

The Pulse magazine



Official Journal of the PGRO

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PGRO - THE UK'S CENTRE OF EXCELLENCE *for peas and beans*

"PGRO is a non statutory levy body which is the UK's centre of excellence for peas and beans. It has a long history and a well-earned reputation for stability and consistency - along with a track record of providing authoritative, up to date information and project work based on solid, reliable research.



"It is one of the few independent, applied research organisations easily accessible to its levy payers and merchant members for sound, up to the minute advice on all aspects of growing and processing pulse and vegetable legume crops. Indeed, it is one of the few applied research facilities left in the UK that is supported by growers.

"The voluntary levy contribution paid to PGRO funds a substantial amount of work that benefits growers – and all involved with pulse crops. This includes the PGRO Recommended Lists, crop protection and general agronomy trials, and a wide range of other near market research. It also funds the knowledge transfer events which our staff organise and attend for the benefit of levy payers every year.

"For the future, the PGRO aims to maintain and develop its longstanding role at the forefront of keeping pulses as one of the mainstays of UK agriculture - to the benefit of growers and consumers alike."

Roger Vickers, Chief Executive



ADVICE TO GROWERS

A key part of PGRO work is our advice to growers. For example, PGRO offers a plant clinic where samples of seed or plants affected by pests, diseases, disorders or other problems may be submitted for diagnosis and, wherever necessary, members of staff will carry out investigations in the field.

PGRO also provides education and training courses and runs grower/ agronomist meetings around the UK, with our annual series of Roadshows providing the opportunity to hear PGRO and outside experts give presentations on the latest information at venues round the country.

Monitoring and forecasting systems are available to members for some pests and diseases. A pea moth spray forecasting

system and a risk prediction scheme for downy mildew in spring beans, based on weather factors and data from in-season crop monitoring are available to members.

Our personal service is augmented by our publications which are an authoritative source of advice and information to growers and others. In addition to the annual Pulse Agronomy Guide, PGRO publishes three issues of the Pulse Magazine, one issue of the Vegetable Magazine, Crop Updates during the growing season and Technical Updates providing information about pest, disease, disorders and weed control as well as services and other disorders.

RESEARCH PROGRAMMES



Applied research in all aspects of pulses and vegetable legume production is a key activity of PGRO and undertaken on a national basis.

Our research and development programme for both pulse and vegetable legumes is reviewed annually by expert representatives from all sides of the industry, with input from PGRO staff.

Most of the research is undertaken through field trials and experimentation and about half of these are conducted at the PGRO's facilities and trial ground at Thornhaugh, near Stamford. The remainder is located in the main production areas to take

into account differences in climate and soil types and pest or disease pressure.

The work is mainly funded by the crop levies but additional research projects are undertaken with grants from Defra, BBSRC, AHDB-HDC, EU and others. Most studies are undertaken by PGRO's own team of technical staff, whilst others are contracted to appropriate bodies.

Results of the research are freely available to levy payers and associate members, and an additional service is the provision of advice which is given by the PGRO technical team responsible for the R & D programme.



PGRO Demonstration Day, Tuesday 1st July 2014

**Stockbridge Technology Centre, Cawood,
Nr Selby, North Yorkshire. YO8 3TZ**

For a number of years PGRO has held open days for vining peas and for pulses during late spring/ early summer at our Thornhaugh Headquarters and

Research Station where the team has opened up the trials taking place on site for inspection, combining this with presentations and technical input. However, because of the nature of the site and its geographic location, not all the trials are duplicated at Thornhaugh, hence not everything that PGRO conducts is visible in any one year.

We have decided that this year it is time for a change to enable growers and advisors to see varieties in a different location and on a different soil type. So, we have taken advantage of the opportunity to use a site in the Vale of York where the PGRO Demonstration Day 2014 will combine both the vining pea and pulse open days into a single event.

A wide range of varieties will be on display, together with demonstration agronomy trials, selected relevant guest exhibitors, and the usual technical agronomy and research presentations with cropping updates.

The objective is to give growers, potential growers, agronomists and advisors the opportunity to brush up on the technical aspects of growing - and to give personal contact with the PGRO technical team.

Full details will be published on the PGRO web site, in the press and elsewhere as the date nears. We will also be at Cereals 2014, Duxford, Cambridge on Wednesday 11 and Thursday 12 June.

Book both events in your diary - we look forward to welcoming you!



Stuff of Nonsense ...

**“Half a pound of tuppenny rice,
half a pound of treacle.
That’s the way the money goes,
Pop! goes the weasel.”**

I have no idea what that means and it seems, nor does anyone else. Nonsense words added to a popular dance tune way back in the 1850’s. There are of course all manner of interpretations around the origin of the lyrics but none of them have any substance and indeed many of the theories are known to be or can be proven completely false. Depending upon where you are the words to the tune are different or have evolved a number of verses. In London they preferred the words

**“Up and down the city road,
in and out the eagle.
That’s the way the money goes,
Pop! Goes the weasel.”**

Then of course the nonsense spread and evolved, by 1901 in the USA they were singing about a possum gallivanting around a chicken coup but the poor old weasel was still getting a towelling.

**“All around the chicken coop,
The possum chased the weasel**

By 1914 the possum had changed and the pesky varmint had a new enemy.

**“All around the Mulberry Bush,
The monkey chased the weasel.**

The monkey stopped to pull up his sock,
Pop! goes the weasel.”

Then of course there developed numerous contemporary verses where the chasing of the weasel gets dropped altogether but it (the weasel) still goes pop in the end.

**“Jimmy’s got the whooping cough
And Timmy’s got the measles
That’s the way the story goes Pop! goes the weasel.”**

Since the words have no known meaning and the lyrics are changed to suit the dance leader, the one constant, the one thing that we are certain of is that the poor old weasel gets it every time.

Out of all this nonsense comes the theme that we should beware. Information purporting to be factual may often be fiction or simply changed to suit local circumstances customs or flavours.

PGRO is of course an interested party when it comes to the economics of growing pulse crops. We work with and alongside pulse growers year in year out and desire nothing more than for the benefits of pulse crops to be properly represented and for their popularity as crops of choice to expand. You would expect us therefore to be strong supporters.

The economics of crop production are regularly analysed in terms of their gross margin output. Everyone knows that Gross Margins of each crop are not the only way to review the economics of

an enterprise but they are widely quoted and often debated. In recent times there have been various publications that have discussed the economics of peas and beans - few if any of them make any attempt to credit the preceding pulse crop with any of the resulting benefit reaped by its successor and frequently they use lower end yield estimates and out of date market prices. As a result pulses are treated like the weasel- chased and popped at the end. It is the stuff of nonsense.

In reality, rotations benefit enormously from incorporating a variety of crops and cropping regimes. The soil is better managed as a result the work load is spread over a wider period, the weed control opportunities for ALL crops are improved and the profitability of the whole enterprise viewed over time is enhanced and made more sustainable.

Prices for pulses remain historically high and there is continued strong market demand for UK produced peas and beans. Growers who are paying attention to pulses are making very good money and significantly adding to the viability of their whole enterprise by making pulse crops an integral part of their crop rotations.

I hope that you enjoy this edition of Pulse Magazine and find it informative. Apart from of course the start of this editorial you will find it a nonsense-free zone.

Roger Vickers, Chief Executive



PGRO Chairman Stephen Frances is pictured here at presentation to Jim Scrimshaw (above right) who has completed 25 years continuous service



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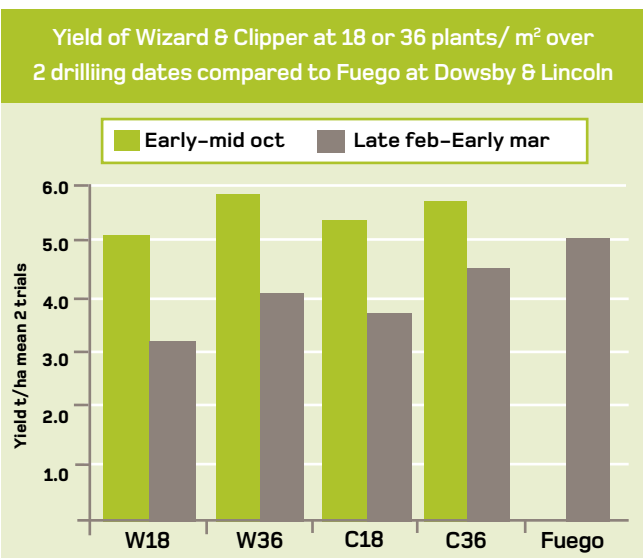
STEPHEN BELCHER

With the tough autumn of 2012, planting winter beans in the spring became an option. Stephen Belcher describes how the resulting crops fared.

“Weatherwise, the autumn of 2012 was an awful time for field work and many winter bean crops were not planted. With growers having seed in the barn (either bought or saved) the inevitable questions were asked: can I plant winter beans in the spring? What is the likely yield? And how late will they be to harvest?”

A small amount of previous trials work indicated that they could be grown when planted in the spring, but to treat them as spring bean, increasing the plant population to more like that of spring beans (typically 40 plants/m²).

Of course, PGRO winter bean trials suffered the same fate as commercial plantings and this gave an opportunity to gather some concrete data. As part of the Optibeau project, winter beans Wizard and Clipper were sown at 3 sites, at 4 populations, and at 3 sowing dates. A summary of data is presented here, from the sites at Dowsby, Lincoln and Thorney.



Main conclusions

- On average winter beans Wizard and Clipper sown in the spring at 18 plants/m² gave a 34% yield reduction compared to autumn sowings at the same population.
- This yield reduction was lowered to 18% on average by planting 36 plants /m² in the spring compared to 18 plants/m² in the autumn.
- Spring sown winter beans at 36 plants/m² did not match the yield of spring sown Fuego. With Wizard and Clipper yielding 83% and 90% of Fuego respectively.
- Autumn sown Wizard and Clipper at 18 plants/m² yielded as well as or a little better than spring sown Fuego.
- End February sown Wizard matured 12 days later than Mid-October drilled Wizard and 7 days later than late October drilled Wizard.
- End February sown Wizard matured 8 days later than early March sown Fuego.

So, winter beans sown in the spring were not a disaster, even at 18 plants/m². Maturity is, however, later by 7-12 days for Wizard. It must be remembered that 2013 was a late season for most crops, by about 10-14 days. The lateness of the season benefited autumn crops sown in the spring and indeed late sown spring crops too. Autumn 2013 was heading the same way as autumn 2012, but thankfully a drier two weeks at the beginning of December allowed us to get all the autumn plantings in.

Sowing and harvest dates at Thorney

Sowing date	Harvest date		
	Wizard	Clipper	Fuego
10/10/2012	24-Aug	03-Sep	-
26/10/2012	29-Aug	08-Sep	-
28/02/2013	05-Sep	08-Sep	-
06/03/2013	-	-	28-Aug

Andy Bury, President of BEPA (British Edible Pulse Association) looks forward to markets in 2014

The new crop bean market prospects are looking very bright with a strong demand pull from Egypt being the main market driver again for 2014/15. The open autumn allowed much better planting conditions for winter beans and in all areas the crops are looking very well having come through a relatively mild winter. We expect to see the area of winter beans back up to previous levels of 2012 and currently no adverse yield concerns.



ANDY BURY

Certainly the spring bean acreage will be lower this year following the big autumn plantings of wheat and OSR. We expect to see the planted acreage down from 90,000 Ha in 2013 to 72,000 Ha this year and if we use a 5 year average yield this should give a total UK crop of about 350,000 tonnes down from 450,000 tonnes this year.

The market values have taken the lower crop into account, with new crop feed beans currently trading over £200/t in many parts of the country. This represents a premium of £+65/t over feed wheat which is a historically high level.

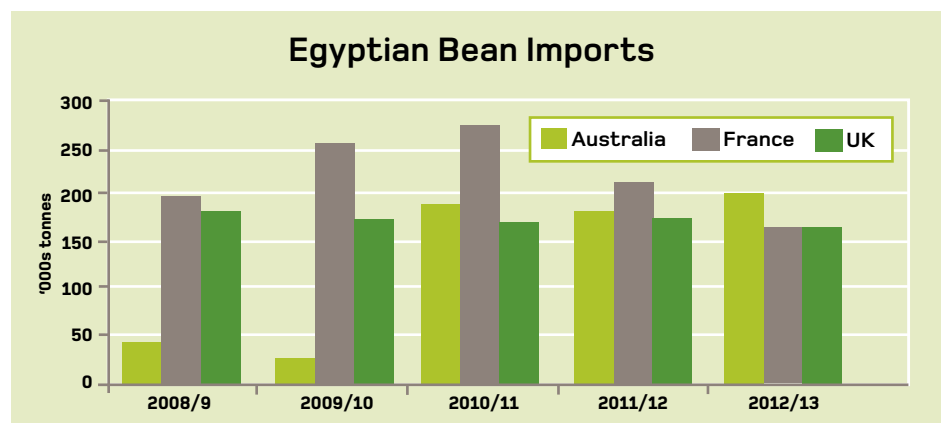
On top of this feed base, new crop human consumption premiums are already trading at over £25/t. Values from here will depend on currency and quality and quantity of both French and UK beans but, unlike

other crops, it's a really positive outlook.

At values of £350/t for new crop marrowfat contracts, peas are already at the top of the gross margin league table. It is likely that as we head towards new crop the market will be hungry to see the first samples as there will be no carryover again this year.

Large blue peas will also be required by both the processors and the micronisers, although with values £30-50 lower than marrowfats.

As usual, the market will be driven by yield and quality and it will be extremely important that growers do all they can to protect quality as feed levels will be trading closer to feed bean values.



The General Assembly of the UN in New York has declared 2016 as the 'International Year of Pulses'

Pulses have been the cornerstone of global nutrition for centuries. Having a UN dedicated year will raise the level of awareness of pulses and the important role they can play in health and nutrition, food security and environmental sustainability.

Today, the UK is one of the world's leading producers and exporters of faba beans and marrowfat peas, as well as the world's biggest importers of white beans which are manufactured into iconic Baked Beans in tomato sauce. Chickpeas are a main ingredient in Hummus which has become a

popular and healthy snack food in the UK, while stews and soups made with Lentils provide warming and nourishing winter foods.

The idea of a year dedicated to recognizing the role of pulses in sustainable agriculture and healthy diets was conceived by Hakan Bahceci, chairman of CICILS, the International Pulse Trade and Industries Confederation. "This is the greatest opportunity in a century to give pulses the attention they deserve. Pulses can help to increase food security for those with shortages

and to tackle the increase of diseases linked to lifestyles such as obesity and diabetes. Plus, they improve cropping systems and are good for farmers."

A series of national committees are being established around the world to work with their governments, farmers, NGOs, retailers, food manufacturers, health & science organizations and UN bodies to make 2016 a success globally and in each country.

There will be more about the 'International Year of Pulses' in future issues of The Pulse Magazine as 2016 nears!

Jim Scrimshaw looks at the place of spring sown crops in the battle to control blackgrass.

"If you looked through the farming press last autumn, you will have noticed that the 2014 season potentially offers the best opportunity to control blackgrass (*Alopecurus myosuroides*) we've had for six or seven years. Why is that?"



JIM SCRIMSHAW



Blackgrass in autumn sown crops is a continuing problem

From blackgrass seed collected from 200+ indicator farms, germination was 54% compared to nothing above 37% since 2006. This indicated low dormancy – and in low dormancy seasons with adequate moisture, delaying drilling by three weeks should mean a significant increase in the amount of blackgrass which emerges that can be sprayed off. Soil moisture will help the residual pre-emergence herbicides work better

Work at Rothamsted has indicated that, although there can be a yield penalty, on average this approach can help reduce the blackgrass population by 30%. This can be a gamble - in autumn 2012, some who delayed drilling were then delayed into the spring - or drilling was abandoned altogether because of the very wet weather throughout much of the autumn.

This and other cultural techniques, along with chemical control, all have to be considered in the battle against blackgrass. Growers cannot rely on chemical control alone. Chemical control can cost you in excess of £120/ha but may only deliver 20-30% control. Products, particularly post-em, are failing and some level of resistance in some situations may exist to several of the pre-emergence products. There is nothing from a chemical perspective that is going to solve this problem any time soon. Back in 1990, work at Rothamsted suggested that one seed would produce 4 heads - now up to 15

heads are being seen with each head producing up to 200 seeds. The situation is not getting any better and cases of resistance are increasing. It is now said to be present on over 16,000 farms in the UK.

The nature of our rotations and that they predominantly include autumn sown crops is a major reason why blackgrass is a problem. Around 3 million hectares of the 4.3 million hectares of arable land in the UK is sown in the autumn. 70-80% of blackgrass germination happens in the autumn, hence we see more of a problem in these crops than spring-drilled. Re-thinking rotations can significantly help when combatting blackgrass and also brings other benefits.

Including a spring sown crop – such as peas and beans - in the rotation is likely to be the most beneficial single element in the battle against blackgrass. Rothamsted work suggests that, on average, spring cropping achieves 88% control of blackgrass. A spring sown crop will not always be feasible as the heavier, moisture-retentive land associated with blackgrass may be difficult to work effectively in the spring and herbicides to continue the blackgrass fight may be limited. However, between them, peas and beans do have the active ingredients prosulfocarb, triallate and pendemethalin approved which are used in cereal herbicide programs. There are also post-emergence graminicides with activity, however, these should not be relied upon for control as there may be resistance issues in some situations.

Blackgrass seeds generally germinate from the top 5cm of soil and are not particularly robust. Hence, good ploughing can reduce the seed bank by around 70% and is particularly useful if seed returns have been high in the previous season. Historical knowledge, seed returns, previous cultivations, and any drainage issues can help build up a picture of the seed bank and help identify problem areas when considering rotational ploughing. Shallow non-inversion tillage also has its place depending on the circumstances. This can stimulate germination of shed seed to allow spraying off, or increase the

chances of control from pre-emergence materials such as propyzamide or carbamate which are permitted for use in winter beans should an autumn pulse fit into the rotation better – and there is no blackgrass resistance to either of these actives.

Whichever cultivation technique is used, PGRO work has shown that neither peas nor beans need to follow the plough. Both crops can be successfully established and be profitable when direct drilled - providing soil conditions were favourable in the first place and the equipment being used is appropriate.

Increasing cereal seed rates and the use of more competitive varieties can usefully decrease blackgrass populations, but on their own only offer 20-25% reductions. Fallow breaks too can reduce seed banks by 70-80% per year. However, the reason for the fallow is to get on top of high infestations. A reduction of 70-80% is still going to leave a significant population to control. Basically, a one year break is not enough and any seed return has to be avoided otherwise it has been pointless exercise. This option can have a valuable role to play, but the prospect of land being out of production for perhaps two years or more is not attractive.

There is no one answer to the struggle against blackgrass. Failing chemistry, increasing resistance and the 'Sustainable Use of Pesticides Directive' which prioritises non-chemical methods of plant protection pushes growers toward an integrated approach to the problem.

Diversifying the rotation to include more spring crops could be the most effective long term means of addressing blackgrass issues. Pulses have the potential to return >£1000/ha, need no nitrogen, leave residual nitrogen for the following crop, and generally increase yield of the following cereal by 0.8t/ha. The fact they also help in the fight against blackgrass must have an additional value when considering the farm business as a whole.

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Plans are in place to increase the combining pea acreage for the third year in a row this season on a Northumberland farm where pulses are valued as much for the opportunity to leave a clean entry for cereals as for the soil fertility benefits they provide.

The crop forms part of a broad rotation on the 880ha (2,200ac) farm, close to Berwick-upon-Tweed, that Andrew Warcup farms with his brother Guy, from where they grow combinable crops on a wide range of soils, from heavy clay through medium loam to lighter ground.

While they have let ground for many years to a vining pea group, combining peas only returned to the Warcup's cropping plan two years ago. This isn't their first venture into growing peas for the combine, though.

"Back in the 1980s we used to grow 100 acres of canning peas for Batchelors," Andrew Warcup explains.

"But some mixed results with a few late harvests and the subsequent effect on the next wheat crop meant we decided to go away from growing combining peas, switching break crop land into oilseed rape and spring beans. However, six years ago, we also began letting land to a vining pea group.

"That has meant we've continued to see the benefits of growing pulses, with wheats after vining peas often yielding 0.5t/ha more than those after other crops. I also like to have a mix of cropping to keep the combine moving once harvest has started, and combining peas help here as they tend to be ready between winter barley and winter wheat."

Those benefits, and the attraction of potentially good gross margins, meant that two years ago combining peas were put back into the rotation, this time for the micronising market. From an initial 14ha (35ac), the area has been expanded year on year so that for 2014, the Warcup's

Berwick pea grower Andrew Warcup explains how peas provide his cereals with grassweed control benefits

are growing 44ha (110ac) combining peas, alongside 300ha (750ac) winter wheat, 160ha (400ac) oilseed rape, 120ha (300ac) winter barley, 100ha (250ac) spring barley and 100ha (250ac) winter oats, along with 40ha (100ac) of vining peas for Scottish Borders Produce.

There are a number of reasons for that expansion, says Andrew Warcup: "Oats have been an important crop for us for many years, but that does mean we have issues with wild oats and sterile brome. Peas provide a spring break that allows us a longer sterile seedbed period after the previous crop, and the ability to also control them in the peas with alternative herbicides."

For the past two years, the Warcup's have grown Limagrain's early small blue type Zero4, sold to I'Anson Brothers at Masham for mironising for the animal feed trade.

Min-till has been practised for the past 15 years, primarily for the drainage benefits it brings to heavy land and the structure it helps give lighter ground. Land is cultivated soon after the previous harvest no more than 10cm (4in) deep, using a Kockerling Precision cultivator.

Although the farm requires some straw for its suckler beef enterprise, chopped straw is valued highly for the nutrients and organic matter it provides.

Two separate applications of glyphosate are then made over the intervening period before drilling with a Horsch Pronto takes place as soon as conditions are suitable at the beginning of April, with no further land movement being done beforehand. Depending upon thousand grain weight and intended plant population, seed rate is around 250kg/ha.

"Good drilling conditions are important, and I would rather sow the crop a little later into decent soils than hash it in when they are too wet. Good consolidation is also critical, and seedbeds are rolled straight after drilling."

The crop receives 3.0 l/ha Nirvana (pendimethalin + imazamox) and 0.15 l/ha Centium 360 (clomazone) for pre-emergence weed control, with 1.0 l/ha of Fusilade (fluazifop-p-butyl) used around two months later to keep grass weeds - particularly wild oats and sterile brome - in check. Nutri-Phite (phosphite) is also applied at this timing where prior soil analysis has shown it's necessary.

"On top of the residual nitrogen benefit we get from the peas, that opportunity to clear up grass weeds is another of the crop's main benefits, in that we get a clean start for the following first wheat or oats," Mr Warcup says.

The peas' fungicide programme is based around an early July application of 1.0 l/ha Alto Elite (cyproconazole + chlorothalonil) and 0.5 l/ha Amistar (azoxystrobin), keeping the crop clean



Pronto drill

through to an early-August desiccation, with harvest following around two weeks later.

“That normally fits in well just before we begin cutting wheat, and with the range of crops we grow, the combine keeps going right through the summer unless the weather stops us. Unloading takes place on the headland, so that we minimise any damage to the good soil structure that peas leave behind.

“We’ve found combining much easier than with the old Bunting type we used to grow for Batchelors, and Guy’s son David and my son

James, who drive our combine reckon peas are now better to harvest than spring barley.

If they are over 15% moisture they go through our mobile drier, which we find is much better for handling high moisture content crops than a continuous flow drier.”

Last year the Zero4 yielded 3.7t/ha (1.5t/ac), and produced a gross margin of £845.74/ha, results with which Mr Warcup was particularly pleased given the difficult spring.

“I think the crop’s root structure hadn’t developed as well as it could, largely due to the

soil conditions created by the winter’s heavy rain. But even in harvest 2012 we achieved 1t/ac (2.5t/ha), despite the poor summer.”

In light of this performance, an increased pea area is again in the plan for this season.

“We’ve raised our acreage year on year since we started growing combining peas again, and that’s as much for the benefits the peas bring to other crops, in terms of weed control opportunities and nitrogen benefits, as it is to their gross margin performance and the spread of harvest workload.”

Around the country with PGRO Barometer growers in 2013

Six of our Barometer growers around the country give a post harvest report on their experiences...

Norfolk – Kings Lynn

“The spring bean season was very late and the lowest yields were returned on the lighter land where they suffered from heat stress.

Overall yields ranged between 5 and 6 tonnes per hectare, and were on the whole very pleasing considering the concern with the late start and the high summer temperatures.

The crop was sold at £240/tonne meaning the returns from the 2013 crop were very rewarding. 2014 will see a slight reduction in area, but beans are now a firm part of the blackgrass reduction programme and will continue to be an important part of the rotation for years to come.”

Essex – Southminster

A generally very pleasing result from the 2013 Sakura pea crop. Yields varied between 3.7 to 5 tonnes per hectare with the lower yields being returned on the later drilled land which was drilled in the poorer conditions of the last week in April. An average return over the 75 Ha of 285 tonnes. With the later drilled crops, weed control was less effective and impacted a little on crop performance, but nonetheless yields were good. The Sakura was easy to combine and the quality of grain harvested was very high and has sold well through Wherry and Sons. With commitment to the pea crop, it will be exclusively Sakura in 2014, though slightly reduced in area as conditions allowed a return to the more normal amount of winter wheat in the farm rotation.

Berwickshire – Coldstream

“A large area was planted with spring beans due to lack of winter crop options, 352 Ha were sown.

Final drillings had been almost a month later than the normal cut off date. It was dry immediately after drilling and pre-emergence herbicides were less effective, especially on brassica volunteers.

Late infections of downy mildew believed to be due to stress conditions added additional costs for disease control.

There was a one week period of 25-30°C followed immediately by 90mm rain the following week which is thought to have negatively influenced pod set on light ground. With a 5-year average of over 6t/Ha, spring bean yields were down in 2013. Heavier land produced 5.5t/Ha and lighter land was lower at 4t/Ha.

Beans form a firm part of the rotation, they ensure a manageable area of late combined crops and a good entry for winter wheat. The area will return to the longer term average in 2014.”

Oxfordshire – Abingdon

“Around one fifth of the farm area is in pulses.

The spring beans were not drilled until mid April due to soil temperature concerns, and harvest was later than normal due to the large proportion of spring sown crops.

Nonetheless, they turned in a very pleasing 3.7t/Ha. The majority of the crop was drilled with a Claydon and strip tilled. In comparison with the small acreage which was ploughed, there were far fewer weeds and what there were proved much easier to control.

Given the extremes of the season few conclusions are being drawn from the 2013 experience and will await repeat performances. The wheat following the beans is looking excellent.”

Cambridgeshire – Thorney

“An excellent crop of Sakura marrowfat peas yielded 4.2t /Ha. Sowing into quickly-warming soils, and aided by timely applications of manganese during the growing period, the crops stood tall and well all season delivering grain of good colour and overall quality.

Staying tall at harvest and with an application of Reglone for crop desiccation and Pod Stick to reduce shedding, the combining was easy and resulted in a very successful crop for 2013.”

Leicestershire – Hinckley

“Over 122Ha of spring beans went in in the spring in different circumstances.

Fanfare drilled into ploughed land looked great with flowers top to bottom. There was little disease and an optimistic outlook was for a 6t+ crop. Populations hit 38-44 plants per sq m after establishment and, possibly due to drought, the crop returned a creditable - but given the initial optimism - disappointing 5t/Ha.

Land that was due into second wheat was too wet. The decision to plough and Sumo in September worked well, drilling the Fury beans with a Vaderstaad into the resulting tilth after a dose of Roundup.

This resulted in the best looking crop ever - until the heat took a toll - and some flowers were aborted 45-48 plants per sq m. Bruchid damage was low and disease was isolated. Occasional spots of botrytis were seen in top leaves late on and, combined with heat, caused a cessation of flowering. Harvesting waited until after the wheat and possibly resulted in more losses in the field than had been expected. Despite the late sowings, beans were actually ready to harvest earlier than in 2012.

All of the wheat following beans is now looking great and spring beans are a major part of the rotation again for 2014.”



PETE IANNETTA

BEANS ARE BEST, SAYS PETE IANNETTA OF JAMES HUTTON INSTITUTE IN DUNDEE

Pete is an agroecologist who studies the ecology and functional diversity of wild arable plant (weed) and crop species: as it is from an improved understanding of crop and wild plant interactions that wild plant and crop co-existence may be optimised to deliver 'sustainable intensification'. After all, it is with the arrival of intensive agriculture that crop production and biodiversity loss have both increased.

“Common sense might predict that any system will be unsustainable if yield or offtake repeatedly exceeds resource inputs, and agricultural ecosystems are no exception. Furthermore, if the quality of resources declines, the system will become degraded. One approach is to ensure that returns to the system include renewable nutrient sources that are sourced locally to encourage the efficient use of resources and natural nutrient cycling.”

The use of renewable nutrient sources is very important as they are 'multi-functional', supporting a wide range of life forms and processes or 'ecological services'. Cropping faba beans is a well-proven option to improve the sustainability of agricultural systems. Faba beans increase the availability of soil phosphorus, boost the population densities of pollinators and other crop-beneficial insects and reduce energy use and greenhouse gas emissions (from tillage, fertiliser production, transportation and use, and also grain legume importation). In particular, faba beans are best known for the fact that they do not require the application of any inorganic fertiliser, by virtue of their symbiosis with nitrogen fixing rhizobia, a partnership which can be highly profitable.

The EU funded “Legume Futures” project has analysed and compared environmental and economic impacts of crop rotations that were legume supported with those that were not. Average gross margins of faba bean followed by cereal can be over €200 per hectare more profitable compared to wheat-wheat cropping due mainly to the pre-crop yield effect and reduced mineral fertiliser application. Aggregated gross margins were approximately €100 per hectare greater for legume supported rotations, and the average increase was related to soil character, increasing from sand to loam soil.

Average gross margins of faba bean followed by cereal can be over €200 per hectare more profitable compared to wheat-wheat cropping

This evaluation has still to take into account the added economic potential of reductions in pesticide applications compared to cropping a single crop species succession, along with the other ecosystem benefits already mentioned above. Additional analysis of Legume Futures data gathered from crop rotation trials across Europe has also highlighted that yields increased significantly as the percentage of legumes in the rotation increased and peaked at 50%

legume inclusion, where there was an equal balance of forage and grain legumes. The same analysis also indicated that soil nitrogen surplus also declined as the percentage of legumes in the rotation increased. Research papers are being drafted from this EU project to highlight the excellent potential of novel legume based crop rotation, and their public release may be anticipated within the next year.

These insights reflect the possible benefits to agricultural sustainability when adopting the best cropping practices, and they contrast starkly with some operations. Recently the James Hutton Institute assessed bean samples (from outside the UK), which appeared to have acquired almost no nitrogen from air.

This was not due to an absence of rhizobia or nitrogen fixation as the 'control crop', to which no nitrogen had been added, acquired 85% of its nitrogen from air. Further querying revealed that nitrogen fertiliser had been added to the test crop at 120 kg of per hectare as a “standard practice for intensive production”.

A recent pot experiment also carried out at the James Hutton Institute highlighted that legume performance may be enhanced by soil nitrogen deficiency. Faba bean plants relying on nitrogen fixation by rhizobia had a root and shoot biomass which was two times higher than those plants supplied with a continuous supply of nitrogen (as nitrate, equivalent to 0.15 kg nitrogen per hectare).



The sort of root system I'd like to see in field grown faba beans

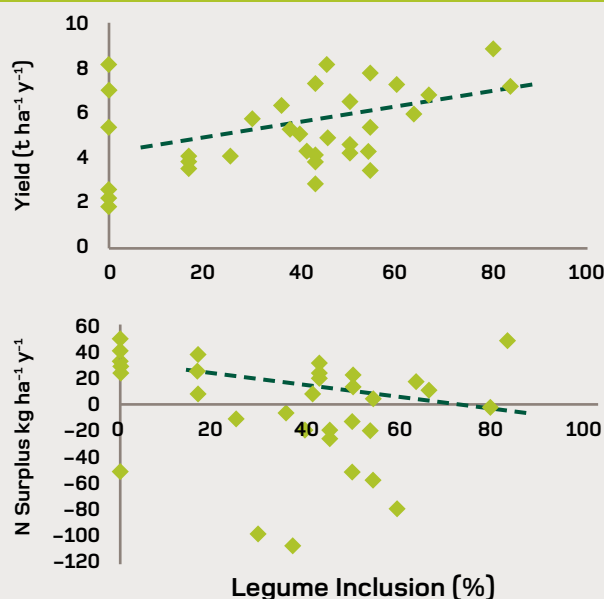
More importantly, the yield of the nitrogen free plants was also two times greater, and equivalent to 4.3 tonnes per hectare, which is very respectable for a pot based trial. The results were remarkably consistent, since all 14 of PGRO's recommended winter and spring varieties showed this exact same trend. Other soil qualities are very important too of course, and a preliminary analysis of data from one of the 2012 field trials at James Hutton Institute shows that shallow and compressed soils can reduce yield potential by over 10%.

The data highlights the importance of soil qualities, and especially low soil nitrogen conditions, and begs questions for those cropping beans, such as: what crop was cultivated, and what tillage practices were used, before cropping beans? There are also many unknowns regarding the current quality of rhizobia populations in UK soils, and this is something that the James Hutton Institute is also now quantifying.

Underlying all of the above comments is a very significant assumption, which is: that there must be a good market to ensure that cultivating beans is profitable. The current main research challenge is to improve our understanding of those environments and agronomic practices that optimise and stabilise faba bean yields. Also, which practices may enhance specific qualities of the beans for food processors - and can their commercial appeal may be increased, especially for higher value products within the human food chain? Data are now being gathered as part of a Technology Strategy Board funded project called 'beans4feeds' which is testing the commercial opportunity for 'air fractionation' to provide protein and starch enriched concentrates. The protein concentrate is being tested for suitability as a feed for farmed salmon, and the starch concentrate is being tested as a feed ingredient for poultry and pigs. As a development of this project, the starch concentrate is also being tested for its potential to enhance baked and brewed product quality.

However, this story is also for another day and until then, The James Hutton Institute wishes you buon fagioli!

An analysis of productivity and soil nitrogen surplus of crop rotations across Europe.



The scientific research reported here is supported by funding from: the Scottish Government; the European Union funded project Legume Futures (www.legumefutures.eu; economic data from Moritz Reckling - www.zalf.de) and; the Technology Strategy Board Funded Project Beans4feeds (www.beans4feeds.net).

Beans4feeds is co-funded by the Technology Strategy Board (TSB101096). The industrial partners of beans4feeds are EWOS Ltd., BioMar Ltd., Limagrain UK Ltd., Marine Harvest (Scotland) Ltd. and Harbro Ltd. The academic partners are the Universities of Stirling, Aberdeen, St. Andrews, Scotland's Rural College and the James Hutton Institute.

This work is also supported by many colleagues at the James Hutton Institute, and several collaborators. Particular thanks are extended to those at the University of Abertay-Dundee (Prof. Graeme Walker and Dr. Athina Tzibula-Clarke).

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Mark Ballingall, Senior Weeds Consultant at SRUC (Scotland's Rural College), examines new approaches to herbicide use in spring beans grown at wide rows

“There has been much research work on growing winter rape on wide row spacings at anything between 30 to 60 cm and, indeed, this has now been adopted into commercial practice on a large majority of farms. The winter rape crop is very plastic and responds to wider row spacings by branching to fill the inter-row space. In a rape crop most of the yield comes from pods on branches rather than the main raceme. To increase branching from individual plants and thus optimise green leaf area it is vital to reduce the seed rate otherwise the result is crowding in the drill. Answering the question as to whether spring beans respond in a similar way was an

aim of this project funded by the PGRO.”

In addition, it is recognised that conventional residual herbicides are prone to leaching into water courses under certain conditions. They are under the spotlight and may be lost in the future as a result of EU Directive 1107/2009.

An alternative approach to weed control in winter rape (funded by the HGCA) applying glyphosate and low doses of residual herbicides to the inter-row gap had previously been carried out by SRUC and NIAB-Tag and a similar approach was adopted for beans in this trial.

In 2013 the spring bean variety Babylon was sown at the standard row width 12cm, with



MARK BALLINGALL

wider rows at 24cm and 48cm. Herbicides were applied to the inter-row gap. The recommended residual herbicide Nirvana (Imazamox pendimethalin), was compared with glyphosate, applied at each row width using a shrouded nozzle. Each row spacing was replicated at 20 and 40 seed/m² to establish how the crop would compete within the row.

Spring beans do not branch in the same way as winter rape but increasing the row width could increase the number of pods and thousand grain weight. The trial was taken to yield. Thousand grain weight was measured and weed control assessed.



The yield results are illustrated in Figure 1. The top yield at 5.5t/ha (2.2t/acre) was achieved with Nirvana applied inter row at the closest row spacing and highest plant density (12cm spacing and 40 plants/m²), a 2.0t/ha increase over the same spacing at 20 plants/m². As the inter-row spaces were increased there was a drop in yield although there was little difference between

the Nirvana applied at 24cm or 48cm at the same seed rate.

The use of glyphosate inter row produced the highest yields with the closer row spacing and greater seed numbers due to better weed control. However, despite having much greater weed ground cover, the control at the high seed rate (40 plants /m²) and the even closer 12cm row spacing yielded 0.5t/ha more.

It is clear that due to its indeterminate growth habit, the spring bean does not compensate in the same way as winter rape, although in 2013 the plants were shorter than normal due to moisture stress.

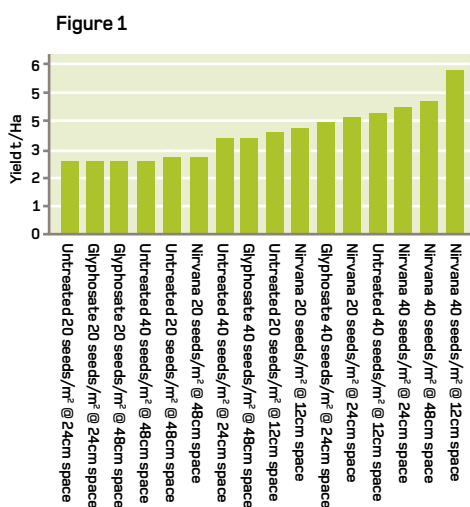
This was a one year trial and there needs to be more work on seed spacing and the plasticity of the spring bean crop at different row spacing in years where moisture is not limiting. In this trial, thousand grain weight seemed to be correlated with increasing yield, but was not related to pod number. Although it was not statistically significant, this is

illustrated in Table 1 with the highest pod number/plant coming from the plots with the lowest yield.

Table 1: Comparing spacing, (cms) and seeds (m² in pairs) on weed control and the components of yield. (SRUC 2013)

Treatment	Spacing	Seed/m ²	Weed Ground cover 19th June %	Pod No's/ Plant 19th August	Yield T/ha	TGW gms
Untreated	12	20	63.0	11.2	3.4	683
Nirvana	12	20	6.7	16.2	3.5	687
Nirvana	12	40	3.0	13.3	3.4	702
Nirvana	24	20	6.7	17.5	3.8	703
Nirvana	24	40	2.7	11.6	4.2	648
Nirvana	48	20	4.0	18.6	2.5	721
Nirvana	48	40	3.0	11.3	4.4	692
LSD			28.6	3.94	0.35	71

With the long term future of herbicides in spring beans uncertain under EU Directives, this trial shows there needs to be more work involving industry on other novel forms of weed control and establishment of spring beans.



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BECKY WARD
PRINCIPAL TECHNICAL OFFICER



DR KERRY MAGUIRE
PLANT PATHOLOGIST

Becky Ward and Kerry Maguire give an update on progress with PGRO's research projects.

BruchidCast 2014

Monitoring and forecasting bruchid attack in beans is soon to become easier as new tools are available to growers in 2014.

BruchidCast® is designed to aid the timing of insecticide applications by giving up to five days advance warning of periods of peak pest activity by post code area. This will include warnings of local conditions conducive to pest activity, forecasts of potential spray opportunities and local weather forecasts.

The BruchidCast project has been running for three years and is supported by Syngenta Crop Protection UK, Frontier Agriculture, Oecos, PGRO, The Sustainable Agri-Food Innovation Platform, and Rothamsted Research as the science partner.



The BruchidCast forecasting system will be available in 2014 on the Syngenta website at <http://www3.syngenta.com/country/uk/en/AgronomyTools/Pages/BruchidCast.aspx>.



As part of the final drive to get the system up and running, we are seeking grower volunteers to host monitoring sites, using the new trap, along the A1 corridor from South Bedfordshire to North Yorkshire. If you would like to be part of the monitoring network please contact **Becky Ward** on **01780 782585** or email **becky@pgro.org**

Promising results for bruchid control in field beans

A novel monitoring and forecasting system for the integrated management of bean seed beetle *Bruchus rufimanus* (SAF-IP/TSB 100871)

The project is funded by an industry consortium in conjunction with the Sustainable Agri-Food Innovation Platform (SAF-IP). Partners are Syngenta Crop Protection UK, Frontier Agriculture, Oecos, Rothamsted Research and PGRO.

The previous Defra Link funded project (LK09102) provided a new recommendation for control of bruchid beetles in field beans, advising that sprays are applied when temperatures reach 20°C for two consecutive days when around 50% of pods are 2cm long. The use of angled nozzles was shown to improve spray penetration into crops, and optimum water volumes were found to be 150 to 200 l/ha.

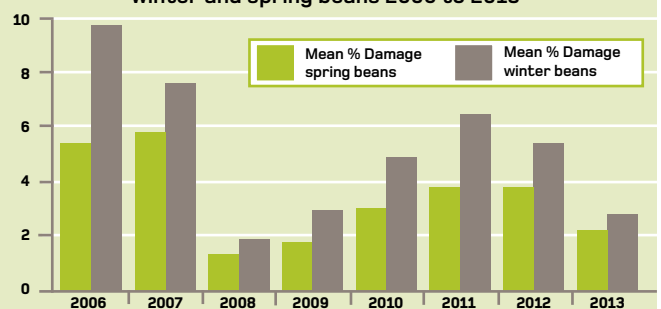
The new SAF-IP project is

in its final year in 2014 and has successfully developed a monitoring and forecasting system for the control of bruchid damage in field beans. Data collected during the last eight years has shown that damage levels across the UK have fluctuated quite significantly (figure 1).

There was a reduction in damage to produce in 2013 following the prolonged cool weather in the spring and early summer, and late development of crops, and although there have been years such as 2011 when damage levels were high, the new recommendation has prevented increases to the levels that we saw in 2006 and 2007.

2013 saw a record number of crops that met the standard for the human consumption market, at 98%, a real improvement for growers in the UK, and premiums of up to £50 per ton over feed can be reached for this market.

Figure 1 – Mean percentage damage in winter and spring beans 2006 to 2013





Cydia nigricana

Pea moth forecasting service will now be available on the PGRO website

Pea moth damage to quality in combining peas continues to be an important issue for growers aiming for human consumption markets. Fortunately growers have good tools to help manage control of this pest.

The pea moth trap is available from Oecos limited and are received in sets of two. These should be placed in crops by mid-May and monitored three times each week during peak pest activity.

A threshold for combining peas is reached when ten or more moths are caught in either trap on two consecutive occasions. When a threshold is reached the PGRO pea moth forecasting service should be used to forecast optimum spray date for your area, which can be between ten and twenty days following threshold catch. The forecasting service will be available at the PGRO website at www.pgro.org

The pea moth trap is available from Oecos limited, 11a High Street, Kimpton, Hertfordshire, SG4 8RA or by calling **01438 832481**



Pea moth trap



Root nodules on peas

New research into pea root health

The 2014 season sees the start of two exciting research projects into the world of Rhizobia and the root pathogen *Aphanomyces euteiches*.

The first is an exploration into the world of Rhizobia and the beneficial relationship with peas. The project will look at the role of phosphate levels on rhizobial populations and how starter fertilisers can affect the free living rhizobial population. The aim is to identify the conditions for the proliferation of free living rhizobia which can then colonize the roots. This will be carried out in large scale field trials with the assessment of the rhizobial population in the laboratory.

The second project is also concerned with pea root health, but this time focuses on the root pathogen *Aphanomyces euteiches*. This is a soil dwelling fungus which is becoming an increasing problem for pea growers. Unfortunately the first time many growers realise they have a problem it is too late remedy the situation for that year. The pathogen builds up in wet soils especially when peas are grown frequently in the rotation. This project aims to evaluate methods of detecting the pathogen prior to field losses. Both projects are funded by the HDC.

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