

## ANNEX 6 (January 2015)

### EXPERT WORKING GROUP ANNUAL REPORT AND ACTION PLAN TEMPLATE

Please return your completed Annual Report and Action Plan to [wheat.initiative@versailles.inra.fr](mailto:wheat.initiative@versailles.inra.fr) by November 30.

#### NAME OF EXPERT WORKING GROUP

Control of Wheat Diseases and Pests

#### LEADERSHIP & AUTHORSHIP

<b>Chair</b>	Name (Organisation, Country)
<b>Vice-Chair(s)</b>	Name (Organisation, Country), Name (Organisation, Country)
<b>Report Authors</b>	Evans Lagudah (CSIRO, Australia), Justin Faris (USDA-ARS, USA)

#### MEETINGS HELD (please attach minutes of these meetings using the template provided)

<b>Face-to-Face Meetings</b>	Meeting of workers involved with necrotrophic pathogens, six members present, January 12, 2015, Plant and Animal Genome XXIII Conference, San Diego, CA USA
<b>Other Meetings</b>	Number of EWG members present, Time, Date, Location/Online Number of EWG members present, Time, Date, Location/Online

#### AIMS OF THE EWG

To build on the existing framework of the Borlaug Global Rust Initiative (BGRI) in accelerating international collaboration towards durable resistance against all three rust pathogen species in wheat.

To establish and foster an active network of researchers studying the necrotrophic and/or host-selective toxin-producing pathogens that cause the Stagonospora, Septoria, and tan spot diseases (the leaf blotch disease complex) of wheat with a common goal of advancing the knowledge base of host-pathogen toxin interactions to enable effective control strategies for minimising wheat yield losses from these pathosystems.

To promote interactions among scientists conducting research regarding wheat resistance to Fusarium head blight with an overall goal of providing knowledge, tools, and resources that will enable the limitation of yield losses and mycotoxin contamination of wheat grain.

To enable effective interaction among researchers engaged in host-nematode interactions and other below ground biotic stress constraints to establish an international platform to deliver on combined genetic approaches and management of the wheat rhizosphere in improving and stabilizing yields.

To facilitate a network of researchers with a focus on insect pests and viruses in wheat in furthering knowledge in this field and strategies aimed at reducing the impact of these pests to wheat crop loss.

To provide a forum for researchers on powdery mildew resistance and fungicide development/application to work towards integrated genetic solutions and management strategies aimed at sustainable wheat production in regions prone to powdery mildew epidemics.

#### (YEAR) ACTIVITY REPORT

Objectives identified for (year)
Progress against aims in for 2014
Initiated the identification and coordination of research objectives for research on the most economically important wheat necrotrophic pathogens
Outputs and deliverables in 2014
Established list of key labs and researchers among the EWG who work with specific wheat pests and pathogens
Contribution to Wheat Initiative objectives ( <a href="http://www.wheatinitiative.org/about/objectives">http://www.wheatinitiative.org/about/objectives</a> )
Links established with other Wheat Initiative activities
Additional activities

PROVISIONAL ACCOUNTS STATEMENT FOR (year)							
Incomes				Expenses			
Origin	Budget	Actual	% received	Type	Budget	Actual	% spent
Wheat Initiative	€	€	%	Organisation of Meetings	€	€	%
Others	€	€	%	Consumables	€	€	%
				Travel and Subsistence	€	€	%
				Communication	€	€	%
				Other Costs	€	€	%
<b>Total</b>	€	€	%	<b>Total</b>	€	€	%

*Please send a consolidated accounts table (Annex 7) to the Secretariat by January 15<sup>th</sup>.*

ACTION PLAN FOR NEXT TWO YEARS
Priorities identified for (year 1- year 2)
<ul style="list-style-type: none"> <li>-Elect a chair and vice-chair for the EWG</li> <li>-Use the forum of the international cereal rust and powdery mildew conference in Denmark to identify areas impacting on the objectives of the control of pests and diseases group</li> <li>- Use the gathering at the BGRI 2015 and international wheat conference to seek out any new developments not captured in objectives of the EWG</li> </ul>
Expected outputs and deliverables for (year 1- year 2)
<ul style="list-style-type: none"> <li>-Validation and/or revisions to the document outlining the aims and objectives of the EWG</li> <li>-Establish a focus group on necrotrophic pathogens to follow-up on report generated from initial meeting at PAG, San Diego</li> </ul>
Timeline of activities for (year 1- year 2)
<ul style="list-style-type: none"> <li>-Aim to elect chair and vice chair by mid 2015 well in advance of the proposed face to face gathering at the international cereal conference</li> <li>-Denmark meeting earmarked for May 2015</li>   <li>- BGRI gatherings earmarked for September 2015 and 2016</li> </ul>

BUDGET STATEMENT FOR 2015			
Resources requested/expected		Expenses	
Origin	Budget	Type	Budget
Wheat Initiative	40 000 €	Organisation of Meetings	1 000 €
Other source	€	Consumables	€
Other source	€	Travel and Subsistence	39 000 €
Other source	€	Communication	€
Other source	€	Other Costs	€
<b>Total</b>	€	<b>Total</b>	40 000 €

Additional documents
<p><b>Minutes of EWG group on Control of Wheat Diseases and Pests with focus on necrotrophic pathogens</b></p> <p>January 12, 2015</p> <p>Town and Country Hotel, Plant and Animal Genome XXIII Conference, San Diego, CA</p>

EWG members present included Tim Friesen, Steve Goodwin, Gert Kema, Morten Lillemo, Huyen Phan Phan, and Brande Wulff.

Three major necrotrophic/hemibiotrophic pathogens were identified including *Zymoseptoria tritici*, *Parastagonospora nodorum*, and *Pyrenophora tritici-repentis*. Additionally, *Cochliobolus sativus* was mentioned as a problem in a few areas of the world.

- The research area of each of these diseases has expanded or good progress has been made, but it was agreed that the gaps important in each interaction require better understanding. In addition, the interaction between different foliar blights – particularly in the light of the expanding understanding of effector driven responses – is of increasing interest and importance. Advances in the understanding of how to solve these disease problems would come down to understanding how the pathogen incites disease and how wheat resists or succumbs to each pathogen. This seems stating the obvious, but is still an area of major attention in order to provide breeders with advanced tools other than specific and well-characterized inoculum for selection of superior genotypes.

Specific gaps include:

1. Identifying and understanding effectors and their corresponding targets in wheat. This would involve the identification of resistance and susceptibility genes in wheat, identification and characterization of effectors in each pathogen, and the interplay between these effector host gene interactions within and between each disease system.
2. Mechanisms of resistance to hemibiotrophic pathogens specifically addressing what the pathogen is doing during the switch from the biotrophic to necrotrophic phase and what resistant wheat is doing to fend off the pathogen at this transition.
3. Resistance to these necrotrophic/hemibiotrophic diseases in durum wheat lags behind that of bread wheat and requires an additional input. The vast amount of data in the various bread wheat systems should be compared and superimposed on durum wheat thereby fostering food security – apart from the pasta industry - as durum wheat is of particular importance for many smallholder producers in North Africa.
4. Deciphering population diversity in terms of functional genes - such as effectors - complements the generic population genetic studies that contributed significantly to the understanding of pathogen behavior on various spatial and temporal scales. These data are essential for fostering effective breeding and resistance gene deployment.
5. The relationships between various necrotrophs as well as between necrotrophs and biotrophs (i.e. is there antagonism between the two) is an understudied area, but yet of great practical significance.
6. Disease management through fungicides usually is required in intensive production environments where host resistance is limited or declining. However, the azole fungicides have dominated the market for years in basically all plant pathogens, but particularly for the necrotrophic foliar blights. The risk of fungicide resistance is huge and a continuous worry to the industry and growers. Identification of new fungicide targets in order to diversify the product portfolio is very important, but also extremely difficult and costly. Fundamental understanding of host – pathogen interactions contribute to discovery and should be dealt with in public-private partnership with the agrochemical industry.
7. A detailed calculation of the global economic impact of necrotrophic and hemibiotrophic pathogens is necessary to understanding the potential return on research dollar investment.

