PCGIN Newsletter - May 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:

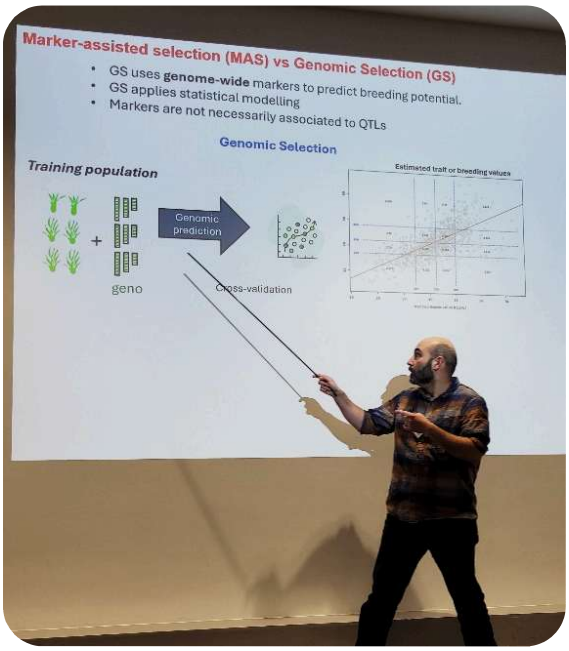
- The annual Stakeholder Meeting held at Kew Gardens, 27 February 2025 including the workshop on premium traits for UK pulses
- Industry Stakeholder focus: Limagrain
- Introducing Callie and Elaine, research assistants funded by PCGIN
- The latest research findings and publications

2025 Stakeholder Meeting and Premium Traits Workshop

Royal Botanic Gardens, Kew

Images by Felicity Perry, JIC

Following the success of last year, the 2025 PCGIN Stakeholder meeting was again held in conjunction with the UK Legume Research Community meeting. Our wonderful host and organizer was Caspar Chater who is a Senior Research Leader at Kew Gardens. We were privileged to use the Atrium and Lady Lisa lecture theatre of the Jodrell Laboratory, with access to the gardens. There were 103 delegates, including representatives from 17 companies and 6 other organisations (in total 28 non-academic participants).



Jose de Vega presenting

Posters and networking in the atrium

In addition, we ran a one-hour workshop on premium traits. One of the objectives of the new PCGIN programme is to explore and then prioritize genetic traits that can help push up farmgate prices. While this is a recurrent topic, it is very timely again because of the growing market for pulses as a sustainable, high-protein crop and PCGIN's new genetic resources. We kicked off with an open discussion during the Stakeholder meeting, which will be followed up with individual consultancies and a final report due in September this year (2025).

View the full report.

Industry spotlight: Limagrain

Limagrain is a global seed and agri-food company, with UK trial sites and offices in Rothwell (Lincs) and Woolpit (Suffolk). Limagrain is represented on the PCGIN management team by Elise Cocciantelli, Head of Cereals and Pulses Support (CAPs) and Global Pulses Coordinator.

Limagrain is unique in that its parent company is a French agricultural cooperative of 1,300 farmer members based in the plain of Limagne-Val d'Allier. The cooperative owns its capital and ensures its stability.

Limagrain breeds, produces, and sells high value-added field and vegetable seeds and is the only seed company that links breeders, farmers, manufacturers,

distributors and consumers by developing unique agri-food chains to add value to the produce.

Pulses is one of 8 seed groups under investigation by Limagrain Field Seeds which also include cereals and oilseeds. Research and development activities are carried out by more than 600 people at 27 research centers. Trials are carried out in an extensive network of 30 countries, and in 2023/2024, 65 new varieties were launched.

Limagrain's UK pulse breeding program aims to address the pea and faba bean markets with different needs from farmers. Traits of interest for both pea and faba beans include yield, seed quality, protein content, resistance to lodging in the field and digestibility. For example, the development of low-vicine varieties of faba bean could improve the uptake of plant-based foods in human diets, and improve the digestibility of peas and beans in feed as a substitute for imported soya beans.

Meet the PCGIN researchers…

Research Assistant: Callie Rice at the University of Reading

What is your role?
I am a Legume Pre-Breeding Research Technician and work in Donal O'Sullivan's team supporting the Reading PCGIN objectives.

How did you get involved with PCGIN?
After my studies I joined Donal O'Sullivan's team and learned about bean husbandry and phenotyping.

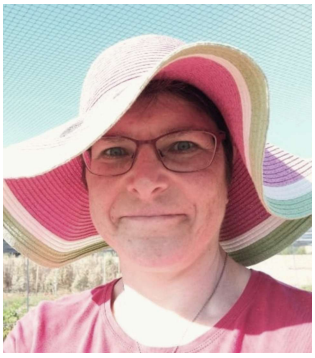
What previous experience do you have and how is this relevant?
I studied Biology at the University of Bath where I did several Plant Biology modules. I did a placement year at the Royal Botanic Gardens, Kew and then a Research Master's at the University of Bristol working with wheat and tobacco.

What research projects are you currently working on?
I am finishing the nutrient analysis of the EMS mutant faba bean population, through phytate assays and ICP-MS. I have also been phenotyping the population, growing up and backcrossing a selection of lines with interesting traits. The next big project is to create a 'Panel of Panels' of faba bean genetic diversity by sowing out four different panels.

Can you describe a typical day?
There is no single typical day! Depending on each stage of a project, I may be over at the glasshouses or in the field sowing seeds, check on plants or spend weeks harvesting and threshing beans. During a day in the lab, I run one or two protocols for nutrient analysis.

What aspects of the job are most interesting or exciting to you?
Finding beans with an usual trait is great as it could lead to further work. For example, I noticed a viviparous mutant [which *germinate* in the pod]. This line is being crossed with other varieties.

Research Assistant: Elaine Farrow at the John Innes Centre



What is your role?
I am Research Assistant for 3 days/week to support some of the PCGIN-funded research at JIC.

How did you get involved with PCGIN?
I was initially hired to do elemental micronutrient analysis (ICP-OES) on collections of wheat and pea seed. After this project ended I provided technical support to Ahmed Warsame [*a PCGIN-funded postdoc*].

What previous experience do you have and how is this relevant?
I received an MSc in Chemistry from the University of East Anglia in 2004. After a varied career in Post-16 science education I switched to vocational work in laboratories supporting the food, feed and beverage industry.

What research projects are you currently working on?
I have been progressing the pea EMS population. I have also collected leaves for DNA extraction and whole genome sequencing. Next is analysing phytic acid in a segregating population grown in the field to nail down a low-phytate locus.

Can you describe a typical day?
Currently I spend a lot of time in the glasshouse to tend the EMS population, coming back to the lab with harvested seed pods for shelling, seed counting and data recording. I also support students with technical aspects.

What aspects of the job are most interesting or exciting to you?
I am happiest when working at the interface between matter and data, linking biological and chemical properties. I am relatively new to biological research, and the complexity of plant phenotypes and metabolic processes is endlessly fascinating.

Research Updates

Protein in faba bean and pea (Milestone 5)

The results of two year field trials for each crop are now available through our website, www.pcgin.org. In faba bean, there is a negative correlation between protein and yield, which is being followed up by Tom Harvie with BBSRC Follow-on Funding (Fabaplus) Three significant loci for total protein were mapped for faba bean, but none were found for pea. In pea, the *sbel* mutation (starch biosynthesis) affects protein content and this is present in about half the diversity population, creating two half-populations and not enough lines in each for statistical analysis. However, NIR data as an approximation of protein are available from the JIC Germplasm Resource Unit (GRU) are available to analyse a larger collection of pea accessions.

Lentil diversity panel (Milestone 6)

The ICARDA lentil collection of 198 lines has been multiplied in the greenhouse by GRU. The seed is being threshed and most lines have been planted in microplots at the JIC field station this spring. The lines will be assessed for

growth performance and disease resistance (from naturally occurring pathogens). The seed will be analysed for protein and compared with lentil varieties that are grown at a small-scale in the UK.

Pulses and climate change (Milestone 7)

All five GINs are working with the Met Office to model future climate risks for specific UK crops. From PCGIN, Becky Howard (PGRO) is leading this to identify climate conditions that affect peas and beans. For example, we hear from Industry Stakeholders that heat-induced flower abortion in peas and beans is an issue. This then needs to be 'translated' to a threshold temperature and critical growth stage (e.g. second half of June). We will look at both abiotic and biotic risks. For the latter, we expect more aphids spreading viruses and the dreaded Bruchid beetle may be moving North.

Publications

Webb A, Thomas JE, Davis H, McAdam S, Angra D, O'Sullivan DM, Gostkiewicz K, Capozzi M and Wood TA. Identification of QTLs linked to partial resistance to foot and root rot caused by *Fusarium avenaceum* and *Fusarium oxysporum* in faba bean (*Vicia faba*). bioRxiv 2025.02.21.639454;
DOI: 10.1101/2025.02.21.639454

Rayner T, Saalbach G, Vickers M, Paajanen P, Martins C, Wouters RHM, Chinoy C, Mulholland F, Bal M, Isaac P, Novak P, Macas J, Ellis N, Steuernagel B, Domoney C (2025). Rebalancing the seed proteome following deletion of vicilin-related genes in pea (*Pisum sativum L.*). Journal of Experimental Botany.
DOI: 10.1093/jxb/erae518.

Rayner T, Mundy JEA, Bilham LJ, Moreau C, Lawson DM, Domoney C, Wang TL. A suite of pea (*Pisum sativum L.*) near-isolines: Genetic resources and molecular tools to breed for seed carbohydrate and protein quality in legumes (2025). Int J Mol Sci. 26:2612.
DOI: 10.3390/ijms26062612.

Feng C et al, Domoney C, Ellis N, Chayut N, Cheng S (2025). Genomic and genetic insights into Mendel's pea genes. Nature, Online ahead of print Apr 23.
DOI: 10.1038/s41586-025-08891-6.