

WGIN5 Stakeholders' Meeting 2025

Wednesday 5th February at JIC conference centre

Barbara McClintock Suite

1. This meeting is another hybrid meeting (like last year's) and is **still open for registration**
2. To register for in-person attendance, follow this link: <https://www.eventbrite.co.uk/e/22nd-wgin-stakeholders-meeting-2025-in-person-registration-tickets-1137790364609>
3. To register for online attendance please follow this link: <https://www.eventbrite.co.uk/e/22nd-wgin-stakeholders-meeting-2025-on-line-registration-tickets-1137836472519>
4. To join the online Zoom meeting you will need these links and passwords:
<https://us06web.zoom.us/j/82273447797?pwd=XgFqJ04isV0HY4vlpjGOxB6oAQGJ4I.1>

Meeting ID: 822 7344 7797

Passcode: 693363

- **09:30 onwards** registration + coffee/tea
- **09:55 – 10:00** Introduction – Peter Shewry (RRes)
- **10:00 – 10:20**
Talk A **What factors are driving UK grain markets?** Olivia Bonser (AHDB)

This presentation will look into both global and domestic factors that are driving UK wheat grain prices. Key topics include global weather, geopolitical change and an overview of supply and demand for last season and this season. Initial expectations for harvest 2025 will also be covered.

- **10:20 – 10:40**
Talk B **An overview of WGIN phase 5 (2024-2029)** Kim Hammond-Kosack (RRes)

WGIN started in 2003 and has provided a research platform for the delivery of tools, resources and expertise for the identification of naturally occurring (useful) genetic variation in a broad range of new traits for hexaploid wheat. WGIN phase 5 commenced in July 2024 and involves researchers based at Rothamsted Research, John Innes Centre, NIAB in Cambridge and the MetOffice in Exeter. Many of the researchers and the topics to be investigated are new to WGIN. In WGIN phase 5, 80% of the research efforts will continue to focus on improving hexaploid wheat, and 20% will focus on two UK agriculture underutilised cereal species, namely durum wheat and triticale. For the first time we have included precision breeding approaches to increase the range of useful variation available for key traits. Within WGIN 5 the plan is to focus on experimental breeding, grain protein deviation, enhancing resilience to pests and pathogens, adaptation to climate change and enhancing crop stability. WGIN has always acted as a catalyst giving rise to multiple and diverse areas of research which are taken up by breeders, academic researchers and other funding agencies. In this presentation, I will give an overview of the planned activities that will be taking place within the WGIN 5 core project.

WGIN5 Research Plans

Partner – John Innes Centre (JIC)

- **10:40 - 10:55**
Talk 1 **Experimental Breeding (title TBC)** Simon Griffiths (JIC)

Talk summary to follow

- **10:55 – 11:10**
Talk 2 **Precision Breeding in Watkins Landraces: Fixation of Key Genetic Targets**

Mark Smedley and Sadiye Hayta (JIC)

We selected four key Green Revolution alleles—RHT-1 (height), PPD-1 (day-length sensitivity), and local adaptation alleles such as R (grain sprouting resistance in the field) and PIN (a hard grain milling texture)—for fixation at the outset of a precision breeding programme within a Watkins pedigree. To reproduce these alleles in landraces, more tuneable gene-editing technologies such as Base Editing and Prime Editing were employed alongside standard

CRISPR knockout technology. Wheat transformation protocols were optimised in selected Watkins lines using a construct containing a reporter gene (GUS) which when stained turns blue to visualise T-DNA integration, along with various RHT-1 constructs, enabling refinement of transformation and editing strategies.

- **11.10– 11.30 Refreshment Break – 20 mins**

Partner – NIAB

- **11:40 – 11:55**

Talk 3 Field screening for novel Septoria resistance sources – the Wild West!

Phil Howell (NIAB)

Genetic resources derived from the wild wheat relatives *Triticum monococcum* and *Aegilops tauschii*, which introduce novel genetic variation into the wheat A and D genomes, respectively, have previously been reported to show excellent disease resistance. A series of introgression lines derived from these wild relatives will be tested for resistance to Septoria tritici blotch STB, the most economically significant foliar disease for UK wheat growers. This will include replicated screening trials under high STB / low yellow rust field conditions at a NIAB location in South Devon.

Partner – Rothamsted Research

- **11:55 – 12:10**

Talk 4 The current state of the NIFTYR population - emerging resistance traits

Mike Hammond-Kosack (RRes)

The *Triticum monococcum* (Einkorn) introgression population (called NIFTYR) has been generated at Rothamsted in a Paragon bread-wheat background since 2006 – a long-term project, indeed. Genotyping analysis of all 1029 lines is now complete, which will allow pre-selection for further breeding and experiments. The main reason for creating this population, using only conventional breeding techniques, was the intention to transfer the strong resistance of Einkorn cultivars against many pathogens, including Take-all, Yellow Rust, Septoria, into bread-wheat. This could reduce or even negate the need for pesticides on agricultural fields. Field phenotyping in 2023 and 2024 has revealed many promising NIFTYR lines with yellow rust as well as brown rust resistance. Extended glasshouse phenotyping during 2024 for Septoria resistance has shown that several NIFTYR lines specifically introgressed with a Septoria resistant Einkorn cultivar exhibit very strong resistance to Septoria, both in attached leaf seedling assays, but most recently also in maturing plants (GS53-64) on the flag-leaves. WGIN5 will include extensive field phenotyping of NIFTYR lines for Septoria performed in the wild west by NIAB, field trials for Take-all resistance at Rothamsted and more.

- **12:10 – 12:25**

Talk 5 Can we break the negative link between yield and grain protein content?

Malcolm Hawkesford (RRes)

Higher wheat yields often mean lower grain protein content. This is influenced by both growing conditions and genetics (variety). In the new WGIN project we will investigate genetic variation in this interaction, to identify useful germplasm and genetic markers for increased grain protein independent of yield, to aid breeding of this trait.

- **12:25 – 12:40**

Talk 6 Potential emerging cereal viral threats – challenges and opportunities

Lawrence Bramham (RRes)

Climate change is already beginning to impact on UK cereal cultivation, breeding priorities and the deployment of refined agronomic practices. Insect-vectored viruses are a significant threat, due in part to the presence, prevalence, and behaviours of the associated transmission vectors which is likely to change in the future. WGIN viral research is exploring current and future wheat viruses of note with vector and virus species suggested through a comprehensive literature review to be of highest priority to monitor for and model the climatic conditions

necessary for successful vector distribution. There exist challenges for effective future virus control but also opportunities, both to be explored within WGIN.

Partner – Met Office

- **12:40 – 12:55**

Talk 7 **Analysing climate data to support breeding resilient wheat**

Andrew Cottrell (MetOffice)

Climate change affects UK wheat in a variety of ways, both abiotic (e.g. heat stress, drought, water-logging) and biotic (e.g. changing pest risks). How can understanding the projected UK climate in more detail help support efforts to breed more resilient wheat varieties?

- **13:00 – 14.00** **Lunch**

Partner – JIC

- **14:00 – 14:15**

Talk 8 **Exploring an untapped Durum Wheat germplasm reservoir as a basis for diversification of UK arable crop rotation and as a future source of alien introgression for soft wheat improvement**

Noam Chayut

(JIC)

To strengthen UK agriculture and food system resilience there is a need to diversify the UK crop basket and cropping systems. A recent DEFRA endorsed review aiming to identify target crops shortlisted Triticum Durum for its high economic potential. The Germplasm Resources National Bioscience Research Infrastructure (GR-NBRI) in JIC is the custodian of the A.E Watkins landrace collection, assembled in 1920s-30s, of which 356 are Durum wheat accessions which originated from 25 countries. We will present how this largely untapped reservoir is being developed and used in WGIN5 to explore its adaptability potential for UK future agro-environment and processor needs.

Partner – RRes

- **14:15 – 14:30**

Talk 9 **Establishing genome editing as a reverse genetics tool for trait improvement in triticale**

Vladimir Nekrasov and Mark Wilkinson (RRes)

Triticale is a hybrid of wheat and rye. As a feed crop, triticale is a good alternative to wheat as it is rather high yielding and, at the same time, has high levels of resistance to pests and diseases. As part of WGIN5, we are going to utilise the genome editing technology (CRISPR/Cas) for the purpose of improving triticale lodging tolerance, by targeting the Green Revolution gene *Rht-1*, and the nutritional value of triticale grain, by targeting genes involved in synthesis of non-starch polysaccharides (NSPs), which act as antinutritional components of animal feed (e.g. for poultry) due to their inhibitory effect on digestion of starch, lipid and protein.

A related non-WGIN defra funded project

- **14:30 – 14:45**

Talk 10 **Defra Survey of Crop Pests and Diseases update**

Julie Smith (ADAS)

Understanding pest and disease pressures at a regional and national level is vital to crop management. In-season information can help guide spray decisions and data can be used to support forecasting models. Long term trends are useful indicators to help prioritise plant breeding targets to futureproof our crops and to enable researchers to explore the effects of climate change on pest and disease levels. National level data can help interpret the impact of changes in agronomic practice and pesticide legislation, to inform policy decisions in a post-Brexit era. The Defra Survey of Crop Pests and Diseases has been running for over 50 years to monitor the levels of pests and diseases

in winter wheat and winter oilseed rape, as well as collecting information about agronomic practices and pesticide inputs. This has created a powerful and unique dataset which can be used to inform crop management.

- **14:45 – 15:05**

Talk 11 **Fireside chat with farmers** - Tom Allen-Stevens (BOFIN)

'One year on' what happened in the 2023-2024 season after such an awful start

- **15:05 – 15:50** **General discussion**

How can the WGIN5 activities link with existing research projects?

Devising new joint projects to build on the WGIN5 activities

- **15:50** **Final remarks** - Peter Shewry (RRes)
- **16:00 – 16:30** **Refreshments**
- **16:30** **Meeting ends**