

Research Strategy for Combinable Pulse Crops

The working strategy document of the PULSE PANEL 2016-19

The Pulse Panel is made up of growers, trade and industry representatives. Meeting twice each year its purpose is to give guidance and advice on priority R and D areas to PGRO for the expenditure of Pulse Levy in the pursuit of grower objectives concerning the production of combinable pulse crops.

By partnering with growers, other science and research organisations, and by collaborating with commercial partners, PGRO works to leverage additional resources and access EU and UK funds to complement the levy contributions to deliver maximum effect.

The 5 key priorities identified by the Pulse Panel are as follows.

- 1: Deliver **YIELD STABILITY** and improved **QUALITY** by understanding and quantifying the influencing factors and providing recommendations to ensure its realisation.
- 2: **SOIL HEALTH** and plant and soil biological interactions greatly influence pulse crops. Provide recommendations for remedial actions and the delivery of soil health improvement.
- 3: Deliver **CROP NUTRITION** plans for modern production techniques providing recommendations for optimum performance.
- 4: **ENVIRONMENTAL CHANGE** will influence future cropping techniques. Deliver recommendations for growing in a changing environment.
- 5: **LEGISLATION UPDATES**: To provide relevant information that can be used to impact and promote production and consumption

Theme	Description	Priority 1-5 (1 is high)	Previous, current and proposed work	Status
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1. Yield and quality

Deliver yield stability and improved quality by understanding and quantifying the influencing factors and providing recommendations to ensure its realisation, including development of IPM systems and new crop protection products

Plant breeding and genetic improvement	Peas and beans	Identifying traits for peas and beans for yield stability, disease tolerance and quality that can be used for breeding	1	Defra: PCGIN	Current
General	Peas	Identifying factors affecting yield in peas	1	Pea Yield Enhancement Network	Current
Pulse varieties	Peas and beans	Peas and beans: Variety evaluation; optimum sowing dates; drought tolerance.	1	Recommended List Trials - Pulse Levy; Improving the resistance of legume crops to combined Abiotic and Biotic stresses (ABSTRESS) - EU FP7 Improving the availability of UK sourced protein feed through new faba varieties, production and utilisation systems - Optibean - IUK 101082; An integrated program for the development of lupins as a sustainable protein source for UK agriculture	Current
					Previous
Plant density	Peas and beans	Assessment of optimum plant density for greatest economic gain	2	PGRO levy funded: Combining pea optimum populations Improving the availability of UK sourced protein feed through new faba varieties, production and utilisation systems - Optibean - IUK 101082.	Current
					Previous
Pod set stability	Peas and beans	Maximisation and stability of pod set	2	Improving the availability of UK sourced protein feed through new varieties, production and utilisation systems - Optibean - IUK 101082.	Previous
Mechanisation and harvest guidance	Peas and beans	Providing guidance for prevention of harvest losses	2		GAP

Visual quality retention	Peas and beans	Providing guidance for retention of visual quality of grains	2	Quality Determinants in pea seed - QDiPS - Defra Link.	Previous
Production continuity	Peas and beans	Forecasting supply and demand; Techniques for altering crop maturity; Improved storage.	4	Novel computer vision techniques for food quality analysis - identification of <i>B. rufimanus</i> damage in field beans for human consumption - IUK 131442. Investigation of the use of plant growth regulators for yield and protein content.	Previous
					Proposed
Resource management	Peas and beans	Efficient use of energy and other resources: Alternative energy sources; Resource management.	4	AHDB - UK Partnership for Crop Nutrient Management - RB209 consortium - supported by levy boards and industry.	Current

Pests	Peas and Beans	Pea and bean weevil: Development of seed treatments; Novel control systems and IPM; Resistance.	2	Chemical evaluation: In conjunction with chemical companies including screening trial for weevil control; A novel 'lure and kill' system for the control of <i>Sitona lineatus</i> and <i>Bruchus rufimanus</i> - IUK 101910; Brassicas, leafy salads, oilseed rape and legumes: Developing and evaluating management strategies to mitigate woodpigeon damage to crops - AHDB-Horticulture FV426a. PGRO and industry funded Stem nematode PhD: better understand the crop pest relationship; establish a more reliable quantification method; investigate likely control methods (catch / cover / biofumigation) or cropping techniques. Investigation of the viability of <i>Ditylenchus</i> spp. when fed to cattle as whole beans or straw. Improving the availability of UK sourced protein feed through new faba varieties, production and utilisation systems - Optibean - IUK 101082; Monitoring and control of <i>Bruchus rufimanus</i> in field beans - Defra LK09102; A novel monitoring and forecasting system for the integrated management of bean seed beetle - IUK 100871; HDC Factsheet 01/12; A review of the woodpigeon costs to Brassicas, salad crops and oilseed rape and the effectiveness of management activities - AHDB Horticulture FV426; Combating insecticide resistance in major UK pests Beans and peas (AHDB/ CRD/ PGRO/ BBRO); Application of SNP genotyping and rapid screening procedures to enable commercialisation of faba bean varieties with stem nematode resistance - IUK 100878; Investigation of the status of UK pea viruses.	Current
	Beans	Bruchid beetle: Novel control systems and IPM; Resistance.	1		Proposed
	Beans	Stem nematode: Novel control measures and IPM.	1		Proposed
	Peas and Beans	Field thrips: Development of seed treatments; Novel control systems and IPM.	2		Previous
	Peas	Pea bruchid: Risk to UK crops; mitigation.	1		Current
	Peas	Pigeons: Improved control	1		Current
	Peas and Beans	Aphids: Control and optimisation of product use; Resistance.	1		Proposed (UK pea viruses)

Diseases	Peas and beans	Downy mildew: Secondary infection; Varietal tolerance; Foliar product availability; Seed treatments.	1	Downy mildew varietal resistance - PGRO Levy; Foliar control - PGRO Levy with chemical companies; Pea downy mildew diversity in the UK - AHDB-Horticulture FV436. Legumes for the agriculture of tomorrow - LEGATO - EUFP7; web-based forecasting system for downy mildew in spring beans - www.cropmonitor.co.uk - FERA/PGRO	Current
	Beans	Ascochyta fabae: Improved control.	4		Current

Peas	Root disease: Rotational management; Chemical control; Cultural control; Biofumigants; Diagnostic techniques.	1	Investigating the relationship between <i>Aphanomyces euteiches</i> and yield decline in peas - PGRO Levy/ Nottingham University; Improving the resistance of legume crops to combined Abiotic and Biotic stresses - (ABSTRESS) EUFP7; Legumes for the Agriculture of Tomorrow - LEGATO - EUFP7. Cover crops for improved soil structure and pathogen suppression - vining peas; Understanding and mitigating the causes of yield decline in peas (PhD) - MIBP (iCASE with BBSRC)	Current plus Proposed development of molecular diagnostics
Peas	Sclerotinia: Improved control.	3	Reducing the impact of Sclerotinia disease in arable rotations, vegetable crops and land use - Defra LINK LK09130 SA563;	Previous
Beans	Chocolate spot: Foliar product availability; Cultural control.	2	Improving the availability of UK sourced protein feed through new faba varieties, production and utilisation systems - IUK 101082; Broad beans: Fungicide program for chocolate spot control - AHDB-Horticulture FV355; Towards the development of a laboratory based assay for the detection of common root rot (<i>Aphanomyces euteiches</i>) in vining peas.	

Weed control and Beans dessionation	Dessication timing; Product effectiveness for dessication.	3	Timing and effectiveness of diquat and glyphosate, including effects of glyphosate on seed germination	Current
Peas and beans	Products; Inter-row weeding; wide rows and inter-row applications.	2	Chemical blackgrass control - PGRO; Improving availability of UK sourced protein feed through new faba varieties, production and utilisation systems - IUK 101082.	Previous
Peas	Vision technology.	2	Vision guided spot sprayer for weed control - AHDB-Horticulture FV307b.	

2. Soil Health

Soil health and plant and soil biological interactions greatly influence pulse crops. Provide recommendations for remedial actions and the delivery of soil health improvement

Soil structure and soil health	Peas and beans	Soil structure; organic matter content; compaction and aggregation; aeration; effects of soil health on soil-borne pathogens.	1	Cover crops for improved soil structure, organic matter content, reduction of compaction and pathogen suppression - vining peas	Current
		Impact of cover crops on soil health.	1		
		Impact of crop rotation on soil health.	1	Development of a Horticultural Soil Management Information System - AHDB CP 107d.	Current
		Impact of field operations and land management on soil health.	1		Gap
		Water infiltration; waterlogging.	1		
		Soil erosion.	1		
Rhizobia and nodulation	Peas and beans	Effects of rhizobial treatments on yield and Biological N fixation; Effects of nutrients on rhizobia; Effects of soil health on rhizobia.	1	Field beans - rhizobial and mycorrhizal treatments for yield - PGRO Levy funded with Plantworks, Legume Technology and the James Hutton Institute; Vining peas - the effects of soil phosphate levels on rhizobial population - AHDB-Horticulture FV428.	Current

3. Crop Nutrition

Deliver crop nutrition plans for modern production techniques providing recommendations for optimum performance

Nutrition	Peas and beans	P and K requirements and N residues	1	Vining peas - the effect of soil phosphate levels on rhizobial population - AHDB-Horticulture FV428; AHDB - UK Partnership for Crop Nutrient Management - RB209 consortium - supported by levy boards and industry; Seed treatments for peas - PGRO levy.	Current
				Improving the availability of UK sourced protein feed through new faba varieties, production and utilisation systems - Optibean - IUK 101082; Identification of critical soil P levels in peas AHDB-Horticulture FV 380; Establishing best practice for determining soil nitrogen supply - AHDB project 3425.	Previous
			1	AHDB - UK Partnership for Crop Nutrient Management - RB209 consortium - supported by levy boards and industry.	Current and Proposed
		Sulphur: revisiting the potential need for sulphur (as a major nutrient) applications as a result of environmental change			
		Micronutrients: Understanding the impact of micronutrient benefits in crop health; provision of recommendations.	4		Current
Root development	Peas and beans	Root development: Ensuring strong and vigorous root development; nodulation for improved N fixation; plant growth	1	Vining peas - the effect of soil phosphate levels on rhizobial population - AHDB-Horticulture FV428	Current
Protein production	Peas and beans	Foliar N applications: Improved protein content.	2		GAP
		Yield and protein content: Relationship between yield and protein; Improved protein content.	2	Protein content versus yield in legumes: releasing the constraint - IUK 101079.	Previous

4. Environmental Change

Environmental change will influence future cropping techniques. Deliver recommendations for growing in a changing environment.

Diffuse pollution	Peas and beans	Contribution of agricultural contribution to diffuse pollution; Improved drainage; Efficient use of nutrients; Precision farming.	1	Improving the availability of UK sourced protein feed through new faba varieties, production and utilisation systems - Optibean - IUK 101082; Identification of critical soil P levels in peas AHDB-Horticulture FV 380; Establishing best practice for determining soil nitrogen supply - AHDB/ Defra project 3425/ LK09128.	Previous
Climate change impact	Peas and beans	N ₂ O emissions; crop residues.	2	Minimising Nitrous Oxide Emissions of Arable Crop Products - AHDB/ Defra project 3474/ LK09128; Improving the availability of UK sourced protein feed through new faba varieties, production and utilisation systems - Optibean - IUK 101082.	Previous
Irrigation	Peas and beans	Effects of irrigation on pod set and yield	3	AHDB-Horticulture fact sheet 02/12 for vining peas - irrigation.	Previous
					GAP for Pulses

5. Legislation updates

To provide relevant information that can be used to impact and promote production and consumption

Use and consumption of pulses	Peas and beans	Review of health benefits; promotion of consumption and use; collaborative approaches.	5	International Year of Pulses collaboration 2016 - FAO; Pulse Crop Genetic Improvement Network - PCGIN - Defra.	Current
CAP reform	Peas and beans	Interpretation and guidance provision;	1		Current

Agro-chemical registration	Peas and beans	Identify and anticipate changes; 1 propose solutions; develop new IPM systems for improved management.	Lure and Kill technology to manage beetle pests of field beans and peas - IUK 101910; Contracts and projects to screen new and novel active ingredients; Contracts and slot trials to identify new active ingredients.	Current
Pollinator strategy and review of benefits to pulses	Peas	Benefits of pollinators; benefits of 2 crops to pollinators; threats and impacts of farming practices.	PhD - Biology and Ecology of <i>Bruchus rufimanus</i> - PGRO/ Newcastle University; Proposed cultural techniques for improved pest management and reduced impact on pollinators.	Current