



Coordinating global research for wheat

Adaptation of Wheat to Abiotic Stress EWG

Annual report and action plan

NAME OF EXPERT WORKING GROUP	
<i>Adaptation of Wheat to Abiotic Stress</i>	

LEADERSHIP & AUTHORSHIP	
Chair(s)	Fernanda Dreccer (CSIRO), Simon Griffiths (JIC)
Vice-Chair(s)	Matthew Reynolds (CIMMYT), Abraham Blum (PlantStress.com)
Report Authors	Fernanda Dreccer (CSIRO)

MEETINGS HELD (please attach minutes of these meetings using the template provided)						
Face-to-Face Meetings	Name	Date	Location	Duration	# EWG members present	Cost (€)
	EWG HeDWIC TAC meeting	September 2015	7 th Int Wheat Conference, Sydney	2h	16	433,33
Other Meetings	Type (online, etc)	Date	Location	Duration	# EWG members present	Cost (€)
	Email chains	ongoing				

AIMS OF THE EWG
<p>Adapting wheat to abiotic stress will necessarily encompass a broad range of environments, mechanisms, and scientific approaches.</p> <p>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.</p> <p>Furthermore, harvest index may be reduced if reproductive processes are impaired by stress that occurs at critical developmental stages.</p> <p>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</p>

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.

2015 ACTIVITY REPORT

Reminder of **EWG action plan for the duration of the EWG, with flow-chart indicating timeline and outputs**

Establishment Phase (2014/15)





- Solicit sponsorship from appropriate stakeholders internationally.
- Sponsors/stakeholders establish technical advisory committee(s)
- International call for ideas developed
- Series of conferences to help determine the most appropriate research areas and available expertise worldwide.
- Business plans developed around research topics (e.g. Heat & Drought, Problem Soils, etc)

First 5 year Research Phase (2015-2020)

- Establish research platform(s) at appropriate sites worldwide, by linking with existing national and international R&D activities and their sites
- Competitive call for research tenders published internationally and awards made, supported by a coordinated, or even joint funding effort by WI members (ICC; donors).
- Research and pre-breeding commence simultaneously to ensure applicability of one with the other, and to capitalize on near term wins.
- First new stress adapted lines available to breeding programs worldwide for testing and confirmation.

Second 5 year Phase (2020-2025):

- Second research and pre-breeding phase incorporating successful proofs-of-concept from Phase 1.

 2014-2015	<ul style="list-style-type: none"> • Identify top research priority • Develop international research programme proposal
 2016	<ul style="list-style-type: none"> • Mapping and gap analysis of Heat and Drought projects • Secure critical-mass among funding agencies to launch international call for proposals
 2017-2020	<ul style="list-style-type: none"> • Launch of research and pre-breeding phase • Testing and confirmation of new stress lines available to breeding programmes
 2017-2020	<ul style="list-style-type: none"> • Develop phase 2 research and pre-breeding phase
Objectives identified for 2015	
<ul style="list-style-type: none"> • Solicit sponsorship from appropriate stakeholders internationally. • Sponsors/stakeholders establish technical advisory committee(s) • International call for ideas developed • Series of conferences to help determine the most appropriate research areas and available expertise worldwide. • Business plans developed around research topics (e.g. Heat & Drought, Problem Soils, etc) 	
Progress against aims in for 2015	
<ul style="list-style-type: none"> • The EWG aims established for 2015 are on track and progressing well. • The technical advisory committee was established • Meetings were held among EWG members (7th IWC Sydney, PAG San Diego) • Following the Frankfurt workshop a Heat and Drought proposal was drafted • EWG members selection was finalised, counting more than 100 members. • Elections were held among EWG members to elect Chair and Vice-Chairs. 	
Outputs and deliverables in 2015	
<ul style="list-style-type: none"> • HeDWIC proposal drafted based on Frankfurt workshop (December 2014) of ~100 selected scientists (August 2015) • Meeting at 7th Int Wheat Conference with HeDWIC TAC to review the Frankfurt proposal (September 2015, Sydney) • Three page proposal summary drafted for Wheat Initiative Research Committee (December 2015) • Elections for committee members of Wheat Initiative EWG 'Abiotic Stress' (Peter Langridge and Matthew Reynolds founded and co-chaired the EWG since inception). • New members elected by EWG vote: <ul style="list-style-type: none"> ➤ Fernanda Dreccer, CSIRO (new chair) 	

- Simon Griffiths, JIC (co-chair)
- Matthew Reynolds, CIMMYT (HeDWIC secretary)
- Abraham Blum, PlantStress.com (PR secretary)

Co-opted members of EWG committee include:

- Jagadish Rane, Head, School of Drought Stress Management, NIASM, Pune, India
- Ildiko V Karsai, Scientific Advisor, MTA ATK MGI, Hungary
- Esten Mason, Wheat Breeder, University of Arkansas, USA

Contribution to Wheat Initiative objectives (<http://www.wheatinitiative.org/about/objectives>)

The AWAS EWG is contributing to item 4 of the strategic agenda -4. Increase resource use efficiency and tolerance to abiotic stress.

The EWG endeavours to coordinate global research efforts aimed at improving the abiotic stress tolerance of wheat which aligns fully with the objective of the Wheat Initiative.

Links established with other Wheat Initiative activities

The EWG established links with EWG Phenotyping

Additional activities

ACTION PLAN FOR NEXT TWO YEARS

Meeting planned for 2016

Face-to-Face Meetings	Name	Date	Location	Duration	# EWG members expected	Estimated Cost (€)
	Executive Committee meeting at PAG	January 2016	San Diego	1 day		
	EWG meeting at IPPS or Jamboree	December 2016	Mexico or Frankfurt	1 day		
Other Meetings	Type (online, etc)	Date	Location	Duration	# EWG members expected	Estimated Cost (€)

Priorities identified for 2016

- Securing commitment from funding bodies and launch HeDWIC as international research programme
- Conduct a survey to map EWG AWAS Heath and Drought programmes/projects
- Identify top research priorities for AWAS EWG

- Meeting of EWG members to discuss further developments of HeDWIC
- Develop awareness of the research topics singled as priorities through planning of a series of position papers, webinars and holding a special session or workshop at an international conference (e.g. International Plant Phenotyping Symposium, Interdrought, Crop Science of America, etc).

Expected outputs and deliverables for 2016

- Endorsement of Wheat Initiative Research Committee meeting of HeDWIC as a high priority (PAG, San Diego)
- Endorsement of Wheat Initiative -Institutional Coordination Committee of HeDWIC as priority area for global research coordination/collaboration (Paris).
- Gather the interest of several funding agencies and bodies to reach the critical mass required. It is expected that :
 - GRDC takes on lead role for fundraising proposal and resource mobilization.
 - Canada is interested to collaborate.
 - France and UK are interested provided the proposal covered temperate/winter wheat
- Deliver results of the mapping survey, gap analysis and top research priorities

Timeline of activities for 2016

- Identify top research priorities for AWAS (March 2016)
- Mapping of Heat and Drought projects (March-June 2016)
- Gap analysis made of global wheat R&D for heat and drought projects database (March-June 2016)
- High level talks CIMMYT/GRDC about how to set up and run HeDWIC and next fundraising steps (Mexico, March 2016)
- CIMMYT meet with Canada (Development and Agriculture ministries) (May 2016)
- GRDC Board decision on scope of commitment to HeDWIC (mid June 2016)
- EWG Face to Face Meeting will be probably held towards the end of the year (either at IPPS in CIMMYT or at the EWG Jamboree, both in December)

Additional documents

Meeting organised in 2015

	Meeting 1
Location	Sydney
Date/duration	Sept 2015
# attendees	16
Cost of the meeting	433,33 €

Meetings planned in 2016

	Meeting 1	Meeting 2
Location	San Diego	TBD
Date/duration	Jan 2016	Dec 2016