

Mining the ICARDA germplasm collection for biotic and abiotic priority traits (ICA 100010)

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Major achievements 2017

The GRDC funded project aims at identification of sources of disease resistance and heat and drought tolerance in genebank accessions, FIGS subsets and in the elite breeding germplasm.

Supplied germplasm to Australian partners

- Two FIGS subsets were constructed, one for frost tolerance (318 accessions) and one for resistance to spot form of net blotch (200 accessions). Seeds were supplied to Australian Small Grains Genebank. Total since 2013: 19 FIGS subsets with 2300 accessions;
- 70 new sources of resistance to diseases (Net Blotch, spot blotch, powdery mildew, scald and leaf rust), making a total since 2013;
- 35 elite breeding lines making a total making 611 lines since 2013



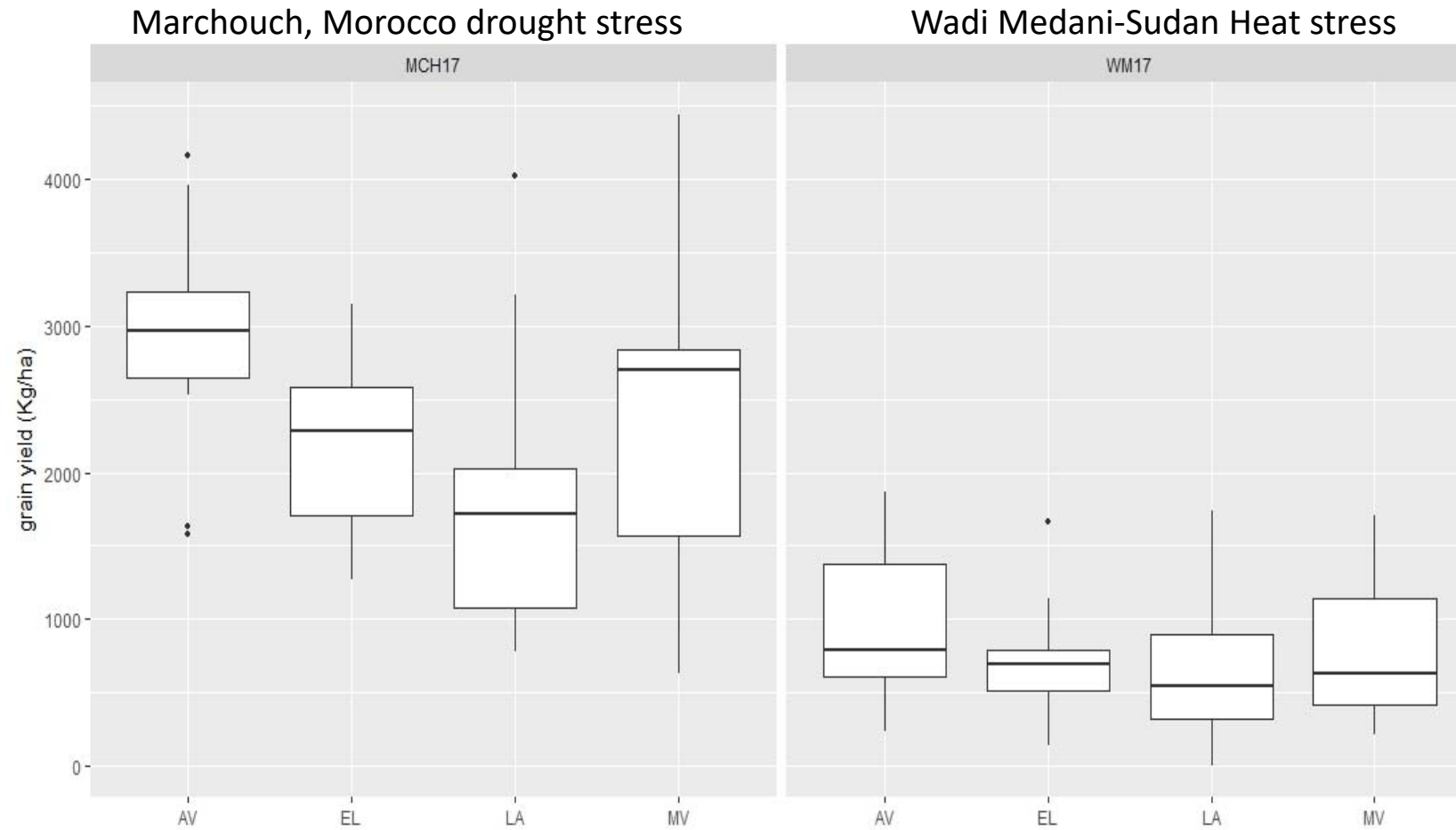
Search for new sources of resistance to major diseases

- From 719 accessions evaluated for major foliar diseases at Marchouch station, 43 were found to be resistant, 112 to be moderately resistant and 489 accessions to be susceptible to powdery mildew. Only 2 out of 75 accessions of FIGS leaf rust showed adequate resistance at the aggressive population of leaf rust at Sidi Allal Tazi.
- From the seedling tests conducted in the growth chamber, 33 sources of resistance to net blotch and 12 sources of resistance to spot blotch were identified.
- 114 accessions of *Hordeum spontaneum* were evaluated at seedling stage for spot blotch and net blotch and 17 and 55 were respectively resistant including 11 which are combining resistance to both diseases. Under leaf rust infection at Sidi Allal Tazi, 9 accessions showed high levels of resistance.

Hordeum spontaneum sources of resistance

IG #	Infection responses	
	Spot blotch	Net blotch
38943	2	2
39880	3	1
39884	3	2
39891	3	3
40009	3	2
107046	2	2
107426	3	2
131642	3	0
145508	3	2
145575	3	3

Evaluation of drought and heat tolerance



Av: Australian Varieties; EL: Elite Heat Lines; LA: accessions for Heat FIGS; MV: Moroccan Varieties

Exchange of visits

- Dr. Mark Dieters, Dr. Hugh Wallwork and Dr. Kithsiri Jayasena visited Morocco 09-12 April 2017
- P. S. Verma and Dr. Sajid Rehman joined the CAIGE Barley tour in Australia from 3-12 September, 2017



Two PhD students:

- 1- Ms. Houda Haidar on “Identification of sources of resistance and the study of inheritance of resistance to *Rhynchosporium secalis* of barley”**
- 2- Ms. Mariam Amouzoune on "Study of resistance to leaf and yellow rusts in Moroccan and global barley germplasm”.**

Areas for future collaboration

- Possibility of phenotyping under controlled environments the barley panel and other germplasm;
- Improving the malting quality of barley and use of the unique plant type of Western Australia barley (Hindmarsh and La Trobe). The erect leaf type, high tillering, dwarf, and responsive to higher inputs for high grain yield was impressive. This ideotype could be important specifically for high input conditions. The high input program would consider developing ICARDA genetic resources using this ideotype for malting barley program at ICARDA.
- The valuable landraces, 2- and 6-rowed genotypes identified in current CAIGE-Barley Program for key abiotic and biotic stresses would only be useful if a successful pre-breeding program is in place. GRDC should strengthen pre-breeding programs to utilize the flow of useful genetic resources including use of *Hordeum spontaneum* and to pyramid the genes.
- ICARDA-Australia CAIGE Program should take initiative to genotype all the barley genetic resources flowing into Australia so that the phenotyping data set can be effectively mined for several valuable genes important to Australia and ICARDA.
- Develop magic populations and RILs for gene mapping.