



# SAGIT RESEARCH SUMMARY

UA1415: Genetic characterisation and exploitation of heat stress tolerant durum germplasm

## IN A NUTSHELL

The SAGIT-AGT heat stress chamber was used to study the heat stress tolerance of 31 durum breeding lines, along with commercial durum varieties and bread wheats for comparison. The trial identified suitable parents for future breeding, which may lead to the development of new heat tolerant durum varieties 8-10 years from now.

## FAST FACTS

### THE DATES:

Start: July 2015

Finish: June 2017

### PROJECT PARTICIPANTS:

University of Adelaide:

Jason Able.

Australian Grain

Technologies: Paul Telfer.

### THE PROBLEM:

Heat stress causes significant losses for South Australian durum growers.

### THE RESEARCH:

A range of durum varieties and breeding genotypes were tested in a heat chamber to identify suitable parents for future breeding.

## BACKGROUND

Heat stress has large implications on cereal production in South Australia with stressful temperatures during spring having large negative impacts on the grain yields achieved by producers.

## RESEARCH AIMS

The core objectives of the project were to:

- Screen selected entries from Durum Breeding Australia's (DBA) Southern Node Breeding Program against leading bread wheat varieties in heat stress trials;
- Evaluate the relative heat stress tolerance of the selected durum entries to the benchmark bread wheat varieties;
- Identify elite heat stress tolerant durum parents for further exploitation through breeding; and
- Disseminate the heat chamber trial results by updating growers at forums and field day events.

## IN THE FIELD

The project team selected 31 durum lines from Durum Breeding Australia's Southern Program, along with seven commercial durum varieties and two bread wheat varieties and subjected to a split-plot replicated trial.

Single seeds were planted in 10cm x 10cm x 18 cm pots, irrigated and supplied with nutrition until anthesis. Ten days after the end of anthesis, plants were subject to 36 degrees Celsius with 40 kilometre per hour wind speeds for three days in the AGT-SAGIT heat chamber.

At maturity, the plants were harvested and statistical analysis performed on a range of measures of plant health and grain yield.

## RESULTS

Significant differences in heat stress tolerance were identified between genotypes and the results from both years (2015 and 2016) resulted in the identification of some potential heat tolerant germplasm.

DBA-Aurora<sup>®</sup> recorded a loss of 22 per cent Thousand Grain Weight (TGW), an indicator of plant yield, after heat stress, and several breeding lines gave better heat stress tolerance. By contrast, older varieties showed far lower heat stress tolerance, for example Tamaroi recorded a TGW loss of 49 per cent when exposed to stress. The heat tolerant bread wheat variety, Halberd, recorded a TGW loss of 13 per cent.

The Southern Australia Durum Growers Association visited the heat chamber trial as part of their annual crop walks. On both occasions there was excellent attendance at the field event with 50 growers and sponsors in 2015 and 30 growers and sponsors in 2016.

## VALUE FOR GROWERS

The research findings from this 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.

### MORE INFORMATION:

Jason Able, University of Adelaide

08 8313 7075

[jason.able@adelaide.edu.au](mailto:jason.able@adelaide.edu.au)



Example trial design layout for the heat stress experiments (2015-2016).

### SAGIT DISCLAIMER

Any recommendations, suggestions or opinions contained in this communication do not necessarily represent the policy or views of the South Australian Grain Industry Trust (SAGIT). No person should act on the basis of the contents of this communication without first obtaining specific, independent, professional advice. The Trust and contributors to this communication may identify products by proprietary or trade names to help readers identify particular types of products. We do not endorse or recommend the products of any manufacturer referred to. Other products may perform as well as or better than those specifically referred to. SAGIT will not be liable for any loss, damage, cost or expense incurred or arising by reason of any person using or relying on the information in this communication.

**CAUTION: RESEARCH ON UNREGISTERED AGRICULTURAL CHEMICALS USE.** Any research with unregistered pesticides or of unregistered products reported in this communication does not constitute a recommendation for that particular use by the authors or the author's organisations. All pesticide applications must accord with the currently registered label for that particular pesticide, crop, pest and region.

Copyright © All material published in this communication is copyright protected and may not be reproduced in any form without written permission from SAGIT