Coordinating global research for wheat

Adaptation of Wheat to Abiotic Stress EWG

Annual report and action plan

NAME OF EXPERT WORKING GROUP
Adaptation of Wheat to Abiotic Stress

LEADERSHIP & AUTHORSHIP	
Chair	Fernanda Dreccer (CSIRO) and Simon Griffiths (JIC)
Vice-Chair(s)	Matthew Reynolds (CIMMYT)
Report Authors	Fernanda Dreccer (CSIRO), Simon Griffiths (JIC) and Matthew Reynolds (CIMMYT)

AIMS OF THE EWG

Please list the main objectives listed in the EWG proposal, as endorsed Adapting wheat to abiotic stress will necessarily encompass a broad range of environments, mechanisms, and scientific approaches.

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Two stresses that already predominate on a worldwide basis, and are expected to increase under climate change, are heat and drought. The response of crops to these stresses has a number of similarities, although the genetic basis is not necessarily the same. Growth rate is accelerated due to increased plant temperature which reduces the window of opportunity for photosynthesis and resource capture while both heat and drought stress may also inhibit growth directly at the metabolic level.
Furthermore, harvest index may be reduced if reproductive processes are impaired by stress that occurs at critical developmental stages.
Conventional wheat breeding has made significant genetic gains under both stresses (Gourdji et al., 2012)

and the key aim of AWAS would be to complement this effort by deploying the most recent advances in biotechnology, phenotyping and physiology to accelerate current genetic gains, as well as tackle some of the most challenging aspects of climate change, such as tolerance to sudden extreme climatic events or combinations of stress factors.
The focus of AWAS will be on drought and heat stress but it is important to remember that these stresses do not occur in isolation.
They are frequently linked to other environmental factors that can limit wheat productivity.
For example, cold and frost stress can restrict the suitable growth window, in appropriate nitrogen response can lead to excessive biomass production and increase susceptibility to drought stress and soil structure, including salinity, can limit access to moisture.

STRATEGIC RESEARCH AGENDA CORE-THEME(S) /TOPIC(S) COVERED BY THE EWG

- *Core Theme 2 Subtopic 2.2: Protec yield potential by improving tolerance of wheat to abiotic stresses*
- *Cross-cutting Theme 6: Knowledge exchange and education*

2016 ACTIVITY REPORT

MEETINGS HELD				
Face-to-Face Meetings	Location	Date	Duration	# EWG members attending
	Texcoco, Mexico	16/12/2016	1d	Griffiths (JIC), Reynolds (CIMMYT), Rane (ICAR), Jagadish (KSU), Hu, Dreccer (CSIRO)
	PAG San Diego	January 2016	1d	Griffiths (JIC), Reynolds (CIMMYT), Mason (University of Arkansas), Langridge (University of Adelaide)
			3d	
Other Meetings	Type (online, etc)	Date	Duration	# EWG members attending
	Informal meetings amongst members at conferences	Year-round		
	Frankfurt (Jamboree and Wheat Conference)	12-14/12/2016		Dreccer (CSIRO), Berger (The Plant Accelerator – University of Adelaide), Langridge (University of Adelaide), Asseng (University of Florida)

PROGRESS AGAINST AIMS				
Objectives identified for 2016 in the global EWG Action Plan	**Tasks/actions undertaken by the EWG (with task #)**	**Achievements**	**Outputs/Deliverables**	**Comments**
Annual meeting	Email	Action plan discussed	Annual meeting held in Texcoco, Mexico, 16/12/2016	
Identify top priorities for AWAS	Survey	Information analyzed	Heat and drought identified as top priorities	Next survey in 2018
Map EWG AWAS Heat and Drought projects	Survey	Survey completed	Information contributed to larger survey conducted by CIMMYT	This information made available to GRDC for business case preparation
Securing funding to support Heat and Drought research	Skype meeting		Support offered to GRDC to help build the business case for heat and drought research funding Survey results and members email list made available to GRDC	GRDC has taken the lead role in gap analysis and fundraising for heat and drought
Additional objectives	**Tasks/actions undertaken by the EWG**	**Achievements**	**Outputs/Deliverables**	**Comments**
Link to other EWG	Contact during the year and at annual Jamboree	Agreement with Phenotyping EWG	AWAS and Phenotyping to add a module about phenotyping for abiotic stress to support ICARDA's current breeding course	Needs financial support from WI

2017 PLAN

MEETINGS PLANNED			
Face-to-Face Meetings	Location	Date	Duration
	To be decided by Survey in January 2017		1d
Other Meetings	Type (online, etc)	Date	Duration
	Various meetings between EWG members at different conferences	Throughout 2017	

PLANNED ACTIVITIES			
Objectives identified for 2017 in the global EWG Action Plan	**Tasks/actions to be undertaken by the EWG (with tasks #)**	**Timeline (e.g. February-March)**	**Expected Outputs/Deliverables**
Community building	Annual meeting	March-April 2017	Goals and new opportunities discussed Build links to other EWGs
Outreach and training	Prepare 2 slides for members to show at national meetings about aims of EWG.	March 2017	Dissemination of EWG role and potential
	Set up a system to support two student exchanges per year (subject to funding) to work on similar problems (analogue regions) where funding is already available for research activities.	May 2017	Student training and network build-up
	Shoot a video about abiotic stress impact and phenotyping methods that can be made available as a tool for training and higher	December 2017-December 2018	Education tool

	education courses.		
	Together with Phenotyping EWG, support a course module on phenotyping for abiotic stress at the training offered by ICARDA in April 2017.	January -April 2017	Training of breeders and crop physiologists
Additional objectives	**Tasks/actions to be undertaken by the EWG**		**Expected Outputs/Deliverables**
Identify champion breeders	Via informal meetings identify a group of plant breeders committed to use phenotyping methods for relevant traits in the pursuit of heat and drought tolerant lines	December 2017	Mobilized community that can help build a support network for early career breeders