



15th WGIN Stakeholders' Meeting

30th November 2017
@ Fowden Hall, Rothamsted Conference Centre, Harpenden

Programme

“Tracking the Wheat Traits of Tomorrow”

- 10:00 **Arrival Tea and Coffee**
- 10:15 Welcome – **Peter Shewry** *RRes*

A) The Wheat Genetic Improvement Network

- 10:20 ‘WGIN going from strength to strength: Highlights and the legacy so far’ – **Kim Hammond-Kosack** *RRes* WGIN provides a research platform for the delivery of tools, resources, bioinformatics information and expertise for the identification of naturally occurring (useful) genetic variation in new traits. While industry breeding programmes tend to have a broad focus on crop varieties with greater yields and improved quality, characteristics that might improve the resilience and sustainability (e.g. abiotic/biotic stress, nutrient use efficiency, canopy architecture), do not receive as much attention as commercial breeding targets. WGIN focusses on these new traits, but also acts as a catalyst giving rise to multiple and diverse areas of research which are taken up by breeders and other funding agencies. Importantly, WGIN is also helping to train the next generation of crop scientists.
- 10:30 ‘What can drones tell us?’ – **Andrew Riche** *RRes*
In this presentation, we describe how the UAV platform developed at Rothamsted is used to monitor field experiments, which traits can be measured from the images collected and how the data extends our use of current field experiments. The WGIN Diversity experiment has been a key resource in developing and testing the data collection and extraction workflows.
- 10:55 ‘UK drought – why we need DT wheat!’ – **Clare Lister** *JIC*
Wheat is susceptible to drought at the start of stem extension (Stage 31) when grain number is being determined. In the last seven years, drought in E. Anglia has occurred five times during April, which coincides with this vulnerable period. We have been looking for drought-tolerant (DT) characteristics in RILs generated from a cross between Paragon (UK spring wheat) and Garcia (bred for drought conditions in S. Europe).
- 11:20 **Break - Tea, Coffee with Flapjacks**

- 11:50 'Wheat Without Aphids?' – **Amma Simon RRes**
 There are currently no commercial wheat varieties with resistance to the cereal aphids which occur in the UK. Here we report on efforts to identify and understand resilience in wheat against the Barley Yellow Dwarf Virus vectoring English grain aphid and the bird cherry-oat aphid, which could be used to reduce crop losses to these pests.
- 12:15 'The WGIN Big Data Experiment' – **Michael Hammond-Kosack RRes**
 The WGIN Wheat Promotome Capture Experiment aims to capture, sequence and compare promoters of 500 wheat genes and their homoeologues contributing to specific traits in 96 wheat cultivars used in breeding, farming & scientific research. This will increase our knowledge of trait-specific gene regulation and phenotypes across a wide range of wheat cultivars and wheat types. Fingers crossed, some of the first comparisons may be ready to be presented here.
- 12:45 Wheat Market Update – **Amandeep Kaur Purewal & James Webster AHDB**
 A whistle stop tour of the global wheat market. Plus, the current state-of play for UK wheat and the outlook for the year ahead.
- 13:15 **Lunch – homemade soup served with a selection of hams, cheese and artisan breads**

B) Designing Future Wheat

- 14:00 'A BBSRC funded wheat programme, Designing Future Wheat (DFW)' – **Graham Moore JIC**
 BBSRC has funded an integrated programme bringing together wheat research at RRes, Earlham Institute, Quadram Institute, NIAB, EBI, JIC and the Universities of Nottingham and Bristol around four work packages. I will provide a brief overview of this programme, and the research being carried out.
- 14:15 'DFW Breeders' Toolkit – Arming the Commercial Breeding Industry with Alleles for the future' – **Simon Orford JIC**
 The Breeders' Toolkit is providing as yet commercially unknown alleles to the breeders' gene pools. Following the development of Near Isogenic Lines using freely available genetic markers and the testing of these over academic and breeder multi-site trials, we are able to concentrate on providing only the best of the best to the breeders for agronomic gain.
- 14:40 'Allelic diversity in controlling wheat spike development' – **Laura Dixon JIC**
 Current yield requirement projections far exceed wheat crop production and so additional methods are required to increase the crop yield. One route to increase yield would be through increasing spikelet number. We aim to achieve this through identifying and exploiting genetic components regulating this response.
- 14:50 'Is gene flow from related species responsible for most of the genetic variation found in today's bread wheat?' – **Keith Edwards University of Bristol**
 To understand what, if any, contribution the wheat relatives have made to the genetic diversity of hexaploid wheat, we have used single nucleotide polymorphism-based molecular markers to compare a large number of bread wheat accessions with a range of wheat relatives. During the presentation, I will discuss our latest findings and I will also discuss what this might mean for the future direction of wheat breeding in the UK.
- 15:00 'Modifying wheat architecture for improved traits' – **Steve Thomas RRes**
 We are using TILLING and novel screens to develop an extensive collection of new alleles to manipulate wheat architecture. These include novel Rht-1 dwarfing alleles that have the potential to provide precise control of plant height as well as improved traits compared to the well used Rht-B1b (Rht1) and Rht-D1b (Rht2) alleles.

- 15:10 'Using rain-out shelters to future proof UK wheat against drought' – **Robert Jackson NIAB** Climate change will likely have a marked effect on UK agricultural practices, including periods of extended drought. In this presentation, we will outline the techniques being employed during DFW to identify wheat lines and practices that will help mitigate the effects of drought on wheat, both in the UK and internationally. This will build on successful work that has already been performed at NIAB.
- 15:20 'Improving the quality of staple foods to deliver health benefits - dietary fibre' – **Alison Lovegrove RRes** There are accepted health claims for cereal dietary fibre relating to reduced risk of type II diabetes, cardiovascular disease and some types of cancers. Our research aims to increase the amount of total and soluble dietary fibre particularly in white flour and to develop and exploit high fibre wheat cultivars, in collaboration with commercial plant breeders and food processors.
- 15:30 'Genome editing as a new powerful tool for wheat breeding' – **Vladimir Nekrasov RRes** Genome editing is a new technique that enables rapid engineering of crop traits via precise manipulation of underlying genes using CRISPR/Cas as a molecular tool. As a result, beneficial traits could be introduced into elite wheat cultivars without lengthy and laborious back-crosses to one of the parental lines. Resulting genetically edited wheat varieties are transgene-free and, therefore, should not be classified as GM.
- 15:40 'Designing new wheat starches' – **Brittany Hazard Quadram Institute** Starch is the major component of the wheat grain and wheat-based foods. Our research aims to understand the genes controlling wheat starch properties and to develop new wheat germplasm with more resistant starch, an important dietary fibre.
- 15:50 'Wheat vs Septoria' – **Kostya Kanyuka RRes** Septoria tritici blotch (STB) cause by the fungus *Zymoseptoria tritici* is the most economically damaging disease of wheat in the UK. Our research aims to identify wheat genes contributing to susceptibility and those contributing to resistance to STB using state-of-the art genomics and genetics approaches.
- 16:00 **Q and A on DFW & WGIN in general**
- 16:30 **Break - Tea and coffee with chocolate brownies**
- 17:30 Depart

Please note:

- Full details on **WGIN** can be found here: <http://www.wgin.org.uk/>
- Full details on **DFW** can be found here: <https://www.jic.ac.uk/research/designing-future-wheat/#>
- You can still register for this event by following this link <https://www.eventbrite.com/e/15th-wgin-stakeholders-meeting-tickets-35456308774>
- **All refreshments courtesy of RoCRE**

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