

# techtalk

## Breeding better pulse varieties

LS Plant Breeding is a UK-based plant breeding company and subsidiary of German breeder NPZ offering peas, beans, oilseed rape and spring wheat to UK farmers. Through the combination of its UK-based breeding programmes and NPZ's expertise and cutting-edge technology it brings high-yielding varieties to the market, making the UK farmer its priority.



# Improving the pulse of farm rotations

**New pulse varieties can help farmers shift rotations towards more regenerative techniques. But are today's varieties good enough, and is their agronomy up to scratch? CPM finds out.**

By Andrew Blake

**There's plenty to suggest, given the ever-brighter spotlights on food production and the environment, that the prospects for pulse crops such as beans and peas are encouraging.**

Given that background, there are several questions that merit answers to ensure growers make the most of the opportunities on the horizon.

### Why are pulses increasingly important to arable farming?

Pulses are significant break crops in arable systems, offering benefits in terms of the crops themselves

and to following crops, says Chris Guest, managing director of L S Plant Breeding.

"With the recent fall in the oilseed rape area we've seen a rise in the popularity of beans, particularly spring types, but also of peas; and those crops' nutritional impact on subsequent cereals is extremely useful — particularly so with current fertiliser costs."

Spring-sown pulses, especially

peas which are early to harvest, are short rotation crops which helps in terms of cash flow, he adds.

"Over two years the gross margin performance from a pulse crop followed by a first wheat can be very good."

### What does the future hold for pulses in the UK?

"Pulses are a hot topic currently, with the drive for 'Net Zero' and increased interest in domestically produced protein, both for animal and human consumption," says Chris.

The crops' ability to fix atmospheric nitrogen, meaning they need no extra artificial N fertiliser, will help farm businesses when assessing their

quests for net zero carbon emissions, he points out.

"With additional opportunities coming forward for other uses of plant-based proteins — including a new novel 'plastic' alternative — the demand for domestically produced pulse products is positive.

"There's also strong interest in decreasing our reliance on

*LS Plant Breeding managing director Chris Guest sees a bright future for pulses such as the firm's new winter bean Pantani.*

imported soya, and we expect to see continued interest in the role of pulse products in animal feed rations, both in compounds and in the home mill-and-mix sector.

"Along with the health benefits from consuming pulses — the future is very bright."

There are challenges however, he acknowledges — not least in the light of the shrinking armoury of chemical controls for diseases, pests and weeds.

"It places more pressure on the plant breeding sector to ▶

*“Nutritional impact on subsequent cereals is extremely useful – particularly so with current fertiliser costs.”*



*Genetic improvements are important to counter losses of agrochemicals, says LSPB breeder Craig Padley.*





*Pulses have relatively low reproduction rates, notes Olaf Sass.*

► look to overcome some of those challenges with improved genetics,” says LSPB breeder Craig Padley.

“Many years ago, the Green Pig project showed that beans and peas could play a role in displacing soya in certain animal feed situations.”

Now, continued work on fava beans with low levels of two anti-nutritional factors, namely ‘Vicine’ and ‘Convicine’, known as LVC beans, means there is scope for higher inclusion rates in pig and poultry diets to be developed further.

“With LVC beans acceptable for

existing markets we see the crop shifting to this type in the coming decade.

“Tannin-free spring beans have also been developed allowing their greater inclusion in the home feed sector.”

### How is the UK pulse market developing?

Along with the relatively new LVC beans there is interest in producing higher protein varieties of both beans and peas, according to Craig.

Yellow/white peas are other areas for development. “We still import significant volumes from Eastern Europe, but we’re more than capable of producing these domestically.”

### What is involved in breeding a new pulse variety and what are the challenges?

Breeding of large-seeded pulses like peas and faba beans has inherent challenges which need to be considered, says NPZ breeder Olaf Sass.

“Both crops have relatively low reproduction rates. With faba beans it’s about 1:60, compared to rapeseed at about 1:1000.

“Consequently, it takes longer to get the seed of selected superior

lines to the market in large quantities. It also limits the ability to test young material in trials,” says Olaf.

“Breeders try to overcome this by growing two generations a year — one during the regular growing season in Europe and another, during our winter, in a counter season nursery in the southern hemisphere, for example in Chile or New Zealand.”

In beans partial outcrossing by insects is both a challenge and an asset, says fellow NPZ breeder Gregor Welna.

“A challenge due to outcrossing is that a breeder needs to carry out the first stage of crossing and multiplication in bee-proof cages, then take the best lines identified on to further



*Lynx spring bean is consistently high on the list for yield.*

multiplication in careful isolation,” explains Gregor.

“An asset is that faba beans offer a lot of variation which allows



*Breeding has created earlier ripening bean varieties.*

## Messages from the Bean Yield Enhancement Network

### What should growers look for in a pulse variety?

As the Bean YEN's third season drew to a close and information for the results meeting and benchmarking reports in December were being collated, reflections were made on data from the first two years of the network, says ADAS's Dr Tom Wilkinson.

“We were able to look at associations in the dataset so far which, whilst not teasing apart cause and effect, could provide us with some ideas when combined with a review of other studies.

“As we progress with collecting more data in the YEN these ideas may change,” he stresses.

“So far, some of the associations between crop characteristics and seasonal influences with higher yields

that we see are the number of pods per stem, thousand seed weight (TSW) and low evapotranspiration during the summer months.

“This points to an ideal type of crop as having deep roots to access available water, multi-noded stems to increase the number of pods and prolonged canopy survival. It’s probably tall, so good standing ability is important.”

### Are growers/agronomists using the best agronomy – especially in beans?

Several things may be important in helping the ideal crop to develop its full potential, says Tom.

“It’s well known that maintaining good soil structure is particularly important for pulses which are prone to

problems arising from soil compaction. So, looking after that structure is vital in creating conditions for deep rooting.

“Prolonging canopy survival in beans could be achieved for example by using later fungicide applications to protect against chocolate spot, but it must be accepted that they could lead to a later harvest.”

### What extra focus is needed in pulse nutrition – especially on beans?

Good topsoil health and fertility, especially with phosphate and potash, is important to help pulse crops capture all the nutrients they need, stresses Tom.

“Seed potassium levels have been shown to be positively associated with yield in the Bean YEN.

“Levels of sulphur, magnesium and manganese in the leaf tissue during flowering were also linked to higher yields.

“Levels of rhizobium inoculum in the field could also be important in achieving early nodule formation and sustained nitrogen fixation.

“This could be influenced by using a field that has grown beans before (but not more often than one year in five), or by considering rhizobial inoculation of the seed.”

### What should be the priority for growers of beans and peas?

“Maintaining good soil health, paying attention to well-structured subsoils so rooting can be deep and sustain continuous water uptake,” says Tom.



*Yukon spring bean has the highest downy mildew and earliness ratings.*



*New very high yielding combining pea Carrington.*



*LVC spring bean Victus.*



*High yielding green pea Bluetime.*

selection for various markets — spring and winter types, very large or very small seeds, very early types, tannin-free lines with white flowers, yellow spotted lines with a light brown straw colour, LVC and high protein types.

“The last two have become of special interest recently but keeping such types pure is a real challenge with an outcrossing crop like faba bean.”

Yield is still the main breeding goal in peas and beans, but any advances must be accompanied by disease tolerance, for example to downy

mildew and ascochyta, he notes.

“Bruchid seed beetle tolerance is the subject of intense research.”

### How does LSPB ensure varieties suit the UK?

“We have a network of trial sites across the main growing areas to assess yield, agronomics and disease resistance,” says Craig

“Typically, varieties are trialled for several years to ensure seasonal stability, followed by three years of official trials before they appear on the PGRO Descriptive List.

“The harvested grain is also routinely assessed for quality characters, thousand grain weight, protein content and anti-nutritional factors — and in the case of peas good colour retention. This ensures the end-product is suitable for our domestic and export markets.

“For several years we’ve tested beans in Southern Scotland where early maturity is key to ensure a successful harvest.

“Our variety Yukon has the earliest maturity on the PGRO Descriptive List — a great plus for growers in the north of England and Scotland — with the added benefits for all spring bean growers of the highest equal downy mildew resistance rating and a high thousand seed weight.”

Winter bean breeding is conducted at the company’s Cambridge site. This overcomes the crop’s potential winter kill in Northern Germany where NPZ is based.

“Pantani is our first winter bean on the PGRO Descriptive List and

we have further varieties currently progressing through official trials.”

End user involvement is a key part of new variety development, says Chris.

“We’re working with many different market outlets to ensure that varieties are suitable for their end uses.”

These include pale skinned/large-seeded beans for human consumption export markets, large-seeded beans suitable for decortication for use in fish food, and the various colour and seed size requirements in the pea sector.

“For the UK farmer this is as important as ensuring the varieties are agronomically sound.”

LSPB’s long-term record and commitment to pulse breeding shows up well in the fact that ten of the varieties on the current PGRO Descriptive List are from the company’s programme, giving growers a wide choice to suit their location and farm conditions, he adds.

“Varieties such as our spring bean Lynx have consistently been high on the PGRO list.” ■

## Descriptive list now more inclusive

Pulse crops offer many advantages for inclusion in rotations and current varieties are certainly good enough, says the PGRO’s Steve Belcher.

“The recent move from Recommended to Descriptive List has enabled the list to be more inclusive and not based largely on yield.

“For example, within the current lists we have early maturing varieties, which although they have lower yield potential, their earlier harvest is preferable for some growers.

“In spring beans, the new category of low Vicine/Convicine was introduced to highlight enhanced feeding qualities.

“For beans we have the option of winter and spring types, allowing workloads to be spread.



*The LVC category is a new feature in the Descriptive Lists, notes the PGRO’s Steve Belcher.*

“With agronomy there remain particular challenges with soil-borne diseases and rotations. Crop protection products are coming under increased scrutiny and currently there is no seed treatment for peas.”

## Sponsor message

LS Plant Breeding is a UK-based plant breeding company and subsidiary of German breeder NPZ offering peas, beans, oilseed rape and spring wheat to UK farmers.

Through the combination of its UK-based breeding programmes and NPZ’s expertise and cutting-edge technology it

brings high-yielding varieties to the market, making the UK farmer its priority.

Besides pulses, the company breeds oilseed rape and cereals, with the current AHDB Recommended Lists featuring LSPB’s hybrid oilseed rape varieties — including clubroot resistant and HEAR varieties — as well as a high yielding spring wheat.