# THE DUCCOSE MAGAZINE SPRING 2023

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# A race for survival?

We have been plugging the Pea and the Bean YENs on a regular basis for quite some time and I make no apology for this. Developing these YEN programmes with ADAS has been a good learning process. Keen to avoid them being seen as competitions with prizes, we have slowly built them based on their learning potential. We want growers to understand that they will all have different potential yields on their farm and that their objective should be to fulfil their personal potential and keep an eye on where the economic peak might be. This is an entirely different approach to answering the question of who has the biggest – it's perhaps better to liken it to a race. A race against oneself to improve farm performance and profitability. Would it be too dramatic to suggest a race for survival?

# "

# ARE YOU EVER GONNA PUSH ME LET ME RUN AND LET ME DO?

# I NEED IT AND I'M READY AND I HAVEN'T GOT A CLUE

This may now be corny, but it remains very apt. A seed, whatever seed, has a certain genetic potential. The environment into which the seed is placed limits the realisation of that genetic potential. Therefore, the aim of the grower should be to manage the environment in an attempt to limit losses.

The YENs estimate crop potential using models based upon light availability and water use efficiency, recognising that location is important and factoring it in. Growers in different locations with the same seed may have quite different environmentally-limited yield potentials and, no matter what, one may never beat the other, but it does not mean that each cannot improve significantly.



What is far more interesting is for each to ask how near they got to their potential and what is left for personal improvement. By comparing real farm approaches to production, YENs are gradually building an increasingly significant data set that is identifying the critical areas for attention in pea and bean production, indicated by farm-derived data at field scale. This approach will never identify a silver bullet solution for crop production, and we will never be able to produce a definitive guide that declares 'do this and you will grow the perfect crop', simply because situations will always be different. What we are starting to identify are factors that are positively linked to better crop performance, allowing the grower to target maximum effort into minimising environmentally induced losses.

The larger the data sets, the more clarity that will emerge and the more valuable the YEN programme will become in guiding best practice for each participant. Participation in Pea and Bean YENS is an investment in a farm's cropping future; it requires a little time for collecting data and monitoring crops, but in doing so enhances appreciation of what is happening by looking more closely and getting race ready.

# **C** TIME IS RUNNING OUT AND THE ILLUSION FADES AWAY TIME IS RUNNING OUT ANOTHER DAY IS ON IT'S WAY

Will you win your own race?

Roger Vickers, PGRO Chief Executive

Yello - The Race lyrics Songwriters: Dieter Meier / Boris Blank www.youtube.com/watch?v=Y4QbJRAWvRU

# THE PULSE MAGAZINE

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James Maguire, President of Pulses UK



Pulses UK is the trade association which aims to promote the production and consumption of pulses within the UK.

Pulses UK continues to be active promoting pulses to the British public with a growing social media presence as well as attendance at trade shows and school days across the country.

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# DATES FOR THE DIARY

13-14 June Cereals Event in Perlethorpe, Nott www.cerealsevent.co.uk

### 29-30 November

CropTec at Stoneleigh Park, Warks www.croptecshow.com

Look out for the PGRO Field Trials Open Day in early July (date tbc)

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# Trading markets quiet as buyers wait for news on new crop quantities

Pulse trading in the UK has been solid for several weeks, with old crop markets decoupled from wheat markets, and new crop markets slow to get going.

It is likely that the old crop market will remain in this state for a few reasons, not least demand for animal feed being approximately 15% lower due to avian influenza hitting the national flock, and the higher cost of feed which has taken some farmers out of egg production altogether.

The soya price is competitive against old crop beans, so customers are choosing soya as they can guarantee volumes in one purchase.

Large farm stocks will be a negative at the end of the season, however the market is currently inverse – meaning current contracts are better than the new ones on offer – so could carry.

Ex-farm values are around £245/t, depending upon location and likely haulage costs.

A more normal situation would present a premium of perhaps £25 to £40/t over wheat but at present this is reduced to £10-£15/t at

current market values as alternative protein sources are very price competitive at present.

New crop markets are very quiet for feed, consumers haven't bought anything as they are unsure of their demand up stream for product.

A good winter bean area is drilled, and spring sales appear to be strong with warm soils, should mean slightly earlier drilling which will help yield.

Looking at the human consumption bean markets we see little demand from export markets and the premium available is a nominal £10/t over feed. Trading of new crop has been quiet, with the trade quietly awaiting clarification of the old crop position.

Those to sell might be offered a premium of £25/t over November 2023 wheat futures values.

There is a large spread of values in the green pea markets at present; values have a very wide range based upon the quality of the sample, from about £290 -£340/t ex-farm.





Christina Baskerville, Managing Director

Offering a variety of products from chilled to baked goods based on recipes from around the world, all their products are suitable for vegetarians and vegans, contain two to three of your five a day, and are all based on pulses with no wheat or gluten included.

Easy Bean products, including pulsebased crackers, sell very well in the health food sector and are available at various independent retail chains and wholesalers, with their meal pots in particular selling well on the online grocery delivery store Ocado.

Easy Bean started production in 2008 and was set up with the aim of giving pulses the attention they deserve while also trying to help improve the diets of the UK consumer. Having worked on agricultural development projects in Africa and Central and South America - where pulses are an important crop and significant in the diet - Christina Baskerville, Managing Director, felt that the UK could better utilise pulses.

# Meet Easy Bean, the Somerset-based food brand with a penchant for pulses

Based just outside Yeovil in Somerset, Easy Bean is an artisan food brand which is all about natural food based on pulses. The company champions the pulse as a healthy food ingredient and comes up with creative ways for consumers to increase the number of pulses and vegetables in their diet, as well as promoting more sustainable and environmentally conscious ways of eating and making meals.

"At the time pulses were still very much an ingredient that was used predominantly by vegetarians," Christina says. "After conducting my research into market trends in the UK and noting that healthy eating would become very significant, I felt that there was scope to better promote pulses to the UK consumer."

Easy Bean offers a range of pulsebased crackers, which they have been producing since 2018, with some of these products being made from fava beans, green beans, and yellow peas. These crackers are not only tasty, but also high in fibre with no added sugar. UK and imported pulses are used in the company's recipes, including chickpeas imported from Australia, then milled in the UK, and all products are produced in Somerset in the company's on-site, gluten-free bakery and production kitchen.

By using pulses in their products, Easy Bean says it is committed to becoming as sustainable and as

environmentally conscious as it can. Not only does the production of pulse-based products have a low carbon footprint, but the company has also committed to using 100% renewable energy on their site, as well as using more environmentally friendly LED lights and using third-party distributors who are also committing to sustainability.

"The past few years have been tough, but I sense that the trade is keen to get back on track," Christina says. "There's still a desire from the consumer to eat as healthily and sustainably as they can. Pulses and healthy eating is still a growing sector and we still want to be a part of it. We believe that any sector or industry that has pulses involved has a bright future."

"







Stephen Belcher Principal Technical Officer

# Intercropping combining peas and spring beans

At first sight, growing combining peas and spring beans together (intercropping) is a 'no-no'. Why would you do it? Often peas can lodge close to harvest, which puts many people off considering the crop. In recent intercropping

trials, spring beans have been found to provide the

strongest scaffold to prevent combining peas from lodging and make for easier harvesting

# Combining pea and spring bean intercrops have some advantages over pulse/non-pulse intercrops:

- Pea and bean intercrops don't 'mess up' the rotation, both are pulse crops and, as such, stick to the minimum one in five-year rotation. We do not know the impact of a frequent intercrop of pulse/non-pulse rotation on the build-up of pests and diseases. The best advice at present is, if a pulse is involved in an intercrop, stick to the minimum one year in five.
- If crop protection products are used, then the products for combining peas and spring beans are very similar and compatible. In pulse/non-pulse intercrops there is the issue of finding crop protection products (and rates) that are approved on both crops – if they exist.
- If the end-product is for on-farm use, then there is no dilution of protein content unlike with a pulse/non-pulse intercrop.

Of course, there are some difficulties such as a mismatch in maturity. But often there is some convergence of maturity when grown as an intercrop. Variety selection also plays a part, so choose an early-maturing bean with a late-maturing pea. Crop separation (if needed) is another issue as both are large-seeded crops. Pulse/cereal intercrops are easier to separate than combining peas and spring beans.

# Trial results

Since 2018 in PGRO's intercropping trials, mixtures of combining peas and spring beans have been included and the data is summarised in the table and graph opposite.

In an intercrop the yields of the components in the mix are reduced compared to sole cropping. A method to assess any potential benefits of intercropping is to measure productivity using the Land Equivalent Ratio (LER). LER compares the yields of the intercrop mix to the yields of the mix components when grown as sole crops. LER can give a measure of positive and negative interactions between crops. The graph shows all treatments gave an LER >1.0, with highest being 1.33 or 33% increase in land use efficiency.



In a combining pea/spring bean intercrop increasing the proportion of beans lowers the pea yield and lowering the proportion of beans increases the pea yield. If peas are considered the primary crop, then a balance needs to be struck between pea yield and having enough bean plants to support them. To this end in 2021 and 2022 the proportion of peas was raised to 100 plants/ m<sup>2</sup> and the beans lowered to 20 plants/m<sup>2</sup>, a 5:1 ratio. This has proved quite successful in increasing pea yield, while providing a strong scaffold for the peas.

Looking to 2023, trials will continue but will also look at improving the harvestability and yield of vining peas when grown for seed.

Treatment plants/m <sup>2</sup>	Yield t/ha			
(Years)	Pea	Bean	Total	
P70 (18-22)	3.32		*(6.31) 3.15	
SB50 (18-22)		2.99		
P70 SB13 (18-19)	3.50	0.89	4.39	
P70 SB25 (18-19)	2.87	1.49	4.36	
P70 SB50 (18-22)	2.08	2.13	4.21	
P100 SB20 (21-22)	2.51	1.65	4.15	

\*The sum of sole peas and beans is divisible by 2 to be comparable to same unit area as the intercrops



# Downy Mildew control in Beans - an IPM approach

# IPM approaches are usually designed around the IPMpyramid.

For downy mildew the approach should begin at the bottom with the rotation, moving up through variety selection, crop nutrition, the use of growth enhancers, crop monitoring and finally ag-chem intervention

### **1** Rotation

An adequate rotation avoiding over production of beans in a single field promotes good crop hygiene and minimises soil-borne inoculum build up. A rotation of closer than one crop in five should be avoided.

### 2 Variety selection

The PGRO Descriptive List tables rate both spring and winter beans on a scale of 1-9 for downy mildew resistance with 9 being the highest rating. www.pgro.org/ downloads/DL-LIST20223-pdf2.pdf

### **3 Establishment**

Establishing beans in soils with a good, free-draining structure without compaction will encourage deep rooting and rapid establishment. Deeper rooting will help ensure resilience to drier periods, reduce stress and maintain healthy growth.

### 4 Crop nutrition

The Nutrient Management Guide (RB209) for arable crops defines the best practice guidance for bean production https://ahdb.org.uk/knowledge-library/rb209-section-4-arable-crops page 41.

The amounts of phosphate and potash are appropriate to bean yields of 3.5 t/ha. Where yields are likely to be greater or smaller, phosphate and potash applications should be adjusted accordingly. Fertiliser/ nutrients should be applied at or prior to sowing at a depth below the seed to ensure immediate availability to the growing crop.

### **5 Growth enhancers**

Often referred to as biostimulants, these are designed to maintaining plant health. They provide nutrients or stimulation to the plant with the aim of encouraging resilience in the face of biological or environmentally-induced stresses, including stimulating natural resistance to disease. They can be used from establishment throughout the growing season. PGRO has produced a Biostimulants in Legumes summary which can be found in the publications section of www.pgro.org.

Products containing potassium phosphonates (phosphites) are used to manage crop performance in both field beans and combining peas. However, residues of phosphonic acid are regularly detected in crops above the maximum residue levels. A recent publication in

the EFSA journal describes changes made to maximum residue levels in several crops, but legumes are not included (EFSA Journal, September 2020, https://doi. org/10.2903/j.efsa.2020.6240).

As such, there remains a risk that crops may be rejected for use where phosphites have been applied, if they exceed maximum residue levels.

## 6 Crop monitoring

Downy mildew causes greyish-brown, felty growth on the under-surface of the leaves. The disease is favoured by cool, humid conditions. Monitoring the crop will ensure recognition of the presence



Nutrient (kg/ha)	SNS, P or K Index						
	0	1	2	3	4	5	6
Nitrogen (N)	0	0	0	0	0	0	0
Phosphate $(P_2 0_2)$	100	70	40	0	0	0	0
Potash (K <sub>2</sub> 0)	100	70	40 (2-0 20 (2+)	0	0	0	0
Magnesium (Mg0)	100	50	0	0	0	0	0



# Mechanical, physical, cultural, sanitation

and development of disease, and allow assessment of thresholds for intervention. Disease development is monitored annually and regional risk forecasts are available from Crop Monitor. https:// secure.fera.defra.gov.uk/cropmonitor/. https://map.cropmonitor.co.uk/ reports/9520



# 7 Agrochemical control

Metalaxyl-M (SL567A, EAMU 0917/13) is available in field beans to control downy mildew. It should be applied when lesions can be found on about 25% of plants and the crop has started flowering.





Dr Chris Jugde Senior Technical Officer

# Impact of bruchid damaged seed on the subsequent crop

The biggest cost of using infested seed is lower germination rates and associated seed costs

For the past three years we've been running trials to assess the impact of bruchid-damaged seed on the subsequent crop. To do this we have sown trial plots with different ratios of clean and bruchid-damaged seeds. We used bean seed that was either 0%, 10%, 25%, 50%, 75% or 100% infested.

## **Crop performance**

In all three years plots with the more damaged seeds had reduced early growth. This was measured by scanning the plots with an app to measure green leaf area. The differences in green leaf area only lasted until stem extension. The mature crop grown from the clean seed had no measurable phenotypic differences from the beans grown from the most damaged seed.



There was no significant difference in yield between the different levels of seed infestation, in any of the three years.

## Germination and establishment

The target for plant population was 50 plants per square metre. To achieve this, higher seed rates were used for the more infested seed to compensate for reduced germination. The average germination across the three years for the clean seed was 91%. For the most damaged seed it was 69%. This meant that the number of damaged seeds required to hit the target population was much higher.

### **Financial implications**

Seed costs were calculated by using prices from the John Nix Pocketbook alongside the data from our seed testing. The more damaged seed has a reduced thousand seed weight which helps to compensate for the increase in number of seeds required. This meant that the seed cost was only slightly higher for the more infested seed. An estimated income for the treatments was calculated by multiplying the yield data with the average spring bean price from the John Nix Pocketbook (£195 £/t average over 2020-2022). The seed cost was then subtracted from the income calculation to give a margin for each ratio of bruchid in the seed. Spraying and labour costs weren't



factored into this but would have no reason to vary between treatments. The margins created by this calculation don't differ significantly from each other but do trend towards a decreased margin for the lower quality seed. This trendline corresponds to a drop of £58 per tonne from clean to 100% infested. A more practical comparison would be to compare clean seed to a more typical infestation rate of 40%. This would be a loss of £23.20 per tonne.

## Conclusions

When planning this work, we expected to see a large effect on the crop from sowing infested seed. Instead, the only notable impact was on the germination of the beans. While having to sow higher seed rates to achieve the desired population has a financial cost, this may be less than needing to clean or change your seed.





Dr Becky Howard R&D Manager

# Cover crops in peas 2022

Cover crops can provide significant benefits in rotations; retaining and improving the availability of soil nutrients, increasing levels of soil organic matter, protecting and improving soil structure and alleviating compaction, and improving soil moisture activity. Research at PGRO over several years has demonstrated these benefits for vining peas.

The soil-borne pathogens Fusarium solani, Didymella pinodella and Aphanomyces euteiches, cause foot rot infection in peas and subsequent yield loss. Previous work has shown strong benefits of cover crops in reducing soil compaction, which is strongly linked to foot rot infections in peas. However, there have been concerns that the use of legume species such as vetch or clovers in cover crops could harbour and worsen some of the soil-borne diseases that affect peas. Over the past eight years there has been no evidence of this but work in 2022 with HMC Peas has given the first indication that the risk of one soil-borne pathogen, Aphanomyces, may be increased by using vetches in cover crops prior to peas.

A replicated strip trial was conducted at one site in Lincolnshire to evaluate the impact of cover crops including vetch with oat, phacelia with oat and a winter fallow containing no cover crop prior to peas. The trial was evaluated for foot rot soil infection following the cover crop and observed infection in the peas during the pea season. Although this is a single trial in one year, results indicated that the cover crop containing the vetch led to higher levels of *Aphanomyces* in soils compared to the other treatments (Figure 1).

This did not lead to high infection in the pea crop, possibly due to the dry weather in 2022. *Aphanomyces* often requires high levels of soil moisture to infect peas, although it is known to cause damage in dry weather if earlier infection of the crop in wet conditions is possible. In 2022, however, there was little to no rainfall following drilling of the peas.

Aphanomyces causes severe damage to the roots, leading infected plants to wilt and die prematurely and, in wet years, yield loss in peas can be severe. Aphanomyces is an oomycete disease that leaves thick-walled oospores in soils that can survive for years. In the presence of host plant roots, the oospores germinate, and hyphae infect the root. Oospores may also produce sporangia that release mobile zoospores that can detect root exudates and swim through water-filled soil pores to neighbouring plants.

Further work in 2023 is being undertaken to evaluate the effects of other host species on *Aphanomyces* levels in soils and infection in peas.





Healthy roots







Jake Moscrop PHD Student

# Strategies to optimise pollination of the UK field bean crop

For the past four years Jake Moscrop has been carrying out his PhD in collaboration with the University of Cambridge NIAB, and PGRO. His research has sought to identify previously unexplored variation in floral traits of *V. faba* lines, test the effect of *V. faba* floral trait variation on bee attraction in field conditions, and study whether increased bee visitation due to floral trait differences can enhance *V. faba* yield. Jakes research has also investigated which floral traits are likely to be most important in bee attraction.

Faba beans are an important legume crop in the UK, valued for their protein content and nitrogen fixation. However, the crop is infamous for variable yield. As well as sensitivity to environmental conditions, the dependence of faba beans on insect pollination may be a significant factor contributing to yield instability.

At the same time, as we are growing more crops globally and using more land for agriculture, we are also observing persistent declines in both the abundance and diversity of pollinating insects. One reaction to this news might be that we should develop faba bean lines which are better at self-pollinating, which removes the need for pollinators. The alternative is to consider how we can ensure faba bean crops are adequately pollinated. With fewer bees around, we need to ensure that the lines we grow are as attractive as possible to the remaining pollinators. In addition, to support wild pollinators we need to make sure that the flowers of faba beans are as rewarding as possible. By growing faba bean lines which provide useful resources for bees, in combination with good management practices, we can help to support bee populations, which ultimately benefits the crop.

# Findings

Jake's work has identified substantial variation between lines of *V. faba* in flower morphology, nectar volume and sugar concentration, pollen production, flower colour and patterning, flower opening force and the number of flowers produced by plants. In summary, of the lines examined, Maris Bead produced the highest nectar sugar content per flower (49.00 % weight by weight), alongside Vertigo (42.03 %) and Lynx (39.03 %). Tundra had the largest number of flowers per node on average (9.4), alongside Fuego (7.6), Tiffany, Fanfare, LG cartouche and Maris Bead (all 7.5). Maris Bead had the most intensely-coloured purple flowers, in contrast to most other lines which have white flowers with varying degrees of pink colouration. The results suggest that some lines provide more floral resources and may be more attractive to bees than others. Therefore, one could hypothesise that lines which score highly for the floral traits examined should attract more bees than those which score poorly.

When selected *V. faba* lines showing extremes of floral trait variation were grown in field trials, bees present in the environment preferred lines with more flowers and greater nectar sugar content, particularly the lines of Maris Bead and Lynx. Bees showed consistency in preference between years (2021 and 2022) and location (Lincolnshire and Cambridgeshire). In general, carder bees and white-tailed bumblebees have greater potential as pollinators of the crop, as they perform more "legitimate" flower visits, entering the front of the flower. Red-tailed bumblebees and honeybees may be less effective pollinators, as they perform more "nectar-robbing", chewing holes in the flower to remove nectar, and visit extra-floral nectaries on the plant stipules.

During field trials, Jake also tested the effect of pollinator exclusion on yield of different *V. faba* lines. Exclusion of pollinators had a negative effect on faba bean yield compared to open pollination for the majority of lines tested in both 2021 and 2022. However, the size of yield difference varied greatly between lines. The largest yield difference between open pollination and pollinator exclusion was for Maris Bead in 2022 (79.5 %), Yukon in 2022 (53.6 %) and Tiffany in 2022 (39.1 %).

Following field trials, the effect of specific floral traits on bee behaviour was examined in controlled conditions to examine bee behaviour in response to differences in standard petal appearance and colour, wing petal spot size, and flower scent.

In controlled conditions Bombus terrestris worker bees showed

innate preference for models representing standard petals of the *V. faba* line Maris Bead over those representing NV129. Similarly, they showed innate preference for models representing standard petal vein colour of the *V. faba* line Maris Bead (purple) over those representing NV129 (yellow). *B. terrestris* workers also showed preference for the scent of Maris Bead flowers over those of NV129. Together these results suggest that colour and scent may provide strong foraging cues when *B. terrestris* workers forage on *V. faba* flowers and partly explain the bee preferences observed in the field.

*B. terrestris* workers also showed ability to distinguish between extremes of trait

variation for petal background colour and wing petal spot size, suggesting that these traits can influence bee behaviour, when paired with a good nectar reward.

# Conclusions

This study has demonstrated for the first time that differences in floral traits can influence bee attraction and affect yield. Research identified flower colour, nectar content, flower number and scent as promising floral traits which should be explored further. In the future, the information gathered by this study can be used to select lines which better support wild pollinators and are likely to have stable yield in environments where pollinators are





present. Equally, this information provides a starting point for breeders to consider floral traits as a means of improving yield and developing lines which are more beneficial and attractive to bees.

The future of agriculture needs to work more closely with nature, in contrast to industrial methods which degrade the environment. This mindset can be applied not only to the techniques we use, but also the crops we grow. By making use of *Vicia faba* floral traits we can better support pollinators, ensure good pollination of the crop and produce more sustainable food.



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Roger Vickers PGRO Chief Executive

# Achieving a seed's full potential

While the pea YEN has been running slightly longer than the YEN for beans, the data for both has been accumulating effectively from 2019. With four years of entries behind them, each YEN programme is now close to, or has exceeded, the magic 100 crops – the point at which more in-depth analytical tools such as REML can be used to reveal trends. Although it must be stressed that while trends and associations can be identified it cannot be assumed that there is always a cause and effect relationship, this analysis will start to drive opportunity for more targeted approaches to crop improvement.

Restricted Maximum Likelihood (REML) analysis is a particular form of estimation that does not base estimates on a maximum likelihood fit of all the information, but instead uses the probability of random variation calculated from a transformed set of data. It is generally accepted that in order to perform this kind of analysis with a real meaning the data set must be of a certain minimum size.

The trends of two variables in a data set may appear to be linked but it is entirely possible that they are unrelated. For example, it cannot be assumed that freedom from disease is directly linked to the frequency of fungicide use, although it can be assumed that yield might be linked



# Crop development & agronomy associations

Higher yields with earlier sowing

• Later senescence & longer season length for spring beans

 Low sample size for winter beans but similar trends

Good pest and disease control, higher yields

Higher yields with fungicide use but not with insecticide use

Bruchid damage negatively linked to yield More likely linked to higher May temperatures than insect damage.

Average harvest losses in 2022 0.25 t/ha.

to freedom from disease and, while fungicides are useful in achieving a disease-free crop, they are not the only determining factor.

As we have previously written in this publication, the true value of the YEN programmes will increase as the data sets increase through greater grower participation. It would be fantastic if 100 crops of peas and of beans could be tracked through YEN each year!

YEN

Bean YEN



For now, however, real milestones have been reached. Over the weeks ahead the data set will be analysed in even more detail and it is anticipated that we will be able to report with even more confidence on the trends in field crop analysis in the future. Understanding of the real crop factor relationships will lead to guidance for interventions to improve pea and bean crop production. Individual participants have already received their bespoke in-depth report about their cropping for last season, sharing anonymously and comparing their metrics to others in the programme, delivering insight for improvement.

The indicative factors highlighted on these pages are from examination of the four-year data set.

Potential yield on any site is determined using an ADAS model, based upon capture of available light and moisture availability, assuming a theoretically 'perfect' variety grown with 'inspired' husbandry, achieving either:

(i) 60% capture of light energy through the season, and its conversion to 1.4 tonnes of biomass per terajoule, or

(ii) Capture of all the available water held in the soil to 1.5 m depth (or to rock if less) plus all rainfall from April to July, and conversion of each 20 mm into a tonne of biomass per hectare.



# **Yield Component associations**

Higher yields positively associated with:

- Pods/shoot, seeds/m<sup>2</sup>, plant height,
- Individual shoot biomass, crop biomass
- Harvest Index & thousand seed
  weight
- Higher plant population increased yields in non-marrowfats

High yields coming from large well podded plants

Pea YEN

- Maximise light capture & avoid stress through flowering to increase sink size
- Seed filling important for seed size
  - Avoiding stress during seed fill and maximising canopy duration

Clearly year on year and site by site yield biophysical potential will vary, but typically the modelled pea yield potential is over 8t/ha and bean yield potential over 13t/ha.

Nothing can be done to influence available light nor without irrigation, rainfall. So other factors must be addressed to ensure that the maximum light and moisture are captured. Identification, measurement, analysing and discovering how to beneficially influence over 70 of these factors for improved crop performance are the goal of YEN.

To participate in either the Pea or the Bean YEN for crop 2023 register here: www.yen.adas.co.uk/networks-

# projects.

While the value of the testing included in the programme more than covers the financial cost of entry, subsidised places and sponsorship for free participation are available on a first come first served basis.



There are many different varieties grown and the overall sample is too small to make individual variety judgements. However, ADAS data from other much larger longer running YEN programmes shows how little variety contributes to yield performance variability in comparison to other factors. This is not to denigrate the importance of varieties or their traits which carry huge importance for growers but highlights perhaps more how critical husbandry is in achieving the full potential in every seed.



YEN

# New YEN 'ideotype' for Beans... from 2019-2021 harvest

# Average YEN yield % t/ha

- Best yields 8 t/ha (winter), 7.2 t/ha (spring)
- High yields in both W & S Beans rate positively to later growth
- Plant height, biomass / shoot
- seeds / pod. thousand seed weight
- harvest index and total straw biomass (t/ha)

### So... our new Bean Yen ideotype has:

- Tall multi-noded stems
- Prolonged canopy survival
- Deep roots

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The Pea & Bean YEN wouldn't exist without it's sponsors:





# Summer events for pulse growers to attend

While the winter period has seen the team consolidating the results of the 2022 harvest, preparing for the new season and engaging in significant knowledge transfer engagements, the approaching spring will bring with it the return to a clear focus on advisory work and the 2023 crop trials.

Events will take a back step until nearer to harvest when, as usual, PGRO will exhibit at Cereals (at its new location near Mansfield on 13 and 14 June) and the PGRO pulses field trials open day in Stubton.

Our pulses field trials open day presents a unique opportunity to visit the PGRO trials at a time when the research is marked up for visitors, with the researchers responsible for the trials on hand to take you through the whys and the wherefores of the trialling process.

The many trials in progress will include, but not exclusively; herbicide screening, pest and disease control, variety trials, intercropping comparisons, lentil variety and agronomy practices trials, pest monitoring and trapping, and biostimulant evaluations. While the actual date is still yet to be confirmed, it will likely take place during the first week in July; it will be published online and sent out via email in PGRO newsletters and updates.

If you wish to keep up with PGRO activities, receive technical crop bulletins, agronomy alerts, market updates and general PGRO activity roundups, you can receive them directly to your inbox.

Simply email info@pgro.org and ask to be included in the email list. Your address will not be shared.



# KWS GOTHAM Bats above the competition

- New to the Descriptive List for 2023!
- High yielding at 107%
- Superb protein content 22.1

KWS Gotham is our new high yielding variety added to the Descriptive List for 2023. Offering excellent yields at 107% and superb protein content coupled with a strong agronomic package.



SEEDING THE FUTURE SINCE 1856



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# The Resilience Roadshow

Developments in spray applications to strengthen environmental profile

Syngenta has launched both physical and digital products to help protect the environment and boost resilience on farm.

Speaking at the Resilience and Ready roadshow event held jointly by Syngenta and PGRO, Simon Jackson from Syngena said the company has created grower-focused solutions to help farmers meet the challenges they face while promoting best use and best practice.

As well as taking part in an industry-wide initiative to move towards close transfer, Syngenta has developed a new 90% drift reduction nozzle and launched a new app to help ensure farmers are spraying at the right time.

The industry initiative has developed the Easyconnect closed transfer system: a cap which will be fitted on cans produced by all the major manufacturers.

"Easyconnect is a resealable and leakproof system," Simon says.

It consists of two components: a unique screw cap that will be pre-fitted on containers and a coupler.

"This approach ensures the best convenience and fastest emptying and rinsing," Simon adds. "It also significantly reduces operator exposure and environmental risks from splashing or spilling."

Syngenta has also launched a 90% drift reduction nozzle, which is the culmination of 15 years' worth of development.

"Syngenta has a long history of nozzle work," Simon says. "We've

gone from 25% drift reduction to introducing 90% drift reduction and this is great news because we're putting product exactly where it needs to be.

"It's great to reduce drift but we also need to make sure that what we're applying still works really well."

Simon says that the type of nozzle used when spraying is essential for making sure the product lands where it is most needed.

"When we look at a product and how well it works about half of it comes down to what's in the can – the adjuvants, the product itself, etc. The other half is mechanical and obviously weather has an influence. And we often talk about nozzles as being fine tuning but they can actually have an effect on the parts of the other 50%," Simon says.

The new 3D Ninety nozzle is 90% drift reduction, which is stable over a wide range of pressure up to five bar.

'We've done a number of trials to check the efficacy and even with a 90% reduction it was still good."

Another key part of product application to consider is timing. Syngenta has developed a free app to help operators spray at the optimal time, plan their workload and select the most appropriate application techniques on-the-fly.

"Spray Assist will give you a five-day forecast and it will tell you when the ideal spraying opportunities will be over those five days with a much bigger breakdown for that day," Simon says.

# All presentations from The Resilience Roadshow, are now available to watch on YouTube.



Aimee Fowkes, Virology Senior Scientist at FERA, examined the surveillance of virus disease in UK pea crops.



Simon Jackson, Syngenta's Field Technical Manager presenting the information on this page.



Leah Howells, Data Scientist at PGRO, talked about estimating maturity and yield for vining pea crops.



Dr Chris Judge, PGRO Senior Technical Manager, outlined how the organisation evaluates pulse varieties.



Dr Becky Howard,

PGRO's Research and Development Manager spoke about beetle management and IPM in pulses, outlining the work currently being carried out by the organisation and what it hopes to do in the future.











# Three new spring bean varieties added to Descriptive List after gaining National Listing

The Processors and Grower Research Organisation (PGRO) has added three new varieties to its 2023 Descriptive List.

The varieties were absent from the list at its official launch in November while the breeding companies waited for UK National List status to be granted.

These three new varieties of spring bean – Genius, LG Stego, and Futura – went through the same PGRO trials at the same time as the other varieties on the Descriptive List.

Genius, from LS Plant Breeding, is now the top yielding variety on the Descriptive List with a yield of 110%. It has the same maturity as Lynx (6) and a good standing ability (8). LG Stego, from Limagrain, has a yield of 106%, which is the third highest yield on the Descriptive List. It has an earlier maturity (7) than Genius and Lynx (both 6), and has a good standing ability, similarly to Genius (8).

Futura, from LS Plant Breeding, has a good yield of 106% and is a new low vicine and low convicine variety (LVC). This adds an extra adding an extra LVC option to the list alongside Victus. It has the same maturity as LG Stego (7) and is a tall variety at 111cm with a good standing ability (8).

"The Descriptive List is a fantastic tool, giving growers the opportunity to compare different varieties and evaluate which will suit their situation," said Dr Christopher Judge, PGRO Senior Technical Officer. The 2023 Descriptive List can be found at www.pgro.org.

PGR



Watch Dr Chris Judge present the 2023 Descriptive List on YouTube

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Will Evans PGRO Technical Officer

# Lentil production in the UK

Stubton

Nottingham Derby

Leicester

M1

Peterborough

Since 2020, PGRO has been conducting lentil production trials to establish the viability of production in the UK and identify varieties of interest.

Initial findings were summarised in a report in the summer edition of this magazine in 2022. [www.graphicgeneweb. co.uk/pulse-summer-2022/PULSE-SUMMER-2022flipbook.html page 14.] This report combines the results from three years' of trials at Stubton, Nr Newark, Notts. The soil type at this site is Sandy Loam with pH around 7.6, organic matter content around 4 -5%, P & K indexes 1-2.

Over three years, very different growing seasons have been experienced serving fair representation of a variable climate. 2020 was relatively benign and a 'normal season', mostly mild during spring and summer with little water or heat stress. 2021 crops were significantly stressed and much wetter by comparison, accompanied by some hotter spells in early summer. 2022 was unusually dry, with record breaking high temperatures in early summer and very early crop senescence.

Three very different seasons with very

different outcomes, variation serving to emphasise the need for multiple trial seasons to gain a true impression of expectations and consistency.

Activity	2020	2021	2022
Drilling	3 April	13 April	19 April
Harvest	2 September	2 September	4 August
Season Length	152 days	142 days	107 days



# Yields

Each year establishment has been rapid and the target of 120 plants/sqm has been achieved easily. 2020 was the highest yielding year, averaging around 3t/ha, reflecting the lack of stress conditions. 2021 was particularly poor with average yield almost decreasing by half to 1.8t/ha, mainly caused by significant weed pressure and unsettled weather throughout spring and summer. The 2022 average yield returned at 2.4t/ha, the three-year average. Yields probably did not reach their full potential due to the extreme heat and extraordinarily rapidly senescence in the summer. Summarising the three years to date we can conclude prospects of promising yields, significantly above the likely profitability threshold of 0.8t/ha can be reasonably expected.



## Varieties

In total 21 varieties have been evaluated, mainly selected from Canadian sources, selected for suitability for the site latitude. A small number of commercial varieties used in Europe have also been included. The performance of the best variety by colour/size type is shown in the table below (the varieties are not named).

The mean yields for selected varieties are shown below, as well as the mean for each year for all varieties at the bottom of the table.

Туре	Size	Yield (2020)	Yield (2021)	Yield (2022)	Mean (Variety)
Black	Small	3.63	1.48	1.93	2.34
Brown	Small	1.33	1.12	2.66	1.70
Red	Small	4.19	1.94	3.15	3.09
Mottle Green	Small	4.00	2.15	2.72	2.96
Green	Small	4.06	2.01	2.60	2.89
Green	Large	2.20	1.32	2.15	1.89
Green	Medium	1.93	1.37	2.11	1.80
		3.02	1.68	2 4 2	

Yields for selected varieties from 2020-2022

Brown

Mean yields for every variety over 3 years



The differences in yield between varieties was significant. The three-year data shows that red lentils have the most consistent performance. Green lentils were less consistent but a mottled green and a light green had three years averages nearing 3t/ha.

Although 2021 was a tough season for growing, it does give us the oppurtunity to show how varieties perform under stressful conditions, particulary weed pressure. The two best-performing varieties of that year were consistently high performers in the trial series.

### Ground coverage and maturity

Ground cover (particularly important with the lack of approved herbicides in the UK) and earliness of senescence were also scored and in general it has been observed that varieties with better ground cover and early maturity yielded best in our trials.

### Summary

the UK.

Most varieties performed relatively well over the three years with the red lentils showing good consistency across each variety. However, while there may be a market for UK-grown red or brown lentils, they tend to have the least flavour and as commercial commodities are less valuable than other coloured types. With this in mind, the mottled green seems like the standout variety of the trials with very attractive appearance, high yields, good resistance to weed pressures and a medium maturity rating.

With the aim of establishing practices for consistency in yield performance and economic validity, PGRO will now reduce the number of lines in trial. We will focus on the evaluation of agronomic factors such as weed, pest, disease control, establishment and nutrient trials, in order to develop an agronomy advice package for lentil production in



# **MOLECULAR TESTING SERVICE**

PGRO offer rapid molecular testing services for the detection and identification and risk level evaluation of soil borne diseases



# NEMATODE ASSESSMENT

Species tested: Ditylenchus dipsaci, Ditylenchus gigas



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# Molecular Test: presence & identification from soil

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Peterborough, PE8 6HJ

The Research Station, Great North Road,

### Sample - 2 kg of soil

POTATO

> 20 random field locations

NOINO

- 5 to 25cm depth
- After rainfall

## **Management approaches**

- Early detection Seed, bulb and soil testing
- Rotational lengthening
  - population management



• Detects nematodes at low levels

130

- Risk assessment of infestation
- Specific management practice
- Improve crop performance

Weed growth control

- **Equipment sanitation**
- **Chemical treatments**

# **CLUB ROOT TESTING**

Vegetable brassicas and oilseed rape



Source: University of Worceste

# Molecular Test: detection & quantification from soil

Sample - 1 kg of soil

- > 20 random field locations
- 5 to 25 cm depth

### Management approaches

- **Early detection** Soil testing
- - **Rotational lengthening** population management

Outcomes

- Spore numbers per gram soil
- Rotation planning aid
- Improve crop performance



**E** 3 **Chemical treatments** 

Contact us 01780 782585 info@pgro.org



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