Breeding, research and development is key for sugar beet

Sugar beet

SESVanderHave is a leading player in the global sugar beet industry. It specialises in every aspect of sugar beet seed including breeding, research, production and processing of seed through to agronomy and sugar processing. *CPM* went to meet general manager Ian Munnery at the company's Lincolnshire office.

By John Swire

SESVanderHave was created in 2005 when the Florimond Desprez Group acquired the Sugar Beet assets of Advanta. Those originated from the merger of Belgian seed company SES Europe with the Dutch company DJ Vanderhave. Between them, the two companies had almost 200 years of experience and expertise in sugar beet production. SESVanderHave UK Ltd was incorporated in 2012 in Wellingore, Lincolnshire, less than two miles from the original Advanta breeding station at Boothby Graffoe. Then in 2020 it relocated to new larger premises at Heath Farm the site of the former RAF Wellingore.

Ian takes up the story: "The UK team has grown considerably over the last 11 years, we now manage trials across the UK as well as wider commercial and technical group roles globally. As well as delivering trials for the UK and northern Europe for breeding, research and development, the team also provide many contract trials for our partners."

Experience shared

"Sugar beet only came into being as a crop due to the Napoleonic wars as Nelson blockaded the export of sugar cane to France and Napoleon drove the development of sugar beet as an alternative. It is a little ironic to highlight that nowadays Norfolk; Nelson's county dominates UK sugar beet production. Sugar beet therefore remains an important crop across Europe, and globally we supply our blue pelleted seed to growers in around 50 countries, planting over 1 million hectares. In context the entire UK plants around 95,000 hectares each year. Our presence in every country where sugar beet is grown means that our experience of diseases, pests and environmental issues can be shared, allowing us to anticipate threats and deliver solutions. One major difference between us and the rest of the industry is that we are a privately owned company and invest heavily in research and development, ensuring we keep ahead of the curve when it comes to research and innovation; seed production is a case in point.

"Sugar beet seed production for the UK is largely conducted in south west France and north east Italy; climate change is starting to change this so we may have to modify our way of thinking. For example in the UK we hit 43°C in the shade last year, in France it was a lot hotter. So, we need to consider when you lay a delicate little sugar beet seed in a swathe to dry and blast it with such temperatures, it risks cooking it; damaging the seed and reducing our seed crop yields or quality. ▸

Ian Munnery, general manager at SESVanderHave with the mobile tare house.

Sugar beet seed for the UK is mainly grown in south western France.
Photo courtesy: SESVanderHave.

▸ Similarly, seed production this year in Italy was affected by severe flooding that many of us saw on the news; we were lucky it didn't affect us too badly, but it has impacted some. It was not just that flooding washed away some seed crops, a greater threat was the impact on flowering of the male and the female plants, these need to be matched up (nicked), if not you risk reducing seed yields and potentially contamination from other beet pollen. Collectively we need to think strategically when it comes to seed production. Displacement of seed supply and volatile markets following the war in Ukraine make for a challenging supply chain for the seed industry.

"For this reason we also need to be thinking about producing seed in the UK again, not just to mitigate climate risk and ensure security of supply, but also because the Precision Breeding may enable production and use of precision bred seeds long before the rest of Europe, both for domestic and export markets."

There are other mounting problems for the British sugar beet industry at the moment; the industry is under threat from foreign imports, increased costs and as a minor crop it lacks the scale of investment or government support as we see in other markets, suggests Ian.

Crop diversity

"However, sugar beet remains critical to crop diversity in the UK. Despite advances in genetics that have delivered yield increases of 1.5% year on year for the last 20 years, we are still fighting for the security of British sugar production and battling pests, weeds and diseases by breeding varieties for the unique maritime climate of the UK.

"Sugar beet is a good news story compared to cane", says Ian. "It uses around five times less water than cane, requires fewer food miles and is important to maintain rotations; so it has excellent carbon footprint and sustainability credentials. Unfortunately, this has not stopped the threat of competition from cane producing nations which is causing investment in the sector to shrink in the UK.

"Genetics and plant breeding can offer solutions to further improve the profitability of the crop. By breeding varieties that can reduce the reliance on chemistry, nitrogen and energy use for processing, whilst increasing yields, we can help mitigate the threat that imports pose. More robust varieties are the answer to the problem, but breeders need the security that the UK market can be sustainable in order to invest and deliver a decent return on investment. After all it takes us 10 years to breed a variety and three years to produce the seed — so we're very much looking at the long term.

"Further efforts are also being made to increase support for UK sugar beet production and it is hoped that by advocating the importance of sugar beet to crop diversity and the economy, that a sustainable trade in British sugar can be maintained."

Breeding research and development is key to maintaining the competitiveness British sugar industry as an important fixture in British agriculture and SESVanderHave is playing a key part in this process. "We are now managing around 30,000 trial plots on around 30 hectares across the UK, across Europe we have around 150,000 trial plots," says Ian. "Our UK plots are drilled with a precision Monosem drill and harvested with the only mobile tare house operating in the UK which gives considerable flexibility and speed to wash, weigh and produce brei instantly.

"The harvester is basically a mobile tare house that has something of Trigger's broom about it, as it is constantly being updated and improved. We have a number of them across Europe. Three rows of beet are topped at the front of the machine from where it goes through a set ▸

Yellowing viruses breakthrough

Since the discontinuation of neonicotinoid seed treatment, the European sugar beet industry has faced significant challenges. Aphid transmitting yellowing viruses have emerged as a major threat, causing substantial yield losses up to 50% and endangering the economic viability of sugar beet cultivation. As naturally occurring resistance traits are absent, efficient control of these viruses remains a pressing concern.

A promising breakthrough has been achieved through a collaborative effort between IfZ (Institute of Sugar Beet Research, Germany) and SESVanderHave. Research has demonstrated that susceptibility factors for yellowing viruses in sugar beet can be effectively switched off to generate virus resistance. The work provides the basis for specifically identifying natural variation in the sugar beet gene pool and making it usable for cultivation in a timely manner.

Both SESVanderHave and IfZ hold no patent on the identified gene and are committed to share their findings with the entire breeding and scientific community. The work will be funded by the German Ministry of Agriculture (BMEL)

Hendrik Tschoep, director of breeding at SESVanderHave says: "This discovery offers great potential for sugar beet breeding programmes across the globe. As an innovative sugar beet breeder, SESVanderHave, continues to invest significantly in researching this important subject and remains committed to further developments through continued investment."

Virus yellows is a complex of three viruses; beet mild yellowing virus (BMYV) beet chlorosis virus (BChV) and beet yellows virus (BYV). These viruses are transmitted when aphids carrying the viruses feed on the sugar beet. The green peach aphid *Myzus Persicae*, is the main vector, infection of sugar beet plants with the yellowing viruses cause chlorosis of the leaves, a condition where the leaves turn yellow due to disruptions in essential metabolic processes and the transport of assimilates. The presence of virus yellows alters the metabolic activities within the plants, causing increased levels of amino acids , nitrogen, sodium, and potassium in the roots. This in turn has a negative impact on the sugar extractability during processing. Moreover, the yellowed leaves become more vulnerable to secondary fungal attacks, which can further damage the leaves and aggravate yield loss. When a crop is infected with virus yellows the grower can experience substantial yield losses of up to 50% or even more when the crop is affected by other diseases like cercospora leaf spot.

conviso® SMART

I'VE GOT THE POWER

to save time with a single application

Push the button for more efficient weed control in sugar beet.

With only one application you need less time to manage weeds in your sugar beet and have more time for other crops. Get the power with CONVISO® SMART sugar beet seeds from KWS and CONVISO® ONE herbicide from Bayer.

SEEDING THE FUTURE SINCE 1856

www.kws.com

KWS

CONVISO® is a registered trademark of Bayer

ADVERTORIAL

Maximise sugar beet yields by checking harvester set-up

Andrew Dear, head of technical support - agriculture

With the 2023/ 24 harvest in full swing, British Sugar says that roots that are over crowned could be costing growers over £40/ha in lost yield. They advise that growers and contractors need to check their topping standards.

Early-season harvesting is often tricky as many sugar beet crops are yet to fully reach maturity, having big canopies and inconsistent root sizes. The sweltering weather in early September added another complication, and made ground conditions challenging.

However, as the sugar beet industry enters the main campaign, British Sugar believes crop recovery can be improved.

Feedback from beet intake at the Bury St. Edmunds factory is that a high proportion of over-crowned crops has been received. The site also reported. lorry loads with large amounts of green material from late-season weed flushes, although this may only be a transient issue.

"We have seen more over-crowned beet than we would like on the flat pad at Bury St. Edmunds," says Andrew Dear, head of technical support at British Sugar. "We revised our crowning standards 10 years ago to allow for more crown on the sugar beet and to increase the amount of crop recovered; producing higher yields for growers and more beet for us to process.

"Last season, we asked for more crown removal after the frosts growers experienced in the winter; removing the frost-damaged part of the beet which we could not process and could have led to rejections if left on.

"This campaign, the crowning standards revert to normal," advises Andrew. "The optimum is for all leaf material to be removed and the root kept fully intact. This is best illustrated by covering the crown scar on the beet with a two-pound coin."

Trials conducted by the British Beet Research Organisation (BBRO) revealed that for every 5% of over-crowned roots, 1t/ha of yield is lost, equating to £40/ha at the current contract price. The BBRO also discovered that the more prominent scar from over-crowning can triple sugar losses in store, seriously impacting the adjusted tonnage when the grower comes to deliver the stored beet.

"We are fortunate to have highly skilled sugar beet harvester operators," Andrew adds. "I would encourage growers to engage with their contractors to ensure they recover as much of their crop as possible, maximising their yield and returns."

Andrew joined British Sugar in 1996, based in the trials team before becoming an area manager supporting growers. He moved into agriculture operations and business manager roles before becoming Head of Agriculture at Bury St Edmunds. Today, Andrew leads the Technical Support Team. He is also on the British Beet Research Organisation Stakeholder Committee.

If you have any questions, please contact your British Sugar account manager. You can also read the British Beet Research Organisation's advisory bulletins at www.bbro.co.uk

BritishSugar

Ian Munnery says SESVanderHave manages around 30,000 trial plots on 30ha across Europe. Photo: SESVanderHave.

▸ of rotating 'ladies fingers' which corkscrews the beets out of the ground. It then comes up the elevator where it is weighed to get a dirty weight, before it is washed with a high pressure washer to clean off all the dirt. It is then put on the table where any stones are picked out to lgive us a clean weight; wet Lincolnshire limestone looks just like sliced beet so it is still a manual job for our trials team. How the soil sticks to the root is an important factor in varietal choice and why the UK has some of the lowest dirt tares in Europe. It then goes through a set of spinning saws, which turns the beet into pulp which is then put into trays and instantly frozen.

"In recent years we have incorporated a near infrared spectroscopy (nirs) unit on the harvester," says Ian. "This give us the sugar content of each sample as we harvest. All the data is then beamed straight back to the lab. The harvester is fitted with GPS and is self steer, so the harvester does not stop but more importantly greatly improves trial accuracy with all operations operated on GPS. On a good day we can harvest and analyse 700 plots. It is essentially a numbers game to get sufficient data from a range of soil types and locations to evaluate parent lines and commercial hybrids. It is time critical, because in September/October we need to be planting the seed crops and make selection decisions about the best varieties to sow in the coming years. To make good business decisions we need good data from our trials; so we use 2023 harvest data to make decisions for planting in spring 2024."

Next challenge

"Whilst this may sound like an obvious strategy and investment, it is frustrating to know that whilst cereals and oilseeds growers have benefited from combine yield maps and NIRS onboard for many years, sugar beet growers and harvesters still lack this capacity," says Ian. "Mapping yield at farm level against inputs, varieties and both biotic and abiotic threats at scale will be the next big challenge and opportunity given the limitation and costs of sugar beet trialling.

"The addition of drones for plant counts and other analyses mean we are keeping our growers and processors at the forefront of the UK market. It also allows us to benchmark our trials' performance with actual commercial performance from our current portfolio of varieties and technologies as well as a strong pipeline of new genetics to increase resilience for UK growers. We test our varieties under commercial conditions across the beet growing area, not just breed for success in trials." ■