PCGIN

Pulse Crop Genetic Improvement Network

PCGIN Newsletter - November 2025

Welcome to the PCGIN Newsletter, bringing you news about research on pulse crops funded by Defra, including stakeholder activities and our annual network event.

In this edition, you can read about:

- PCGIN Stakeholder meeting, Tuesday 3rd February 2026
- Industry Stakeholder focus: NPZ
- Meet two of our associated PhD students
- The latest research findings and publications

PCGIN Stakeholder Meeting - Registration Open

When: Tuesday 3rd February 2026, approximately 10:00-16:00
Where: PGRO Conference Centre, Great N Rd, Peterborough, PE8 6HJ

This ever popular annual event brings together researchers and industry stakeholders in a two-way transfer of knowledge and experience on pulse crops. A mix of seminars and networking opportunities will bring the latest on Defra-funded research, perspectives from industry (pulse breeding, processing, marketing) and invited speakers on current topics (viruses, climate change).

Programme updates will be posted on www.pcgin.org under News & Events. The finalised programme will be emailed to all registered participants in early January.

Please note: The UK Legume Research Community meeting will take place separately from 5-7th May 2026, organised by Pete Ianetta at the James Hutton Institute, Dundee. See https://uklrc.org/uklrc2026/

Industry spotlight: NPZ UK

Breeding for the Future of Pulses

NPZ UK has been a cornerstone of legume breeding in the UK since 2005 and continues to build on over 125 years of breeding expertise from its parent company, NPZ (Germany), with a strong focus on peas and field beans tailored to British agriculture.

The NPZ UK breeding site in Impington, near Cambridge, benefits from the network of international relationships of its parent company in Germany which gives access to new germplasm, techniques and different climatic conditions to develop and test new adapted breeding material and varieties.

NPZ UK are active members of the PCGIN community, supporting collaborative activities that promote innovation and knowledge exchange across the pulse sector. NPZ UK is represented on the PCGIN management team by Pulse Breeder Edina Kare.

As part of the commitment to advancing pulse production, NPZ UK is leading the ANSWERS project, a Defra-funded initiative in partnership with Innovate UK, under the Farming Innovation Programme. In collaboration with Yara, PGRO, and the University of Lincoln, the project is tackling critical knowledge gaps in field bean nutrition.

By developing tailored nutrition plans and accelerating breeding through improved selection methods, ANSWERS aims to boost nitrogen fixation, yield stability, and protein content – all while supporting climate-resilient, net-zero UK plant protein supply chains.

With on-farm trials across multiple sites and a strong focus on grower engagement, the project is set to deliver practical, scalable solutions for the future of UK-grown beans.

Meet the PCGIN researchers…

PhD Student: Kara Boyd at the John Innes Centre

Kara is a PhD researcher in crop pathology in the group of Dr Sanu Arora. She was drawn to the research project because it has real-world applications. Her PhD project builds on earlier screens for pea downy mildew resistance carried out as part of PCGIN in collaboration between JIC and NIAB.

Can you describe your current research and how it connects with PCGIN's goals or themes?

My research aims to identify and characterise resistance genes to downy mildew in pea. This enables us to provide genetic markers which can be used by breeders. Downy-mildew resistant pea varieties will be a more attractive crop to growers.

Pea downy mildew
Photo by Kara Boyd

What does a typical day look like for you as a PhD student working on this research?

Each day can look very different: some days I will be in the lab all day, others at the computer all day! I have also started to write up my results now as I have entered the fourth and final year of my PhD. I have also completed two industrial placements with my industrial partners KWS (in Germany) and Limagrain (in France) where I had the opportunity to work with seed breeders abroad.

What aspects of your research do you find most exciting or rewarding?

I definitely enjoy lab work the most. It is always very rewarding when an assay works, even more so when the results support your hypothesis!

Have you faced any particular challenges during your PhD, and how have you approached them?

Working with an obligate biotroph (a type of pathogen that can only grow and reproduce on a living host) has been challenging. Having to grow the pathogen on the plant makes bulking inoculum more difficult and time-consuming. For a long time, I didn't know anyone else working with pea downy mildew, so I was doing a lot of trial and error!

What impact do you hope your research will have, either within PCGIN or more broadly?

I hope my research will help to improve pea as a crop and make it a more attractive option to growers. More broadly, I also hope that research into pea will continue, as it has been a bit neglected despite being the first model plant!

PhD Student: Matt Pratley at the University of Reading

Matt brings a unique blend of industrial and academic experience to his PhD research in crop science. After five years in industrial R&D, where he developed molecular and immunological assays for detecting pathogens in swine and poultry, he chose to return to plant science – a field he had specialised in during his undergraduate studies at the University of Nottingham. Motivated by a desire to apply the molecular skills he honed in industry to a subject he's really passionate about, Matt embarked on his PhD into bruchid resistance in faba bean under the supervision of Prof. Donal O'Sullivan and became involved with the PCGIN.

Can you describe your current research and how it connects with PCGIN's goals or themes?

I am investigating the molecular interactions which take place between faba bean (*Vicia faba*) and the broad bean beetle (*Bruchus rufimanus*). *B. rufimanus* is a significant pest of faba bean crops in the UK and elsewhere, causing direct damage to the seeds and reducing the crop's value. There are currently no adequate control methods for this insect, due to its highly specialised lifestyle. It is expected that improved understanding of the molecular interactions between pest and host plant will lead to new opportunities for control of this damaging pest, directly enhancing the productivity and value of this crop, as well as potentially reducing the need for pesticides.

Bruchid
Photo by Matt Prately

What does a typical day look like for you as a PhD student working on this research?

On a typical day you will often find me in one of the controlled environment facilities at the University of Reading or in the molecular laboratory. I carry out controlled infestations of the host plant, then collect samples for further analysis to investigate molecular interactions between the plant and insect pest.

What aspects of your research do you find most exciting or rewarding?

It's a real privilege to work on the molecular basis of bruchid infection, an aspect that has received comparatively little study. Although many researchers have examined the biology, impact and control of this pest, the genes and metabolites involved in the interactions between the broad bean beetle and its host plant remain largely cryptic. It is likely that many of the strategies used by each organism will have parallels in other plant-pest systems, which could accelerate the development of new control strategies, but it is also possible that some completely new mechanisms may be uncovered, as this pest is highly specialised to its host plant.

Have you faced any particular challenges during your PhD, and how have you approached them?

The most significant challenge so far has been familiarising myself with both the crop and its pest since I have worked with neither of these organisms before. However, since I began my studies in February, I quickly gained hands-on experience during this year's growing season, and I have now observed a complete life cycle of the system. This has greatly aided the planning of subsequent experiments.

What impact do you hope your research will have, either within PCGIN or more broadly?

I hope my research will improve our understanding of how this damaging pest interacts with its host, and lead to new possibilities for its control.

Research Updates

Assays to screen for virus resistance in pea (Milestone 11)

A recent field survey of viruses in combining pea, conducted by Fera Science (formerly the Food and Environment Research Agency) found a high incidence of several viruses, which almost certainly impacts yield. These viruses are mainly spread by aphids and sometimes leaf hoppers. With the ban on neonicotinoid insecticides and warmer temperatures, aphid numbers are increasing, and so are the viruses they carry.

An objective of the 2024-2029 PCGIN programme is to screen over 200 pea varieties for genetic resistance to one or two common viruses. Top of the list identified in the Fera study were Turnip Yellows Virus (TuYV) and Pea Enation Mosaic Virus (PEMV). TuYV, despite its name, infects a wide range of crops including brassicas, lettuce, beet and pea, through species-specific changes in its genetic make-up.

To make the screening process more efficient, we will 'bypass' the aphids as disease vectors (a method that can be slow and tricky) and instead use

Agrobacterium to deliver an infectious copy of the virus genome directly into plant cells, where it can begin replicating. The first milestone (M11), setting up the infection system and diagnostics, has been completed, with the results from the screens to follow in a later milestone.

UK germplasm collections of pulses (Milestone 12)

Noam Chayut (JIC, Genebank manager) and Phil Howell (NIAB, Research Lead – crop genetic resources) gathered information on both 'research-interest' and commercially available seed material that is physically in the UK. There were 25 responses from universities, research institutes and breeding companies, resulting in a list of over 600 pulse varieties on either National Lists or PBR lists that can be shared for research and other purposes. In addition to combinable pea (125) and faba bean (70) varieties, there are many varieties of soybean, lupin, runner bean, french bean, vegetable peas and broad beans. The results will be presented at the Stakeholder meeting on 3rd February 2026.

Bruchid beetle in faba bean (sample collection) (Milestone 13)


Bruchid
Photo by Matt Prately

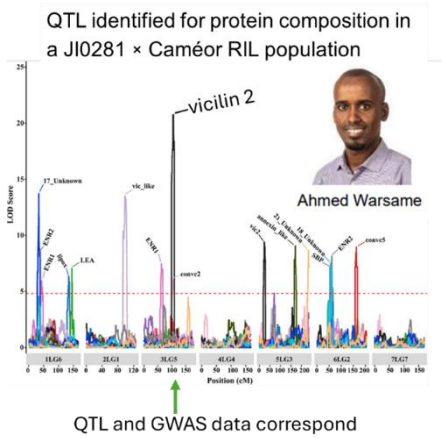
The larvae of these little black beetles damage seed, spoiling them for human consumption. This downgrades the crop from a premium food grade product to animal feed, significantly reducing its market value. Bruchid is a major pest in France and affects faba bean crops in England, but is not (yet) established in Scotland. Understanding more about the molecular biology of Bruchid and finding potential mechanisms of pest resistance is the topic of Matt Pratley's PhD project funded by PCGIN (see Matt's profile in 'Meet the Researcher' section of this newsletter). Last summer Matt collected over 100 live *Bruchid rufimanus* insects from the field. He has set up netted cages for controlled infestation of two faba bean varieties, the susceptible Hedin/2 and the semi-resistant Nova Gradiska, and collected samples from different stages of the infection process. Over the next two years Matt will carry out detailed molecular investigations to identify genes and biological pathways that could inform breeding strategies for improved resistance in faba bean crops.

Premium quality traits for UK pulses (Milestone 17)

The income (gross margin) per hectare from growing faba bean and pea, the UK's two major pulse crops, is relatively low. To stimulate growth in UK legume production in line with net zero goals, this margin would need to be at least doubled, if not tripled. Objective 1.1 of the PCGIN programme addresses this

challenge by identifying premium quality traits that could help get a better farm-gate price for UK-grown pulses. A dedicated workshop was embedded within the Stakeholder meeting, and a short summary of the discussions was shared in the May Newsletter. Promising traits identified in the workshop will be followed up through engagement with stakeholders and further research.

Variation in seed protein composition (Milestone 18)



Dr Ahmed Warsame, a PCGIN-funded postdoctoral researcher at JIC, measured the abundance of 25 major seed storage proteins in more than 200 pea accessions. He found huge variation in the relative abundance of these proteins, which can affect industrial applications of pea protein – both in the food sector and in emerging uses such as bioplastics. Functional properties like foaming, gelling or emulsification are influenced by protein composition, although more research is needed to understand which specific proteins (such as vicilins and legumins) are important for which properties. The results have now been published and one of our industry stakeholders is using the data to develop genomic models that support the selection of pre-breeding lines for the processing industry.

Publications

Warsame, A.O., Balk, J. and Domoney, C., (2025). Identification of significant genome-wide associations and QTL underlying variation in seed protein composition in pea (*Pisum sativum* L.). *The Plant Genome*, 18(2), p.e70051. https://doi.org/10.1002/tpg2.70051

Warsame, A.O. An optimized high-throughput colorimetric assay for phytic acid quantification. *bioRxiv*. https://doi.org/10.1101/2025.07.30.667628