



PROGRESS STATEMENT 2017

Please read the SAGIT Project Funding Guidelines before filling in this form. Guidelines can be found on www.sagit.com.au

Progress Reports must be submitted via email to admin@sagit.com.au as a Microsoft Word document

Project No: UA1415	Project Title: Genetic Characterisation and Exploitation of Heat Stress Tolerant Durum Germplasm	
Previous Project(s) (If this project is on a similar theme to a previous funded project please provide code, title, years and investment details) N/A		
Organisation: The University of Adelaide		
ACN/ABN: 61 249 878 937		
Start Date: (This date must be same as in the Funding Agreement) 1 st July 2015	Completion Date: (This date must be same as in the Funding Agreement) 30 th June 2017	
Address: Research Branch, Level 4, Rundle Mall Plaza, 50 Rundle Mall, Adelaide SA 5000		
Principal Investigator: A/Professor Jason Able		5% Time
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Other Research Staff: AGT Research Staff contracted through this project (specifically led by Paul Telfer)		As required
Administrative Contact: Ms Chelsea DuBois		
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1. BUDGET

Please include below a brief description of the main items required within each category for the current application year.

BUDGET			
Category	\$	\$	\$
	Year 1	Year 2	Year 3
Salaries			
Travel	500	500	
Operating	21,000	21,000	
Capital			
TOTAL SAGIT CONTRIBUTION	21,500	21,500	
Host organisation cash contribution			
Host organisation in-kind contribution*	13,950	14,150	
TOTAL HOST ORGANISATION CONTRIBUTION	13,950	14,150	
Other funding bodies contribution (SADGA)			
Other third parties contribution*			
TOTAL NON-SAGIT CONTRIBUTION	13,950	14,150	

*If it is not possible to specify amounts, then a description of the nature of the contribution should be given.

EXPLANATORY NOTES ON BUDGET ITEMS

Including budget variations

The travel allocation for 2015 or 2016 was not used. This can either be returned to SAGIT or asked that it is used in other SAGIT funded projects (e.g. UA415). A/Professor Able took the opportunity to visit the chamber trials when teaching and/or visiting his own Roseworthy breeding trial so travel costs in 2016 were not incurred (as they weren't in 2015).

2. PROGRESS STATEMENT

Provide clear description of the following:

Project aims

This project aims to:

1. Screen elite, selected entries (in addition to recently released varieties) from Durum Breeding Australia's (DBA) Southern Node Breeding Program against leading bread wheat varieties in heat stress trials conducted with the AGT-SAGIT Heat Chamber;

2. Compare and evaluate the relative heat stress tolerance and the physiological responses of the selected durum entries to the benchmark bread wheat varieties;
3. Identify elite heat stress tolerant durum parents for further exploitation through breeding by using these materials in future crossing blocks; and;
4. Disseminate the heat chamber trial results by updating growers (and consultants/advisors) at appropriate forums and field day events.

Progress against the key performance indicators of the project

Progress against all four listed KPIs has been completed or will be completed by the set dates.

No.	KPI	Date to be completed
1	Screen selected elite durum entries, benchmarking against lead bread wheat varieties. <i>Completed.</i>	31/12/2015, 2016
2	Validate chamber methodology in durum. <i>Completed.</i>	31/12/2015
3	Publish trial results for the SADGA website. <i>Completed (2016) and On-track (2017).</i>	31/03/2016, 2017
4	Annual progress report submitted to SAGIT. <i>Completed.</i>	31/01/2016

Conclusions reached / discoveries made

This must include a dot point summary of progress to date, suitable for use in media articles. Provide more details which add to key findings (eg. tables, graphs) in an attachment of 1-2 pages.

For notes on the experimental design, the data measurements recorded and the analysis conducted, please refer to UA1415 Supplementary File.pdf.

GERMPLASM SCREENED

- 31 selected entries from Durum Breeding Australia's Southern Program (S4 and S3 – all advanced germplasm potentially ready for progression to pre-variety release trials).
- 7 durum varieties including the latest variety released – DBA-Aurora. Other varieties were Yawa, WID802, Tjilkuri, Tamaroi and the two released AGT varieties, Hyperno and Saintly.
- 2 bread wheat varieties as checks (Halberd – identified by AGT as heat tolerant, and Wyalkatchem – identified by AGT as heat intolerant).

GENERALISED SUMMARY OF HEAT TRIAL RESULTS

- Recorded measurements for traits including grain number, grain weight, head weight, spikelet number and thousand grain weight (TGW) resulted in significant differences being identified.
- These differences were either identified between genotypes and/or between the treatments (control vs heat/wind stressed).
- Results of several key indicators for heat tolerance (TGW & HHI) in varieties such as the recently released variety DBA-Aurora and advanced entries including UAD1151101 look encouraging after both the 2015 and 2016 trial data.
- The results from year 2 (2016 trial) suggest that selected durum germplasm has been identified as either heat tolerant or heat intolerant, and can now be verified against the 2015 data to compile a sub-set of durum germplasm that can be used as parents for introducing potential heat tolerance.

- The research findings from this SAGIT sponsored project will play an important role in selecting suitable parental combinations for future crossing blocks, which may lead to the development of new heat tolerant durum varieties 8-10 years from now.

TGW HIGHLIGHTS

- The latest variety, DBA-Aurora, which under non-limiting conditions (control) has exceptional TGW; recorded a 21% loss (in 2015 this was 22%, so consistency between the two experimental seasons is present).
- However, older varieties such as Tamaroi (when under non-limiting conditions also has very good TGW) recorded a 49% loss between the control (62.56 g) and heat/wind stress (31.69 g) treatments. In 2015, this loss was again very similar for this variety (at 46% loss).
- Several advanced breeding lines (listed below as examples) were identified that show lower reductions than DBA-Aurora or even small increases (not significant) when comparing treatments (control vs heat/wind stress). Comparisons to the heat tolerant bread wheat variety, Halberd, can also be made (13.07% loss between control vs heat/wind stress).
- UAD1152020 showed a 7% loss between the control and heat/wind stress treatments (11% in 2015) while UAD1153177 showed only a 6% loss (8% in 2015) – both of these showing reduced loss when compared to the heat tolerant Halberd variety.
- Equally impressive (even though their actual control TGW is lower to start with) are the entries UAD1151046 (48.00 g control vs 48.14 g heat/wind stress), UAD1151101 (56.51 g control vs 50.61 g heat/wind stress) and UAD1151112 (53.19 g control vs 47.55 g heat/wind stress).
- UAD1154192 which was entered into the 2016 NVT trials displayed exceptionally large TGW (even superior to DBA-Aurora) with a value of 70.47 g in the control treatment. However, under stress this line lost 41.17%, with a TGW of 41.46 g post heat/wind stress. While this line may still be released as a variety, it certainly does not appear to be heat-tolerant, with Wyalkatchem (intolerant bread wheat check) only losing 29.11% of its TGW after stress.

FERTILITY HIGHLIGHTS

- Unlike the 2015 dataset, fertility was not significant. As stress occurs 10 days post anthesis, seed number should be largely set so this result is not that surprising.

HEAD HARVEST INDEX HIGHLIGHTS

- Significant differences between the control and heat/wind stress treatments were identified for head harvest index (grain weight divided by total weight of the intact head) across several entries.
- Compared with Halberd (3.7% gain) and Wyalkatchem (11.8% loss), several entries such as UAD1151108 (1.4% gain), UAD1151125 (2.2% gain) and UAD1153021 (4.7% gain) performed better than all other durum entries with an improved head harvest index when stressed.
- Varieties such as DBA-Aurora (9% loss) still performed better than Wyalkatchem but were not as superior as Halberd, while Saintly (22.6% loss) and Tamaroi (31.3% loss) were two poor performing varieties.
- An entry from the 2015 trial (UAD1151101) again showed a small (0.5%) increase between the head harvest index obtained for the control vs heat/wind stress treatments, implying that grain weight and the other physical attributes of the spike (e.g. awns, glumes, etc.) were not affected by the heat/wind stress for the second

year running. Based on the results with the TGW (and other positive attributes) of this line, it is an entry that will be further investigated as a parent (and potential variety in its own right during the 2017 season and beyond).

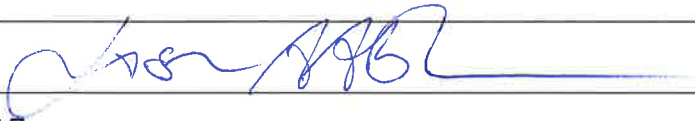
Communication of results to farmers/industry

The heat chamber trial results will be sent to SADGA for uploading to their website. During Spring 2016, the Durum Grower's Association visited the Heat Chamber Trial as part of one of their 'crop walks'. There was excellent attendance at the field event with >30 growers and sponsors attending (which also included visiting the trial site which is part of UA415 – Roseworthy Site only). This was a great opportunity to showcase the important research we have conducted and will subsequently use for making better germplasm selections in the future.

Plans for the coming year

This concludes the heat tolerance project (UA1415). A full report will be compiled and sent to SAGIT in the coming months. That report will also be distributed to SADGA for further dissemination. Thank-you to SAGIT and the board for selecting this project to be funded. It has resulted in identifying new germplasm for heat tolerance (when compared to the bread wheat tolerant Halberd variety) that will be used as parents in future crossing blocks of the durum breeding program at the University of Adelaide.

3. AUTHORISATION OF THE PROJECT REPORT

Name: A/Professor Jason Able
Position: Head, Department of Agricultural Science , School of Agriculture, Food & Wine
Signature: 
Date: 24/01/17