



Coordinating global research for wheat

## EXPERT WORKING GROUP MEETING AGENDA AND MINUTES

### Meeting of the Expert Working Group on Control of Wheat Diseases and Pests with focus on necrotrophic pathogens

12 January 2015, 7:30 pm PST

Town and Country Hotel, Plant and Animal Genome XXIII Conference, San Diego, CA

Chaired by Tim Friesen (USDA, USA) and Steve Goodwin (USDA, USA)

#### Participants

Tim Friesen (USDA, USA)  
Steve Goodwin (USDA, USA)  
Gert Kema (PRI, Netherlands)  
Morten Lillemo (Norwegian University of Life Sciences, Norway)  
Huyen Phan Phan (Curtain University, Australia)  
Brande Wulff (JIC, UK)

#### Apologies and Absentees

Justin Faris (USDA, USA)

Beat Keller (University of Zurich, Switzerland)

James Brown (JIC, UK)

Richard Oliver (Curtain University, Australia)

Jason Rudd (Rothamsted Research, UK)

Peter Solomon (Australian National University, Australia)

#### Agenda (to be checked/completed)

1. Welcome / Introduction

2. Identification of research gaps in the area of wheat necrotrophic pathogens

2.1. Identification of major wheat necrotrophic pathogens

2.2. Gap analysis

3. Next EWG meeting

#### Attachments

1. Welcome/ Introduction

Members of the EWG working on wheat necrotrophic pathogens met to identify the major wheat necrotrophic pathogens and the gaps in this area of research.

## 2. Identification of research gaps in the area of wheat necrotrophic pathogens

### 2.1. Identification of major wheat necrotrophic pathogens

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.

### 2.2. Gap analysis

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:

- a. 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.
- b. 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.
- c. 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.
- d. 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.
- e. 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.
- f. 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.

- g. A detailed calculation of the global economic impact of necrotrophic and hemibiotrophic pathogens is necessary to understanding the potential return on research dollar investment.

3. Next EWG meeting

To be held at the 14<sup>th</sup> International Cereal Rusts and Powdery Mildews Conference, Helsingor, Denmark, July 5-8, 2015

<b>Additional documents</b>