO as authorised to operate on behalf of COGGO.