Niab
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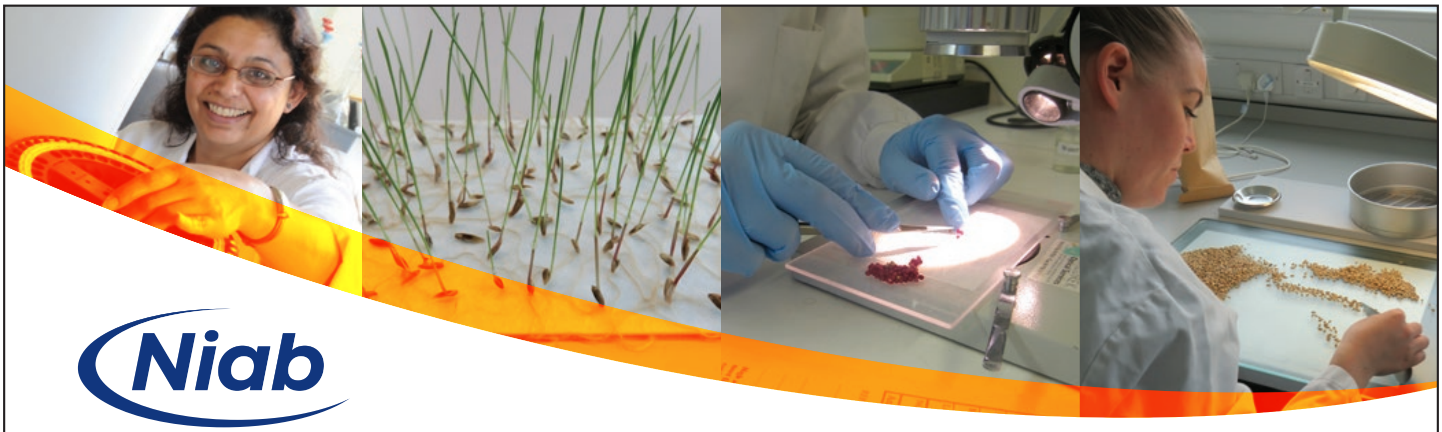
Landmark

Reducing the risk of cereal viruses

In this Issue



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Mario Caccamo, Chief Executive, Niab • mario.caccamo@niab.com

Farm Productivity and Profitability – two sides of the same coin

The long awaited *Farm Profitability Report* by Baroness Minette Batters, released shortly before Christmas, delivers a direct challenge to government and industry. Niab, together with our partners in the Growing Kent & Medway cluster, sponsored the first presentation of the report at the Oxford Farming Conference. Strengthening farm profitability and resilience requires decisive policy action, and we are clear in our commitment to driving that agenda.

Baroness Batters is right to highlight the urgent need for clear, coherent and accessible support for farmers and growers. Today's landscape is too often fragmented, overly complex, and unnecessarily costly. These are barriers that hinder progress rather than enable it.

Niab fully endorses the call for better alignment across the system. As we have repeatedly emphasised in previous issues of *Landmark*, fragmentation across the UK's innovation ecosystem continues to limit the pace and scale of change. Addressing this must be a national priority.

Translating advances in plant science into practical, scalable farm and food solutions is essential if we are to meet the grand challenges ahead. The so called "valley of death" in applied research persists because coherent strategies and sustained investment have too often been absent. We will continue to push for sustainable farm productivity to be placed at the centre of national research and innovation priorities.

We are not short of ideas, yet there is a clear need to speed up the progression of science from the laboratory bench to the point at which results are delivered to farmers, and beyond. Our role at Niab is to bring coherence to that system: de risking the adoption of new technologies, accelerating their journey from research to field, and enabling farmers and growers to build more resilient, competitive businesses.

Over the past 15 years, Niab has trebled in size and established itself as one of the UK's foremost independent applied crop research and knowledge transfer organisations. Our interconnected role across the translational landscape linking scientific research, farmers, and the agri food supply chain is unique.

This year marks a decade since Niab's intervention safeguarded East Malling Research (EMR). Without public sector support, we acted decisively to preserve critical horticultural capability that would otherwise have been lost. Since then, we have worked relentlessly with the East Malling Trust and local stakeholders to modernise the site and reverse decades of underinvestment.

This commitment was recognised through the award of the Strength in Places Fund in 2020 to establish Growing Kent & Medway, enabling us to deliver state of the art research facilities for the horticulture sector.

At the recent conference marking the completion of the Yield Enhancement Network (YEN) project, I underscored one of the key findings from a decade of farmer led data: high wheat yields do not require higher input costs. High

Niab Chief Executive Professor Mario Caccamo originally joined Niab as the Head of Crop Bioinformatics in 2015, became NIAB EMR's Managing Director in 2017 and was appointed Chief Executive in 2021. A computer scientist by training, Mario has over 25 years' experience in life science research and big data, including specific projects to apply the latest DNA sequencing technologies and bioinformatics methods to advance scientific understanding of crop genetics and the interaction of agricultural crops with their environment. He is currently a Director of the Oxford Farming Conference.

Baroness Minette Batters, joined on stage by Niab Chair Dr David Buckeridge, presents the Farm Profitability Report at a Niab sponsored partner event at the 2026 Oxford Farming Conference

Niab CEO Professor Mario Caccamo speaking at the 2026 Oxford Farming Conference

performing crops consistently deliver stronger margins and significantly lower greenhouse gas emissions per tonne of grain. Productivity and profitability are not competing outcomes, they are mutually reinforcing.

High yield crops also achieve superior nitrogen use efficiency, reducing environmental risk while strengthening food security. These results are a product of precision and excellence, not increased inputs. While emissions per hectare increased modestly with higher yields, the intensity of the impact of harvested grain came down significantly.

It was therefore fitting to present at the final YEN conference, given our own Stuart Knight addressed the very first event more than a decade ago, warning of stagnating crop yields. Data presented by Niab at Cereals 2013 showed wheat yields in trials increasing by around 1.0 t/ha per decade, while on farm yields had plateaued. This is a gap YEN has helped the sector understand and begin to close.

Another vital part of safeguarding productivity is Niab's ability to anticipate and respond to emerging threats. This remains a core strength. More than a decade ago, our team at East Malling was the first to detect spotted wing drosophila (SWD) on UK soft fruit crops. This was an early warning that proved vital.

Last year, through our northern field trials, Niab again became the first to detect the breakdown of YR15 yellow rust resistance, now recognised as one of the most significant losses of genetic resistance facing the sector. Understanding the genetic basis of this shift is essential. This is important not just for breeders but for designing more durable, diversified resistance strategies capable of withstanding evolving pathogen pressures. Our collaboration with colleagues at the John Innes Centre is already advancing this work.

This issue of *Landmark*, focused on farm productivity, demonstrates the breadth of Niab's work to strengthen performance and profitability across the sector. From our endorsement of the 30:50:50 agenda, to the launch of the new AHDB Recommended List, to our commitment to train the next generation of crop inspectors, we will continue to champion excellence across UK farming.

Yet the wider context remains challenging. UK food self sufficiency has been falling for decades. Domestic production now accounts for less than two thirds of the food we consume, down from a peak of 78% in the mid 1980s. Shifting consumer preferences, changes in land use, and structural pressures have all contributed. Meanwhile, agriculture faces increasing scrutiny over its environmental impact, with debate often centred on reducing fertiliser use or scaling back production. The YEN findings point to a simpler path forward: producing more from the same land area can reduce emissions while improving productivity.

With the rapid advance of genomics, biotechnology, automation, and AI, the UK has the tools to produce more food with a lower environmental footprint. As the 30:50:50 vision sets out, British agriculture is well placed to demonstrate how science, technology, and data can be harnessed to produce more food with less land, fewer inputs, and reduced emissions.

Looking ahead, we remain unwavering in our mission. Niab will continue to work with the sector, independently, authoritatively, and with purpose, ***to pioneer crop science for the benefit of society***.

Feeding Britain sustainably to 2050 – the 30:50:50 mission

British agriculture is at a tipping point. Competing land-use pressures could see a quarter of our farmland lost and food production fall by a third by 2050. Without radical policy change to boost farm-level productivity alongside environmental goals, we risk ever-increasing dependence on food imports at a time when climate shocks, conflict and geopolitical instability are threatening supply chains around the world.

George Freeman MP was elected to Parliament in 2010 after a 15-year career in technology venture capital. Over 14 years, he served in key science and technology ministerial roles under four Prime Ministers. George has long championed science and technology in agriculture. He launched the UK Agri-Tech Industrial Strategy in 2014 and co-chaired the Taskforce on Innovation, Growth & Regulatory Reform. Re-elected APPGSTA chair in 2024, he leads the 30:50:50 campaign to boost productivity while reducing farming's environmental footprint.

A new report published in November 2025 by the All-Party Parliamentary Group on Science and Technology in Agriculture (APPGSTA) issued a stark warning: productive British agriculture is under pressure as never before. The report sets out a bold, science-led plan to reverse stalled productivity growth – harnessing the latest advances in agricultural technology and innovation to increase farm output by 30% by 2050 while halving environmental impact. We must align policies around innovation, productivity and sustainability to ensure Britain can feed itself affordably in a changing world.

Our report, *Feeding Britain Sustainably to 2050 – The 30:50:50 Mission*, points to a modelling study conducted by the Science for Sustainable Agriculture think-tank in response to the All-Party Group's 30:50:50 inquiry.

Led by former NFU chief economist Dr Derrick Wilkinson, *UK Food security: Outlook to 2050* warns that full implementation of current government targets for housing, renewable energy, tree planting, nature restoration and infrastructure could result in the loss of up to a quarter of farmland over the next 25 years – much of it high-quality arable land. At current rates of farm productivity growth, this would mean a decline in domestic food production of around one-third by 2050.

If we do nothing to protect our most productive farmland, and to boost agricultural yields, Britain will become ever more dependent on imported food at a time when climate shocks, conflict and global instability are threatening supply chains around the world.

That is why, at a major Agri-Science Summit at Westminster attended by more than more than 100 politicians, scientists and industry leaders, we set out a practical, science-based plan to increase UK agricultural output by 30% by 2050, while reducing farming's environmental footprint by 50% – in terms of greenhouse gas emissions, land use, water use and soil health.

The 30:50:50 mission is about aligning food security with sustainability and innovation – producing more from less.

A tipping point for UK agriculture

Despite world-class agri-science and a highly professional farming sector, UK agricultural productivity growth has stalled. Across successive governments, fragmented support policies, excessive red tape and a failure to translate scientific advances into practice have held the industry back.

Defra's own research indicates that its current 'land-sharing' farm policies risk reducing or displacing domestic food production. Unless

George Freeman MP, APPGSTA chair, launches the 30:50:50 Agri-Science Summit at Westminster in November 2025

we reform those policies to incentivise productivity alongside environmental goals, we risk a serious erosion in our capacity to feed ourselves, alongside declining investment in critical infrastructure, input supply and innovation.

The government's Food Strategy, published last July, rightly sets out a vision for a healthier, more affordable and sustainable food system.

But progress towards that goal risks being undermined by competing departmental agendas – not least the rapid industrialisation of solar farms on productive farmland. We cannot afford to sacrifice prime agricultural land in the name of climate targets. Food security is part of sustainability, not in competition with it.

The case for a joined-up mission

The challenges we face – population growth, climate change, geopolitical instability – demand a joined-up, cross-government response. The 30:50:50 framework provides exactly that: a single, long-term reference point for all food, farming and land-use policies.

Our call is simple: embed the 30:50:50 mission across government departments, and elevate the importance of food security alongside climate and environmental objectives by adopting a statutory target of 75% UK food self-sufficiency by 2050.

Doing so would send a positive signal to farmers, investors, and researchers alike that food production is a national priority, on an equal footing with biodiversity and net zero.

Support for the 30:50:50 mission

Since launching the 30:50:50 vision as part of the first ever Agri-Science Week in Parliament event in January last year, the All-Party Group has engaged with more than 100 organisations and individuals across the food, farming and research sectors.

Three key take-aways emerged from this evidence-gathering process:

- The 30:50:50 ambition is widely endorsed as a long-term, strategic framework, and as a unifying point of reference to align productivity, sustainability and innovation goals.
- There is strong agreement that our current policy framework is not fit-for-purpose to deliver against a 'more from less' agenda.
- There is also broad consensus that science, technology and innovation must be central to a re-framing of the policy agenda for UK agriculture, with better use of farm data at its core.

International context

We are not alone in this mission. Around the world, governments are realigning agricultural policy to link productivity with sustainability. The United States' Agricultural Innovation Agenda aims to increase output by 40% by 2050 while halving its environmental footprint. The EU's new Vision for Agriculture and Food also marks a decisive shift towards innovation-led productivity growth, and a move away from the production-limiting "Farm to Fork" agenda. Similarly, the recent FAO-OECD Outlook 2025–34 report forecasts a 14% rise in global food production combined with a 7% emissions reduction over the next decade, driven by uptake of new technologies to reduce emissions and enhance productivity.

Britain must not be left behind.

What we urgently need now is clarity from government about the future direction for UK agriculture. Ministers rightly insist that "food security is national security" – but does that mean producing more of our own food, or simply importing more from abroad?

The answer to that question will shape the investment decisions not only of UK farmers, but also of the research-based companies and organisations whose technologies, innovations and advice will be needed to drive sustainable gains in domestic agricultural productivity.

A unique reset moment?

Combined government plans for a farming roadmap, SFI reset, land use framework and food strategy present a unique opportunity to set a bold, long-term vision for the farming industry.

Our high-level policy recommendations to government demand an urgent re-framing of the policy agenda to deliver against the 30:50:50 mission by harnessing the latest advances in agricultural science and innovation, including how we:

- organise and prioritise research to deliver farm-level impact;
- make better use of farm data to drive productivity gains;
- boost knowledge exchange onto farm to close a widening yield gap in our major food crops;
- streamline regulation to accelerate the route to market for inputs and technologies with potential to deliver on the 30:50:50 goals;
- prioritise genetic innovation in crops and livestock as the main driver of farm-level productivity and sustainability improvements;
- protect our most productive

Support at the November 30:50:50 Agri-Science Summit included Robbie Moore MP, Daniel Zeichner MP, Rachel Bailey, Defra Deputy Director for Agri-innovation Growth and Trade, George Freeman MP, James Wild MP and Charlie Dewhirst, MP

farmland for high-yield food production;

- stimulate the development and uptake of real-time data capture to unlock performance and efficiency benefits, and to transform data-sharing from a perceived threat into a demonstrable benefit;
- adopt a more outcomes-based approach to the delivery of farm support policies to reward measurable progress against 30:50:50 objectives.

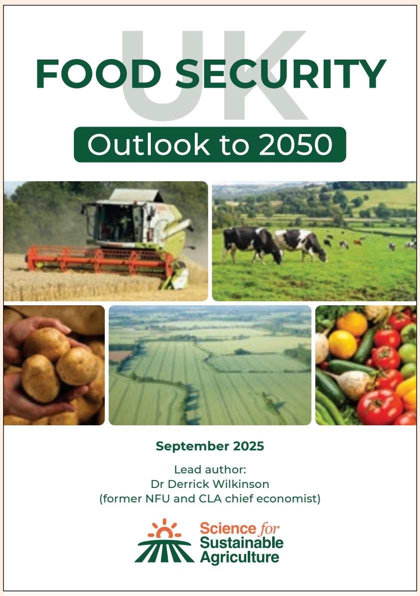
Importantly, our recommendations also align closely with the findings of Baroness Minette Batters' recently published 'Farming Profitability Review', which highlights the need for long-term policy goals to drive productivity growth, support better use of farm data, and improve the transfer of new scientific knowledge onto farm.

The opportunity ahead

From genomics and biotechnology to robotics, AI and precision agronomy, we have the means to produce more food with less impact. What is missing is the policy alignment to unleash that potential.

British agriculture is at a tipping point. We can continue to drift without a clear sense of direction, losing productivity, confidence and investment, or we can capitalise on our agri-science expertise to lead the world in showing how technology, data and innovation can produce more food with less land, reduced inputs and fewer emissions. As we look ahead to 2050, we must ensure that our farmers have the tools, technologies and policy framework they need to feed Britain sustainably. The science exists. The ambition is there. Now we need the political vision and leadership to make it happen.

Download the reports



Clare Leaman has worked in variety evaluation at Niab for over 30 years. For the majority of this time Clare has worked with combinable crops, with a focus on cereals. Much of Clare's work revolves around knowledge transfer within the industry both through the Niab membership as well as to a much wider audience. Translating data and trial information into a digestible format for the growers and agronomists to use on the front line is a high priority. Clare is widely regarded as a key source of independent cereal variety advice to growers.

Cereal candidates for 2026

The new AHDB Recommended Lists were launched in December 2025 and bring a range of new varieties, as well as updated data for existing varieties, across all the major cereal crops. In this article we will review the new additions, looking at their strengths and weaknesses and where they fit in going forward.

Wheat

2025 saw a major change in wheat yellow rust races which has impacted many of the existing varieties as well as the new additions, and how to deal with this in the short term has been the main talking point of most variety conversations for the past ten months. These changes also mean that 2026 has the potential to be a difficult yellow rust year but hopefully, as we move forward, increasing knowledge and understanding will allow the whole chain, from breeder to grower, to mitigate the new risk as much as possible. Part of this will be to ensure understanding not only of how existing varieties are impacted but also these new additions. Of course, variety selection is much more complex than just this one disease and we must remember to review the whole variety package on offer and what it might offer for the years ahead.

After a long hiatus we have seen three new Group 1 varieties in three years. **Arlington** (DSV) is the latest of these to join the new Recommended List with a treated yield just below that of KWS Zyatt. It offers the highest untreated yield of the Group 1s with a solid disease resistance profile including the best septoria resistance in group. Arlington also offers resistance to orange wheat blossom midge (OWBM) meaning less risk and increased choice for Group 1 growers who prioritise this trait. Currently its Group 1 status is classed a provisional whilst large scale testing is ongoing, but this should be completed prior to the seed ordering period. As with all new quality varieties there is still much to learn about how best to grow it for a quality market, but it certainly looks promising.

After an influx of new Group 2 varieties in 2025 this year we see just one. **KWS Grebe** (KWS) offers high yield both treated and untreated, a moderate disease profile as well as resistance to OWBM. Although most likely to be grown under a feed regime these high yielding Group 2 varieties can offer flexibility and wider market opportunities.

The Group 3 sector saw no new additions and now just contains three high yielding options.

For the Group 4s **Sparkler** (Elsoms) joins the Recommended List at the top of soft feed group alongside LG Redwald. As well as high yield it offers relatively good resistance to both yellow rust and septoria as well as moderately stiff straw. It looks to be the earliest of the soft feeds to ripen and is classed as 'High' for distilling quality, widening market appeal. Sparkler certainly looks worthy of consideration for autumn drilling.

The hard feed sector was most impacted by the changes in yellow rust and is therefore the area where new varieties could have biggest influence going forward. However, the new varieties were also impacted by the new yellow rust, and their features will need to be carefully weighed up to judge their future value.

KWS Aintree (KWS) joins the List with the highest treated yield, 4% above that of Champion. It has tall but relatively stiff straw and a good specific weight, but its disease profile is a concern. Whilst its septoria rating is moderate, it is extremely susceptible to the new races of yellow rust which makes it high risk to grow in the current environment. Its high treated yield may be a draw, but remember this will only be realised if the disease can be kept under control, which not only depends on good management but also favourable spray conditions. With a treated yield just 1% below that of KWS Aintree we have **LG Defiance** (Limagrain) which also offers a high untreated yield, good resistance to yellow rust and moderate septoria resistance. It is, however, a weaker strawed type that would suit low lodging sites and later drilling best. Also offering a good combination of high treated and untreated yield is **LG Challenger** (Limagrain). LG Challenger had a solid disease resistance profile, relatively stiff straw and a good specific weight, and is looking suitable for early drilling; it could sensibly be argued to be the best all-around choice of the new hard feed additions.

KWS Fowlmere (KWS) also offers a good treated yield and specific weight but it is relatively susceptible to yellow rust. Its main attraction will be its early maturity, earlier than all others on the current Recommended List and something we have not seen in newer varieties for some time. Finally, we have **RGT Guardsman** (RAGT). A BDYV resistant variety it has a much more competitive yield than its predecessors. It has a relatively good disease profile but is very weak strawed, even with a good management programme, and this needs to be strongly factored in when considering placement on farm.

Overall, a variety set requiring some important considerations to not be overlooked. On balance the varieties looking best placed going forward are Arlington (pending approval), Sparkler and LG Challenger.

The spring wheat AHDB Recommended List also sees a new Group 1 variety. **Charland** (Blackman Agriculture) is a white wheat that produces very white flour in addition to its very good milling and baking qualities. It will have a range of specialist end uses and is likely to attract miller attention. Its treated yield is 10% lower than current top Group 1 variety so markets should be sought prior to planting. It is a short variety with good grain quality and resistance to OWBM, but it is susceptible to yellow rust.

On the feed side **Merkawa** (Senova) is a very high yielding feed variety with good disease resistance and a good specific weight. **WPB Clifden** (Limagrain) also offers high feed yields and a good specific weight but has some susceptibility to yellow rust.

Barley

After many new additions to the AHDB winter barley Recommended List in 2025 this autumn saw far fewer. **LG Catapult** (Limagrain) is a high yielding two-row feed variety which offers BYDV tolerance, continuing the trend of improving competitiveness in the tolerant varieties. This is a huge bonus to growers who now have the option to limit the risks of BYDV using genetics with minimal compromise on yield. LG Catapult also offers a sound disease resistance profile, a high untreated yield and good specific weight, although it will require some straw management. **Darcie** (Senova) is another high yielding variety, best suited to the east and offering good rhynchosporium resistance as well as a good specific weight. It is one of only three varieties on the list to offer resistance to BaYMV strain 2, which has become more widespread in recent years. **SY Barnabus** (Syngenta) is a six-row hybrid with a top yield. It has good disease resistance and a good specific weight but will require some straw management.

All four new additions to the spring barley AHDB Recommended List are currently under test for both brewing and distilling. **Trailblazer** (Secobra) offers very high treated yields and stiff straw, with **Roulette** (Secobra) offering very high yields, both treated and untreated, and is later maturing. **Shona** (Elsoms Ackermann) has performed best in the east whilst **Nolan** (Senova) is slightly further down the road in terms of quality testing. These varieties are unlikely to be available until the end users are surer of their quality attributes which could be at least another year.

Oats

Rannoch (Senova) is the only new winter oat for 2026. The variety is very high yielding, both treated and untreated, and offers relatively good resistance to crown rust although it is susceptible to mildew. It has a high kernel content but low specific weight.

There are two new spring oats, **Jacky** (Saaten Union) and **Neptun** (Saaten Union). Jacky combines a high treated yield with a very high untreated yield, and excellent resistance to mildew but susceptibility to crown rust. Neptun has a similar yield and disease profile but is earlier to mature and has a higher kernel content and specific weight.

Colin Peters • colin.peters@niab.com

New oilseed and pulse varieties for 2026

Colin Peters is Niab's break crop specialist, providing specialist technical and scientific knowledge on the evaluation, selection and management of crop varieties, focusing on break crops including oilseed rape, linseed, pulses, sugar beet and other minor crops.

Winter oilseed rape

As we move forward into the spring of 2026, the oilseed rape crops are starting to grow away and we have lots of really good crops in the ground looking fantastic this year. For the first time in many years, establishment conditions were good and the pressure from Cabbage Stem Flea Beetle (csfb) was very low. The stem larvae numbers detected in the field were a little low so, coupled with the fact that the national crop was probably less than 200,000 hectares in total, it generally meant that there were not many adults about and these came out of the ground later due to the drought/heatwave weather. It did appear that the crop was drilled in two main tranches - those that went early in the regions that had rain in July then a large area drilled when rain appeared in late August/early September. It is great to see growers responding to the conditions and taking advantage of them.

We are aiming to help growers understand how they can very simply take their own stem larvae counts on farm to help understand the local pressure. This could be important this coming year with a bigger crop area in the ground with a instruction video on taking counts available via niab.com.

The 2024/25 season was challenging with a long drought and extreme temperatures in the summer. Trial sites were somewhat at a premium with the much-reduced area of oilseed rape being sown. Nationally twelve sites were taken through to harvest with an average yield across all sites of 5.78 t/ha, much improved from the four-year mean of 5.35 t/ha. The highest yielding site was in the Scottish Borders at 7.11 tonnes/ha (a reminder that trials do not include tramlines and headlands..). Hampshire was the lowest site at 4.23 t/ha which reflected how dry it was.

So, onto the varieties that we see on the AHDB Recommended List for 2026, launched in December 2025. Yields are reported as a gross output, which is the seed yield adjusted for oil content. The values are represented as a percentage of the control varieties which for 2025 were Aurelia, Ambassador, Turing, LG Armada and Pi Pinnacle. We have lost some reliable favourites in Acacia, Ambassador, Aspire and Aurelia amongst several others but these varieties will still be performing strongly in the ground this year. We are lucky to have another seven new varieties added to the full Recommended List this year, but there are also many good varieties that did not make it onto the List and we are going to start with looking at those.

The five hybrid 2025 candidate varieties, Dirigent and Cezanne (NPZ Ltd), Commodore (DSV UK), KWS Martinos (KWS) and DK Exedge (Bayer Cropscience), all have good yields and generally a good agronomic profile although they are all a little later maturing. Martinos and DK Exedge have the full genetic TuYV and pod shatter resistance, Dirigent and Commodore have TuVY resistance and Cezanne has pod shatter resistance. All of these varieties have been through the whole Variety (formerly National) and Recommended List trials process and are good varieties in their own right but did not make the 2026 Recommended List.

Of those varieties that are new on the 2026 Recommended List, three of the top four new varieties arrive at the top end of the List. **Dompteur** from DSV achieves a top gross output at 107% compared to the controls. It is registered for the UK wide area, has TuYV and pod shatter resistance plus very good resistance to stem canker and light leaf spot with intermediate resistance to verticillium. It flowers earlier than some of its neighbours on the List, but they all mature at similar times.

Next on the List is **Karat** from NPZ UK. With very good yields and recommended across the UK the variety does have slightly lower yields in the north. It has TuYV resistance, lacks pod shatter resistance but does have a very good disease resistance profile and is moderately resistant to verticillium.

KWS Domingos (KWS) has TuYV and pod shatter resistance, plus very good resistance to stem canker, although a slightly lower score on light leaf spot compared to Dompteur and Karat with intermediate resistance to verticillium. It is registered for the UK wide area and does look to have a strong yield in the north but with limited data.

These new hybrids are all strong additions to the List, and all have their own strengths and weaknesses worth considering. It is good to see that they are from three different breeders, emphasising the diversity being put into the system.

There is one new conventional variety this year. **Bachus** (Frontier Agriculture) has a creditable score of 98% compared to the controls which only contain one conventional variety. Like all the other conventionals on the List it is a little shorter than the hybrids, does not have genetic resistance for pod shatter and TuVY and has a modest disease resistance. However, it is the highest yielding variety in the group and does provide a fresh new variety in the group for those growers who are keen to use their own saved seed.

We have a new Clearfield® variety in **LG Calvin CL** from Limagrain. These varieties are tolerant to herbicides which would kill all other brassicas including oilseed rape. Hence, they are very useful in certain circumstances if growers have issues with volunteer brassicas. This variety tops the group with a score of 94% and is registered for the UK wide area. It has full genetic resistance to TuVY and pod shatter with an adequate disease resistance profile although it is susceptible to verticillium.

There is a new clubroot resistant variety on the list in **Crios** from RAGT, a hybrid recommended for the north. It is the second highest yielding recommended variety in the group. It does not have genetic resistance TuYV or pod shatter but does have a good level of resistance to light leaf spot. Although it may be tempting to use these varieties on a "just in case" basis, all of them use a very small genetic resistance pool. If used too widely that may break! Ideally use them where you know or suspect you have a problem.

Eriksen from NPZ is a new 'Described' variety on the List. It is a High Erucic acid variety (HEAR) that has yielded very well in trial, especially in the south. It has TuVY resistance and very good resistance to stem canker which is a big leap for this type of variety.

Spring oilseed rape

The only new variety of spring oilseed rape on the List this year is **Crazy CL** (DSV), a Clearfield® variety and very useful in this class for its benefits with weed control.

Spring linseed

There are two new spring linseed varieties; **Balance** (UK agent Elsoms) and **CDC Rowland** (Agent JTSD), both good performing varieties with higher than average α-linolenic acid (ALA) which is an essential omega-3 fatty acid.

Looking at pulses, PGRO has a good selection of new varieties added to the Descriptive Lists for the coming cropping year, with two new winter bean varieties, two new spring bean varieties and seven new combining peas. The sites for the harvest 2025 trials were similar to previous years, working with the same growers and growing areas to get a good geographic spread and a range of soil types around the country. Despite the harsh weather in 2025, the control yield for peas, spring beans and winter beans were all very similar to the previous year.

The Descriptive Lists are based on a five-year data set; adding the 2024 season data means the removal of the 2019 data, using data from 2020-2024. The varieties have to have three years of data in the system at all times.

Winter beans

Patagonia (NPZ UK) has entered the List with a yield of 98% which is mid-table yield wise. It is a little taller than the other varieties but is the earliest maturing. It also has the highest winter bean downy mildew resistance rating compared to the other varieties. **Hepworth** (Senova) is a later maturing variety with a modest yield and fairly short. It is the only variety to have a rating of 6 for rust but does appear to be somewhat susceptible to chocolate spot.

Spring beans

Callas (Saaten Union) yield of 103% which puts it in the top half of the DL. It is early maturing but somewhat susceptible to downy mildew. Callas is a low vicine and convicine variety (LVC), two natural compounds in faba beans that are anti-nutritional and limit how much beans can be included in animal feed, especially

for monogastric livestock like pigs and poultry. LVC beans allow higher inclusion rates because their low vicine/convicine content improves digestibility and feed efficiency. **Maderas** (NPZ UK) has a yield of 98% and also has the benefit of being an LVC variety together with a moderately good downy mildew resistance.

Combining peas

KWS Telegram (KWS) enters the List as the highest yielding variety for yellow peas with a yield of 117%. It is of average height but stands well although slightly later to mature. **Cushla** (Senova) also yields well at 109%, with a good level of downy mildew resistance. **KWS Arkam** (KWS) is a new green pea and the highest yielding in the group. It stands well at harvest despite being amongst the latest maturing varieties. **Bullet** (NPZ UK) is another high yielding new green pea entrant, it has a mid-table maturity timing and also stands well at harvest. **LG Mamba** completes the new additions to the green pea List with a yield of 99%. It is slightly shorter and earlier maturing. **Yoshi** (NPZ) joins Midori as the joint top yielding marrowfat with a yield of 99% but is somewhat susceptible to downy mildew. And finally, **Nyx** (Elsoms) is another new entry to the marrowfat group has a yield of 94% and does have a moderate resistance to downy mildew.

Taking stem larvae counts

Niab's Colin Peters explains how to take csfb stem larvae counts in OSR.

Scan the QR code below.

Claire Carpenter • claire.carpenter@niab.com

Evolution of Niab's crop inspector training

Niab has trained generations of crop inspectors and seed analysts from across the UK agricultural industry. More than 300 crop inspectors are trained each year, regardless of prior experience, who go on to officially check the various levels of certified seed that are sold in the UK. Drawing on more than 25 years of involvement in training, examination, and inspection, Niab's Claire Carpenter offers a perspective on how this work has evolved and how Niab's training approach has adapted to industry needs.

Claire Carpenter has worked as part of the Niab Crop Characterisation team for over 25 years, from working on the recording and delivery of the agricultural species DUS testing programme to statutory seed certification work. She has delivered the statutory seed certification training and demonstrations across UK and European locations, including assisting the government in Bosnia Herzegovina to set-up and implement a seed certification system as part of the process to help the country's agricultural industry recover and trade internationally post war.

My first experience of a crop inspectors' course was far from polished. I remember a dim lecture hall, complex calculations that seemed impenetrable, and a lecturer waving an oversized kale plant from behind a lectern. Candidates sat in rows, equally puzzled, trying to absorb information that was both vital and overwhelming. A few weeks later, in heavy rain, I found myself examining tiny, waxy brassicas and wondering what had led me to take on the Fodder and Oilseeds Crop Inspectors' course. Despite the challenging start, I achieved a distinction and developed a curiosity that motivated me to continue and eventually qualify across all licences. I did not anticipate that, within a couple of decades, I would be responsible for writing course content, developing examinations, and helping to shape the future of these programmes.

What stayed with me from those early years was how valuable the courses were, yet how unclear they could sometimes feel. That experience shaped my long standing commitment to ensuring our training is accessible to every candidate – regardless of background, experience, or learning style. My goal has always been for candidates to gain the knowledge they need not only to pass, but to perform with confidence and expertise in the field.

Crop inspector training is grounded in the Seeds Marketing Regulations, and one of our ongoing challenges has been making a largely stable set of principles engaging, accessible, and relevant. Niab has trained crop inspectors for nearly 70 years, adapting to changes in legislation, requirements, and the demographics of those entering the profession. Across all these shifts, our purpose remains the same: to ensure that certified seed meets the quality expected by growers and the wider industry. Inspectors must be able to verify varieties, identify and describe off types, and confidently apply legislation. As expectations evolve, so too must our training methods.

Twenty seven years ago when I undertook my training, the format was far more traditional. Blackboards, slide projectors, and stacks of paper handouts were standard practice. The delivery was formal, but the knowledge of the team involved was exceptional. At that time, each crop species had its own set of regulations, accompanied by lengthy statutory guidance documents. Former Niab colleague Helen Miness played a crucial role in bringing together the materials needed for each course, preparing training plots, and responding to candidate queries. She possessed the rare ability to visualise the characteristics of a variety before a plot was even sown. Alongside her, the encyclopaedic knowledge of Jennifer Wyatt and the broader Seed Production Department supported the training and examination of hundreds of inspectors and the preparation of thousands of training plots.

As technology advanced, PowerPoint

gradually became more prominent in our teaching, though slides and overhead projectors continued to coexist for some time. The increasing diversity of varieties and the gradual loss of long standing training specialists also required steady adaptation in our delivery.

I took on course coordination in 2005, which required rapidly deepening my understanding of more than 40 species and the intricacies of each licence. This broadened role significantly improved my knowledge of seed certification. Even early in my coordination work, I felt strongly that training should continually improve. My focus was on streamlining delivery, enhancing the candidate experience, and maintaining high pass rates, while ensuring that every aspect of training aligned with statutory requirements.

With the support of colleagues, we fully transitioned to PowerPoint, which enabled us to standardise lectures and provide candidates with handouts that matched the taught content exactly. Candidate feedback has always been a central part of our process, and Niab has always taken seriously the responsibility to act on it. When candidates make the effort to provide feedback, we must listen and use it constructively to refine and strengthen our delivery.

Early in my time with the programme, I was tasked with improving the efficiency of our training plots while also reducing their footprint—two objectives that did not initially seem compatible. Through careful planning and trialling, we managed to make meaningful improvements that enhanced training without compromising quality.

As staff changed over time, my responsibilities expanded to include examinations, lecturing, coordination, working alongside Sue White with a range of supporting tasks, from setting papers to marking and moderating results.

A significant change arrived with the introduction of the Seed Marketing Regulations 2011, which replaced the previous species specific regulatory system. Some areas of legislation came to an end, which directly influenced aspects of crop inspection. Because many inspectors train with Niab on a five year cycle, it often takes time for significant regulatory updates to fully filter through the inspector community.

Around the same time, the increasing number and complexity of varieties required us to change how we approached teaching botanical characteristics. Relying on memorisation of varietal traits was becoming unrealistic. Instead, Niab moved toward teaching inspectors how to observe, interpret, and apply key characteristics – skills that would remain relevant regardless of how the varietal landscape evolves. When selecting training plots, this meant focusing on representing the range of expressions for a characteristic rather than relying on a standard set of recommended varieties.

Niab also saw growing numbers of candidates entering the programme without prior industry experience and more candidates with diverse learning needs. Both developments reinforced the importance of making our training clear, logical, and supportive. We worked with Fera, later APHA, to ensure equality for all, that candidates with neurodiversity or medical issues would receive appropriate support including additional examination time.

By 2020, demand for training was at a peak. We were once again running two initial cereal courses–a practice not needed for about three decades–and pass rates were exceptionally strong. Then the Covid 19 pandemic brought in person delivery to a halt. Like many training providers, we faced the challenge of maintaining high quality training when leaving home was no longer possible.

We had previously considered online delivery for non statutory courses, but lacked both the tools and the insight to implement it effectively. Lockdown changed that. With time for focused development, and working closely with former colleague Douglas Hobbs, we built a basic online training system. Delivering the first online courses in early 2021 was a steep learning curve, demanding rapid development and unprecedented levels of user support.

Since then we have had to deepen our understanding of the online platform to maintain, adapt, and continually improve it. Once plot based courses resumed, the improved confidence and performance of candidates – combined with positive feedback – confirmed that online theory delivery should remain part of the training structure.

With the arrival of Jess Barber in the team, we continued to enhance the system. Today, crop inspector training is delivered in two stages: Part 1 online and Part 2 plot based. The online environment was designed to be intuitive while delivering accurate, high quality information. Paper handouts were replaced with downloadable PDFs, and "reading weeks" allow candidates time to familiarise themselves with materials. Traditional mid course tests were replaced with interactive quizzes offering immediate feedback. We send plant material to candidates studying cereals, and provide forums and a central email address for support. The biggest change has been the introduction of a multiple choice online theory exam, automatically marked by the system. Manual moderation still plays an important role, ensuring fairness and consistency.

Each year, the online platform undergoes a full review and update. Formatting information online improves clarity and supports those with additional learning needs. Although some users assume that online learning reduces personal contact, those who reach out for assistance quickly discover that we actively monitor candidate progress. We track quiz activity, observe participation, and ensure all candidates attend their online examinations – contacting those who might have forgotten. In many ways, online delivery has replaced PowerPoint, but not the support. The commitment of the training team – myself, Jess Barber, Sue White, Tim Henshaw, and Will Griffiths – remains exactly as it has always been: to support every candidate who needs our help.

For further information, course prices and dates, and to book places email cert.training@niab.com or scan the QR code below.

Niab

Events 2026

FIND US AT KEY INDUSTRY EVENTS

Cereals
THE ARABLE EVENT
Wednesday 10 & Thursday 11 June
DIDDLY SQUAT FARM, OXFORDSHIRE

Groundswell
Wednesday 1 & Thursday 2 July
HERTFORDSHIRE

Fruit Focus
Wednesday 8 July
KENT

NIAB SUMMER EVENTS

Booking will be available in late Spring 2026

CENTRAL OPEN DAY • Tuesday 2 June
VARIETIES AND AGRONOMY – CAMBRIDGESHIRE

FARMING SYSTEMS OPEN DAY • Thursday 4 June
WOODHALL SPA, LINCOLNSHIRE

SOUTH OPEN DAY • Tuesday 16 June
VARIETIES AND AGRONOMY – HAMPSHIRE

TMAF MORLEY INNOVATION DAY • Thursday 18 June
VARIETIES AND AGRONOMY – NORFOLK

Visit niab.com/niab-event-hub
for event details and registration

Niab
Plant Science into Practice

Ellie Roberts • ellie.roberts@niab.com

Herbal leys in arable rotations

Multi species leys can deliver significant agronomic, environmental and economic benefits when established and managed well. However, their complexity also presents challenges that differ markedly from conventional ryegrass based leys or standard break crops.

Ellie Roberts is Niab's forage crop specialist, managing the statutory and commercial forage crop trials programmes alongside providing technical and scientific knowledge on forage crops to Niab members, APHA, seed companies, commercial businesses and educational organisations. She works with industry in developing research and training projects alongside contributing to Niab's agronomy guides and publications.

Herbal leys include grasses, legumes and forbs, often containing 8-15 species with more complex mixtures having 30+ (although the SFI 2024 offer required a minimum of five species). Common components include the grasses perennial ryegrass, timothy and/or cocksfoot, white and red clover and the herbs plantain and chicory. The legume birdsfoot trefoil and the herb burnet have also been popular inclusions. As well as high quality forage production, the impetus behind the inclusion of herbal leys in the SFI was in their deeper and diverse rooting structures, improving soil structure, capturing carbon, fixing nitrogen and increasing biodiversity. Herbal leys fit best following a low weed, early harvested arable crop, allowing time for timely weed control. They are less successful following heavily infested spring break crops or late lifted root crops.

Fields with significant populations of perennial weeds such as creeping thistle, docks, couch or high black grass pressure are best managed with stale seedbeds and systemic herbicides. Stale seedbeds may need to be repeated where weeds are particularly prolific. Once the ley is established, chemical control options are limited to spot spraying and risk damaging ley species.

Choosing the right species mix should consider soil type, rainfall, grazing pressure and intended ley length.

White clover, cocksfoot and meadow fescue are the more persistent species, red clover, chicory and plantain are the most productive in the short term (one to three years) and offer some soil improvement but to deliver well, herbal leys should include diverse rooting species and be in situ for a minimum of four years. Shorter lived herbs reseed where leys are given a five to eight week break in the summer.

Competitive species can quickly dominate so high inclusion of perennial ryegrass (especially if N is applied), will suppress slower establishing legumes and herbs which are slower to get going in the spring. Experienced seed providers should be able to develop mixtures to best suit requirements and increase the likelihood of the sown species establishing.

Deep rooting species only deliver soil benefits if they can penetrate freely. Fields prone to waterlogging are unsuitable, as most legumes and forbs are intolerant of anaerobic conditions. Most herbal ley species perform best at pH 6.2-7.0, although specific mixtures can grow well from pH 6.0-8.0. Adjusting soil pH must be done before establishment with applications distributed well through the soil profile.

A fine, firm seedbed is essential. Many species have very small seed and must be sown no deeper than 10 mm. Some species need light to trigger germination and have limited energy reserves to get the shoots up to sunlight. Sowing herbal ley species too deep is the major reason for establishment failure. Rolling both before and after drilling improves seed soil contact and evenness of emergence. Undersowing into a standing crop (usually into cereals) allows the ley understorey to establish before harvest.

Both spring and late summer sowing can work, late summer (late July to early September) following early cereal harvest is often most reliable as weed pressure is generally lower and soil moisture more consistent.

Nitrogen applications will allow grasses to dominate and undermine the diversity. Some farmers prefer to add some N at establishment but in most cases, this is not necessary. Leys containing at least 30% legumes will be productive without any artificial N. P and K indices of 2 are preferable and sulphur levels will need to be adequate for good legume development with any applications being made prior to sowing.

Once established, effective weed control becomes a function of management:

- early, light grazing or topping to suppress annual weeds and encourage plant development once plants have secure roots.
- maintaining a dense, competitive sward by timely grazing/cutting and recovery time
- timely grazing will prevent seeding of weed species such as black grass
- viable blackgrass seed in the seedbank reduces by approx 70% per year
- avoiding poaching.

Growers must accept that complete

weed eradication is unrealistic; the aim is to prevent weeds becoming dominant.

Selective grazing can rapidly alter sward composition throughout the season as species palatability alters with plant growth stage. Ribwort plantain and clover can be grazed out when set-stocking leading to dominance of grasses. For best productivity, graze leys rotationally, offering a limited area every one to three days before moving off. It is critical to leave plant residuals of at least 10 cm and give the defoliated plants sufficient time for stem/root store replenishment before grazing/cutting again. Rotation length/recovery time will vary through the season. It is important not to manage these leys like perennial ryegrass leys but managed well, they can be as productive without the N inputs.

When planning an exit from herbal leys glyphosate is common for ley destruction, applied at high rates due to biomass and deep rooted species. Avoid cultivations that stimulate weed seed germination, with progressive, shallow passes preferable. Significant nitrogen is released as the ley breaks down, therefore cover crops can help capture nutrients if there is a delay before drilling the following crop.

Grower survey

In a survey of experienced herbal ley growers across the UK, respondents operated arable livestock integrations, using herbal leys as break crops or soil building phases before returning land to arable production.

White clover was a popular species for its overall longevity, reliable establishment and nitrogen fixation. Red clover was valued for its high yields, protein, reliable growth and good quality silage. Plantain was found to provide excellent early production, high palatability and improved lamb performance and health. Chicory provided strong summer growth as grasses and legumes growth slowed.

Birdsfoot trefoil was described as hard to establish and less persistent under grazing but there can be a wide range in performance between varieties – check with a seed supplier. Yarrow, sheep's parsley, and burnet are more sensitive to establishment conditions and grazing pressure. These findings

align closely with independent trials of UK multi species systems.

Respondents used a range of establishment methods with success dominated by achieving good seed to soil contact in warm soils by shallow (1 cm) sowing and rolling both before and after drilling. Most weed control relied on pre establishment control and grazing pressure management. Fields with existing perennial weed burdens were repeatedly identified as unsuitable for herbal leys unless well-controlled in advance.

Overseeding new species into existing grassland swards were successful only if dense or thatchy swards were grazed hard and/or harrowed to remove thatch and limit competition of well-established plants.

The main challenges of grazing were timing to avoid over selectivity, and managing dominant species (particularly chicory). In cutting leys, red clover and grass heavy mixes worked best, cutting too low (<10 cm) significantly reduced persistence with several respondents stressing that herbal leys are far less forgiving of cutting height than ryegrass leys.

One respondent reported a 12% improvement in lamb growth rates and reduced anthelmintic use, reflecting wider research linking herbal leys with improved animal health outcomes.

Key points

1. Shallow (1 cm) sowing into clean, warm, well drained soils pH 6.0-7.0, P2, K2 give the most successful establishment.
2. Simpler mixes are effective and often easier to manage but do not provide the full benefits of a diverse herbal ley.
3. Good, timely grazing/cutting management and recovery times are critical for species performance and persistence.

Typical establishment costs: (higher cost ranges include full contractor charges)	
Seed:	£85 - £260/ha (depending on complexity)
Establishment:	£80 - £325/ha (depending on use of contractors)
Total establishment cost:	£165 - £585/ha (to be spread over 3 - 4 years)
Gross Margin Estimates	
Grazing value:	£220 - 500/ha/yr
Current SFI payment	£382 (Funding for 2026 SFI TBC summer 2026)
Establishment cost/yr:	-£45 - £200/ha
Variable costs:	-£60/ha
Gross Margin Range:	£122 - £677/ha/yr
Benefits	
• Nitrogen fertiliser savings ~£450/ha. (N fixation from legumes >150 kg N/ha/year) • Reduced bought in feed Farmers have reported yield uplifts of 5 - 15% in first year cereals following herbal leys due to improved soil structure, nutrient availability and rooting depth • Farmers have reported saving ~£150/year on purchased feed per hectare of herbal ley grazed. Forage utilisation equivalent to ~9-12 t DM/ha.	

Niab

National Field Trials Platform

Working on behalf of Niab members, UK agricultural and horticultural industry, and internal customers

- Over 100 field trials sites supporting over 100,000 plots, across seven areas
- Host farmers working alongside Niab's trials team
- Niab's area operating bases aligned with distribution of trials work
- Accredited, qualified and experienced staff equipped with the latest technology
- Each area led by a manager and trials team, with office facilities including laboratory, storage and workshop space with good transport links, and supported by direct access to technical specialists.

1 Cambridge
2 East Malling
3 Headley Hall
4 Callow
5 Morley
6 Newton Abbot
7 Sutton Scotney

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Trialling new technology and practices on farm with ADOPT

A research and knowledge exchange specialist with a focus on sustainable land use and management, Dr Elizabeth Stockdale is Niab's Head of Farming Systems Research with over 25 years of applied soil and nutrient management research experience.

Innovation and technology are enabling factors that can help boost productivity on farm to provide food, feed and fibre for the growing global population while, at the same time, enhancing the environment. The UK has renowned strengths in bioscience, cutting-edge technology and research with world leading institutes and pioneering farmers. However, it is recognised that there has been a lack of "pull-through" of new ideas into practical testing and then application on farms.

The implementation gap comes from a mismatch between the potential value of a new technology and its successful adoption and integration into real-world practices. This gap is not unique to agriculture but is a common challenge across various sectors, including business, healthcare and education. There are a number of other gaps that also influence implementation including access to technology (sometimes called the digital divide) and skills gaps in the workforce. The problems are often considered to be problems mainly with the end-user; for example: resistance to change, lack of leadership commitment, and insufficient training. But, often the problem arises earlier in the innovation and technology development process, where researchers and innovators have failed to engage with users early enough in the process so that the proposed solution may not solve the farmer's actual problem or sometimes the way the solution is offered does not fit into the wider farming system.

The UK Government has already committed significant funding for agritech and innovation, most recently through the Farming Innovation Programme where £270 million is committed. The overall aim of Defra/ Innovate UK's Farming Innovation Programme is to apply agricultural research to provide real benefits for farmers, growers and foresters and use science to develop solutions for the practical challenges in agriculture and horticulture with a focus on:

- helping farmers, growers and foresters increase productivity, sustainability and resilience; whilst also
- reducing the environmental impact of agriculture and horticulture.

However, within the Programme it was noted that the conventional 'technology transfer' pipeline from research to practice often works poorly in the complex and highly variable environments of agriculture, horticulture and forestry. ADOPT was therefore introduced as a strand of funding within the Programme and opened for applications in spring 2025.

ADOPT stands for Accelerating Development of Practices and Technologies. Its principal aim is to support farmer-led collaborative projects that enable farm businesses to trial new technology and practices on farm (Box 1). ADOPT will have a key role in supporting farmers, growers and foresters to deal with many of the challenges facing their businesses and the wider sectors, including how to:

- cope with climate change, soil erosion and biodiversity loss
- satisfy consumers' changing tastes and expectations
- meet rising demand for more food of higher quality

- invest in farm productivity
- adopt and learn new technologies
- stay resilient against global economic factors.

The focus behind the competition is to allow for productivity increases by encouraging farmer engagement with new and novel solutions which could have considerable benefits to farmers. This could be through improved data recording and utilisation, or through the adoption of the latest technological advancements such as artificial intelligence and automation. It can also include adopting different approaches to soil, nutrient or water management on farm and evaluating them in practice.

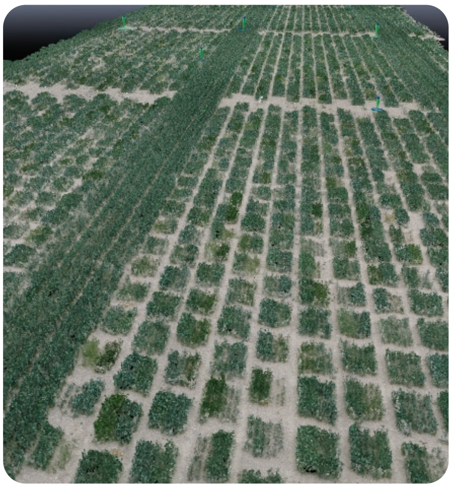
The ADOPT programme is focused on co-construction and delivery of technology evaluation by groups of farmers on-farm. This will enable emerging technologies, tools and approaches to play an important role, and also increase capacity in these sectors by supporting development of strong innovation and critical evaluation skills. Each project is led by a farmer and involves other farmers in designing trials, putting them into practice and sharing the results. The programme is designed to generate practical evidence about what works on farms and enable wider take-up.

Acknowledging that many farmers may have struggled with the processes that are needed to access research and innovation funding in the past, ADOPT has been designed so that each project includes a dedicated facilitator who may act as project manager and provides support during the project. Alongside the main competition there is also an additional facilitator grant that allows farmers to work with a facilitator to take their idea from a few notes on a page to the on-line grant submission stage.

Many Niab staff were successful in their applications to become project facilitators. Since spring 2025, they have been actively working with farmers and innovators to put turn project ideas into fundable projects with clear questions, robust on-farm tests and trials and strong plans to share the findings to help support wider adoption.

The ADOPT programme has a total budget of c. £20 million, this is being offered in a number of rounds of funding and overall the whole programme around 150 projects are expected to be funded. It takes about three months from application to confirmation of success (or not) and then a further two to three months to go through the steps needed to get the project up and running. Rounds 1-5 have received applications; as I write this the timing for applications in Round 6 has been indicated but is still 'detail to be confirmed' on the InnovateUK website (and all the other websites that link to it). It is expected that Round 6 to be open until 8 April 2026 with up to £5 million available for on-farm trials and experiments.

Backed by nearly £2.3 million across 30 projects, the first round of funded projects within ADOPT were confirmed in December 2025 (Box 2). Projects approved from submissions in Round 2 and 3 are also now beginning to come on stream. The trials on farms across all of England's regions explore new ideas in real working farm conditions, from lower emission machinery to digital tools that support day-to-day farm management. Niab is pleased to be part of the teams delivering a number of interesting projects and staff continue to work with farmers to develop proposals for future rounds. Throughout the ADOPT programme, *Landmark* will feature regular updates and outcomes from ADOPT tests and trials. Follow the projects via the ADOPT support hub: www.farmpep.net/adoptsupport.



The on-farm projects that fit ADOPT

ADOPT (Accelerating Development of Practices and Technologies) funds 1-to-2-year projects that are:

- using innovations, practices or technologies that have the potential to address on-farm productivity and sustainability challenges.
- based around farmer-led groups
- collaborative – involving farmers, industry, researchers
- scientifically based trials with significant measurement and recording
- willing to share results and learnings with others.

Find out more about ADOPT funding

Farming Innovation

https://farminginnovation.ukri.org/adopt/

ADOPT Support Hub

www.farmpep.net/adoptsupport

Ask Niab directly: adopt@niab.com.

ADOPT Round 1 Projects where Niab is playing a key role

ABC – Adopting biologicals to control spotted winged drosophila on soft fruit

Farmer lead: W B Chambers Farms Ltd

Challenge: Recent research has highlighted the significant damage caused to UK crops from invasive pests.

Solution: Exploring releases of UK native parasitoids, natural biological controls, on English fruit farms. This adds a new important sustainable pest control option to growers' Integrated Pest Management (IPM) approaches. These natural biological controls will help reduce the serious fruit losses in highly nutritional fruit crops including strawberries, raspberries, blueberries, blackberries, cherries and plums.

Adopting resilient sugar beet at farm scale

Farmer lead: Morley Farms Ltd

Challenge: Sugar beet is a cornerstone crop in UK rotations. However, the withdrawal of neonicotinoid seed treatments has left growers vulnerable to virus yellows, transmitted by aphids, increasing risk of yield losses. Additionally, sugar beet harvests often occur in wet conditions, leading to soil compaction and erosion, which compromise soil health and subsequent crop performance.

Solution: Trial of an integrated approach combining endophyte grass cover crops and strip tillage to improve pest resilience and soil structure. The goal is to develop a sustainable, low-input system that enhances crop resilience, reduces pesticide reliance, and improves soil health.

BioFlow phase two: Transforming soil and water management with biochar technology

Farmer lead: J & K Barnard (Farms) Ltd

Challenge: Managing water is key to crop production and environmental management in lowland peat, where rewetting is the aim, and also in floodplains where the aim is to move water quickly from the surface in mineral soils.

Solution: Pioneering a novel way to inject biochar into the subsoil using advanced mole-drain technology. This forms semi-permeable biochar conduits beneath the surface. Continuous monitoring via real-time water-level sensors and rainfall data will quantify hydrological impacts and verify benefits.

Diversifying rotations; adopting oil seed hemp as a new crop (DOSH)

Farmer lead: Atkin Farms

Challenge: Industrial hemp, once grown widely for rope and sailmaking, has great potential for reintroduction to UK farming as seed varieties have a range applications in the human food chain.

Solution: New seed varieties will be trialled across an environmental gradient. Harvesting approaches will be refined. Crop stems will be composted to develop a novel potting compost. Industry partners will explore post-harvest processing for oil and flour and test the products with consumers.

Roots of change: investigating the role of cover crops in reducing carbon footprint

Farmer lead: Dennington Hall Farms

Challenge: The agricultural sector is under pressure to adopt sustainable practices, reduce reliance on synthetic fertilisers, and improve soil health.

Solution: Exploring how integrating pulses and legumes within cover crop mixtures and as companion crops can help farmers reduce dependence on synthetic inorganic fertilisers. Trials with spring barley and winter wheat will explore and measure the impacts of a range of strategies that sim to maximise the value of legumes, and consider any impacts e.g. increased nitrogen loss, reduced crop yield or quality.

Soil amendments to improve apple establishment

Farmer lead: A C Hulme and Sons

Challenge: Newly planted apple orchards typically require four years to reach full production. At the end of an orchard's life, trees are typically grubbed and burnt or left to biodegrade, releasing the carbon they have sequestered throughout their lifetime.

Solution: Scientific advances suggest that the use of 'charged' biochar, made from grubbed apple trees, and combined with beneficial microorganisms.

Unique insights into the value of Morley's long term trials

Dr Nathan Morris is Niab's farming systems and soils specialist, actively involved in knowledge exchange and farmer training activities. His particular interests and expertise include developing farming systems to improve soil structure and stability whist maintaining crop productivity.

Long-term experiments (LTEs) are a valuable strategic resource that are difficult to maintain through short-term or commercial funding and hard to replace once lost. All provide unique data and are excellent research platforms for extension studies. Long-term rotation studies are rare in our industry but they provide powerful agronomic and financial information for UK farmers. They are critical for understanding how our cropping systems, soils and environment are responding and what interventions can enhance our resilience.

Recognising both the practical and strategic importance of these areas, dedicated farming systems research is being supported across East Anglia, continuing the long-standing co-operation of agricultural field experiments to support building a more resilient farming industry. Within East Anglia, notably at Morley, Norfolk and other locations in Suffolk, there are several LTEs that would not continue without funding (Figure 1). The Morley Long-term Studies (Morley LoTS) programme is funded by the Morley Agricultural Foundation (TMAF) and delivered by Niab.

Learning

LTEs are fundamental in developing our understanding of system changes and allow us to track these over periods of time that strengthen our understanding of fundamental approaches to tillage, nutrient management and other crop inputs. One example of long-term work is that of the Saxmundham Experimental Site. Over the past 125 years, Saxmundham has been fundamental in developing an understanding of phosphorus in managing soil fertility and crop nutrition and has shaped many of the management guidelines used today ('125 years of P research at Saxmundham' in *Landmark* Issue 59).

At Morley, one of the long-term trials that began in 2007, and continues to this day, allows Niab to examine the influence of tillage and the rotational inclusion of cover crops on soil properties, crop yield and financial margin performance. Tracking changes both through seasons but also across rotations allows researchers to delve deeper into what is driving crop performance and yield. Looking across a series of time periods allows us to see trends that would not have shown in single or 1-3 year length experiments. One example is the annual measurement of soil strength.

Penetration resistance, measured with a cone penetrometer, indicates soil compaction and strength by showing the force needed to push a cone through the soil. Higher penetration resistance suggests greater soil compaction, making it harder for roots to penetrate. Across six-year mean time periods, from 2008-2024, the mean soil penetration resistance, relative to the plough, can be tracked (Figure 2). Changes due to cultivation can clearly be seen with shallow tillage increasing around 0.5 MPa compared to plough tillage. It is interesting to see from the long-term results

Figure 1. Long term experiments supported by the Morley Agricultural Foundation (TMAF) delivered by Niab investigating rotations, cultivations, fungicide response, soil amendments and mineral fertilisers

Experiment	Dates	Location	Funders
New Farming Systems: Cultivations	2007-ongoing	Morley, Norfolk	TMAF & JC Mann
New Farming Systems: Rotations	2007-ongoing	Morley, Norfolk	TMAF & JC Mann
New Farming Systems: The Manure and Organic Replacement Experiment (MORE)	2011-ongoing	Morley, Norfolk	TMAF & JC Mann
Sustainable Trial in Arable Rotations (STAR)	2005-ongoing	Otley, Suffolk	TMAF & Felix Thornley Cobbold Trust
The Saxmundham Experiment: Rotation I	1899-ongoing	Saxmundham, Suffolk	TMAF
Morley fungicide response trial in winter wheat	1986-ongoing	Morley, Norfolk	TMAF
Morley fungicide response trial in winter barley	2010-ongoing	Morley, Norfolk	TMAF
The Morley Soil and Agronomic Monitoring Study (SAMS)	2018-ongoing	Morley, Norfolk	TMAF
Periodic lift in sugar beet	1997-2024	Morley, Norfolk	TMAF
New Farming Systems: Soil amendments	2007-2022	Morley, Norfolk	TMAF & JC Mann
Straw incorporation study	1985-2019	Morley, Norfolk	TMAF

that, whilst the penetration resistance remains around 0.5 MPa higher than plough tillage, this has not worsened over the six-year mean time periods, suggesting that the soils are presently not becoming progressively more compact over time.

Saxmundham Trials site May 2023

Relevance

As technology and adaptation to on-farm practices change it is important to ensure that LTEs reflect and adapt to these changes. With this in mind, TMAF and Niab recently discussed how the LTEs currently funded within the Morley LoTS programme would be updated to reflect and maintain the value of the studies. Figure 3 summarises some of the updates to ensure that the outputs remain relevant to both that of current and future farming practices.

For example, there is increasing interest in how reduced inputs, particularly nitrogen, interact with disease development and, consequently, fungicide efficacy. Farmers, including Morley Farms, have increasingly reduced total nitrogen inputs during the last few seasons. This shift has been driven by fluctuating prices, supply issues, and mounting environmental and policy pressures to reduce nitrogen use in line with climate change mitigation targets. The inclusion of a reduced nitrogen treatment within the long-term winter wheat fungicide trial would provide the industry, after five years, with robust data to assess whether more detailed investigations into varietal–nitrogen–disease interactions are warranted.

These long-term trials form an important platform for supporting wider research, supporting both undergraduate and postgraduate students in their projects to collect data from long-term studies that would not be available elsewhere. In addition, these LTEs also support a wide range of research projects with collaborations with scientific and industry partners that significantly enhances the datasets collected from such studies.

Niab is currently producing a guide for the LTEs at Morley to provide an overview of the experiments and a summary of the key findings. When completed, the guide will be available on the TMAF and Niab websites (https://tmaf.co.uk and www.niab.com) and available in print at events.

Figure 2. Mean penetration resistance, relative to the plough (MPa)

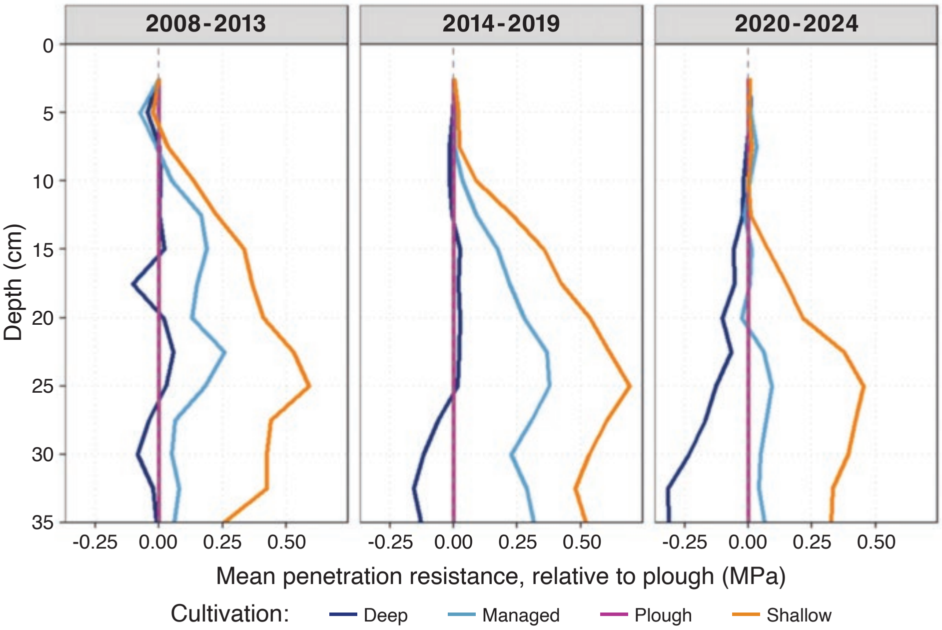


Figure 3. Updated LTEs within the Morley LoTS programme (2026-2030)

Experiment	Updated programme
Sustainable Trial in Arable Rotations (STAR)	Continue to investigate interactions between cultivations for crop establishment and crop rotation and adapt practices to include diverse herbal leys within rotations and the change to low soil disturbance systems.
The Saxmundham Experiment: Rotation I	Continue to explore and report on phosphorous (P) management with the addition of testing novel P management ideas, products or management strategies as they arise that can support crop yields at lower soil P indices.
Morley fungicide response trial in winter wheat	Maintain a baseline for fungicide timing responses (T0, T1, T2 & T3) and examine a reduced nitrogen treatment that would provide the industry, with more detailed investigations into varietal–nitrogen–disease interactions.
Morley fungicide response trial in winter barley	Maintain a baseline for fungicide timing responses (T1, T2 & T3) and optimise existing diagnostic DNA marker sequences to provide rapid, sub-species specific diagnostic markers, to explore ramularia and net blotch development throughout the crop growing season.

THE MORLEY AGRICULTURAL FOUNDATION

The Morley Agricultural Foundation (TMAF) is a charity which hosts and facilitates scientific agricultural research, education, and training. TMAF supports a series of long-term studies to examine how farming practices can support the farming industry both at a regional and national level.

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From soil to insects: understanding cereal viruses and reducing risk

Cereal viruses are much easier to manage if starting with one question: how is infection getting into the crop? There are two main routes: viruses that enter via the roots from soil and those that arrive through feeding by insects. Once the route is known, prevention is clearer because the practical options differ. Current work at Niab links practical agronomy with new resistance screening, particularly for barley yellow dwarf virus (BYDV). This matters because viruses can quietly undermine a crop long before anyone is confident about what they are seeing.

Dr Kostya Kanyuka leads UKCPVS and heads the Plant Pathology Department at Niab, managing strategic and applied research on the biology, detection, surveillance, epidemiology and management of diseases and pests of field crops, working with a wide range of academic and commercial partners and customers. Kostya's overall research interest is to understand how pathogens cause disease on plants and how plants resist pathogens at the mechanistic and molecular level with the aim of developing sustainable solutions for disease control in crops.

Will Vaughan-France is Niab's regional agronomist covering the southwest. He is based in Somerset with his own farm and has experience in a range of technical and commercial organisations.

Arable farming is being asked to deliver more with less. Drilling plans are squeezed by weather, rotations are tighter, and costs remain under pressure. In that context, viruses are awkward: they often mimic other problems, arrive with little warning, and by the time symptoms are obvious there is usually no corrective action that puts things right. Put simply, a spray does not cure a virus-infected plant. The biggest gains come from decisions made before, or during, establishment: reducing exposure at the vulnerable stage, preventing infection where possible, and choosing varieties that cope better.

Two routes, two patterns

Splitting cereal viruses into two broad groups simplifies decisions. One group is soil-borne, where a microscopic soil organism carries virus into roots. The other is insect-transmitted, where sap-feeding insects move virus between plants. Both can cause patchiness, stunting and yield loss, but timing and field patterns differ, and so do the best management levers.

Soil-borne mosaic viruses usually infect wheat or barley in autumn as seedlings establish, but the clearest symptoms often appear later in late winter and spring. Risk is linked to cool, wet conditions around germination and early root growth, and problems often repeat in the same fields because the vector survives for a long time.

Insect-transmitted viruses behave differently. Risk can rise quickly when vectors are active and a green bridge of volunteers and grass weeds keeps insects and virus ticking over between crops. Losses are usually greatest when infection happens early and the crop carries virus through winter.

The next step is simply to recognise which pattern you are dealing with, then focus on prevention that matches the route.

Soil as the reservoir

Soil-borne mosaic viruses are delivered into cereal roots by *Polymyxa graminis*. In winter wheat, the main concerns are the closely related soil-borne cereal mosaic virus (SBCMV) (Figure 1) and soil-borne wheat mosaic virus (SBWMV). In winter barley, the key problems are barley yellow mosaic virus (BaYMV) and barley mild mosaic virus (BaMMV), a different virus genus from the wheat mosaics, but with the same route of entry via *Polymyxa*. The long-term challenge is persistence:

Figure 1. Soil-borne cereal mosaic virus disease symptoms in the field and close-up

Figure 2. Niab membership BYDV variety trial in Devon in 2023

Polymyxa produces resting spores that can survive for decades, so fields can remain at risk long after symptoms were first seen.

Timing can be confusing. Infection usually occurs during autumn establishment, but symptoms are most obvious later as virus moves through the plant and spring growth is slowed by cold weather. Crops may grow away from the worst symptoms as temperatures rise, but the damage to uniformity and yield potential may already be done.

In the field, soil-borne mosaics often show as irregular patches of paler, stunted crop. Patches are frequently linked to wetter zones, variable soils, or tramlines, and can be elongated in the direction of cultivations or drilling, where soil movement drags infected material along the run. At leaf level, the canopy may show pale green to yellow mosaic and a general lack of vigour. Severe cases show marked stunting, fewer tillers, delayed development, and poorer grain set.

Establishment conditions matter because they affect both *Polymyxa* activity and how quickly the crop can get away. Transmission is greatest soon after germination and is favoured by cool-to-mild soils and high moisture – so a cool, wet spell around drilling increases risk, and a slow spring can make symptoms look worse.

Control options reflect that biology. Standard fungicides do not control *Polymyxa* (more closely related to protists than fungi) and will not stop virus transmission in roots. Rotation can reduce exposure, but it will not remove risk quickly because the vector persists. Soil hygiene matters too: moving contaminated soil on machinery can spread the problem between fields. The strongest lever is variety choice because there is no spray solution once infection has occurred. In winter wheat, the varieties Mayflower and Costello are useful resistance sources for SBCMV. In winter barley, all AHDB Recommended List (RL) varieties carry the recessive *rym4* gene, giving full resistance to BaMMV and the common BaYMV1 strain; Darcie, Kitty and Valerie also add resistance to BaYMV2, which evolved to overcome *rym4*.

Insect transmission

BYDV remains the insect-transmitted virus most often linked with economically significant losses in UK cereals. The field picture is not always clear: crops may look thin, uneven, slow to tiller or generally off-colour, overlapping with nutrition, drainage, compaction, or other stresses (Figure 2). Symptoms are not always obvious, so testing and good field context often turn suspicion into confidence. Visual clues can help; symptoms may show more in younger tissue, and discolouration/reddening can sometimes form a lateral V-shape – useful hints rather than rules.

BYDV is transmitted by aphids, and transmission is persistent: aphids acquire virus, carry it internally, and transmit it as they feed. Species such as bird cherry-oat aphid (*Rhopalosiphum padi*) and English grain aphid (*Sitobion avenae*) differ in efficiency, and BYDV occurs as several strains, with BYDV-PAV, -MAV and -PAS important in the UK.

The practical message is simple. BYDV risk is not just "are there aphids?" It is mainly about when aphids arrive, whether they carry virus, and how long young crops stay exposed, especially in autumn. It also depends on whether aphids can establish and multiply: infection pressure builds from second and third generation aphids developing within the crop, more likely with early sowing and milder autumns and winters (Figure 3). Risk can be shaped by the cropping environment: cultivation system, trash levels, the green bridge, and the balance of beneficial insects that suppress aphid build-up. That is why diagnostics and surveillance are becoming more important alongside monitoring. Work at Rothamsted Research highlights substantial genetic diversity within BYDV strains, which matters because tests based on limited sequence sets can miss relevant variation.

Figure 3: BYDV virus infected wheat after potatoes, originally treated for aphids but infected due to later flights over winter

Better detection helps confirm what is happening, track circulating strains, and support breeding so resistance targets the viruses present.

Vector control still has a role, but it is not a complete answer. In UK wheat and barley, in-crop aphid control still relies on foliar pyrethroids, with limited alternatives (for example, flonicamid on some labels, mainly for summer infestations). Pyrethroids can work well where populations are susceptible, but knockdown resistance (kdr) in English grain aphid is already a serious constraint, so monitoring and non-chemical prevention are as important as the spray decision.

That is why resilience through host genetics, backed up by prevention, monitoring and well-timed interventions, is becoming central to sustainable control. Among the 2026/27 AHDB RL winter barley varieties LG Catapult, LG Carpenter, Organa, Integral and KWS Feeris are listed as BYDV tolerant, while SY Kestrel is marketed as resistant. These claims are based on breeders' own assessments and have not yet been confirmed through AHDB RL testing. The winter wheat varieties RGT Goldfinch and RGT Guardsman carry the Bdv2 gene introgressed from intermediate wheatgrass (*Thinopyrum intermedium*), which suppresses BYDV replication and/or long-distance movement (lower virus titres and reduced systemic spread). A Kansas State University study reported ~10% lower disease severity where Bdv2 was present, indicating resistance is strong but partial.

Emerging issue

Wheat dwarf virus (WDV) deserves attention because it is not simply another aphid virus. Its vector is a leafhopper, *Psammotettix alienus*, not an aphid, which changes what control can realistically achieve. The virus cannot be controlled chemically, and aphid-targeted sprays do not reliably control the leafhopper. Only pyrethroids have activity against leafhoppers, while pirimicarb has no effect. It is also a concern that WDV has been confirmed in winter barley crops in East Anglia at meaningful scale.

The message is the same as for other cereal viruses: there is no cure once the crop is infected, so management must focus on prevention. In practice that means avoiding very early drilling of winter barley where possible, removing the green bridge by controlling volunteer cereals and grass weeds at least two to three weeks before drilling, and thinking carefully about field risk. Risk can be higher in cereal-after-cereal situations, near grass margins, or where there is a history of virus-like symptoms. To date, there are no reported sources of WDV resistance or tolerance in UK winter wheat varieties, and in winter barley SY Kestrel is currently the only AHDB RL variety marketed with WDV tolerance.

Testing

Testing is most useful when it improves the next decision. If a field shows similar spring mosaics year after year in the same zones, confirmation supports long-term planning around soilborne risk and variety choice, rather than repeated attempts to "correct" nutrition.

If BYDV-type symptoms appear early enough to consider vector decisions, confirmation helps avoid chasing the wrong cause and strengthens field records – valuable when reviewing drilling dates, green bridge management, and variety choices next season. Testing and surveillance also feed into research: if breeding is to deliver durable resilience, a clearer picture is needed of which viruses and strains are circulating, and where pressure is increasing.

Research

The most valuable cereal virus work is the kind that reduces guesswork on farm. For soil-borne mosaics, it means clearer recognition of risk windows and more consistent information on variety performance where resistance exists, because persistence of the vector makes this a long-term field issue. For insect-transmitted viruses, it means better diagnostics and a stronger pipeline for resistance and tolerance, because vector control is never perfect and infection can occur before any intervention is possible.

A major current example is Niab's work on BYDV resilience. Niab is working with the University of Nottingham and UK wheat breeders, through a PhD studentship, to screen new germplasm developed at Nottingham for sources of BYDV resistance or tolerance. More than 350 wheat–wild relative introgression lines are being screened using robust, repeatable phenotyping under insectary conditions, and many are also being trialled by breeders in inoculated field trials. Linking controlled screening with breeder field evaluation increases confidence that promising material performs under pressure, not just in low-virus years.

Alongside resistance screening, work continues on more strain-aware BYDV diagnostics and faster approaches that support field surveillance and research decisions. The aim is not to add complexity, but to ensure the tools used to identify risk and the traits bred into varieties, match the virus populations crops encounter.

Into the field

A useful habit is to start every suspected case with one question: is this anchored in the field, or does it arrive each season? Repeating spring mosaics in the same parts of the same field, especially after wet establishment, should push soil-borne mosaics up the list. Risk that shifts with green bridge opportunities, drilling date and insect activity should push BYDV and other insect-transmitted viruses higher.

From there, the most reliable improvements are the ones that reduce early infection opportunities. That may mean accepting that shortcuts around green bridge management or drilling timing carry hidden virus costs. It also means treating variety choice as a risk decision as well as a yield decision, and keeping clear virus records because viruses, particularly soil-borne ones, behave like other system problems and tend to build if ignored.

The direction of travel is encouraging. Better surveillance and diagnostics are improving confidence in what is happening in crops, while breeding and pre-breeding are widening the genetic base for resilience. The practical aim is simple: fewer surprises in spring, fewer repeat problems in the same fields, and more seasons where virus pressure is managed quietly in the background rather than dominating the conversation.

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UKCPVS highlights rising pathogen risks and need for stronger stewardship

Niab hosted the annual UK Cereal Pathogen Virulence Survey (UKCPVS) Stakeholders' Meeting in early January 2026, bringing together breeders, agronomists, researchers and industry representatives to review the 2025 season, the latest evidence on evolving pathogen risks and how best to safeguard control options.

Dr Kostya Kanyuka – see page 25.

Dr Charlotte Nellist is a senior plant pathologist, co-responsible for the UKCPVS programme, with interests in disease resistance characterisation on a wide range of crops and understanding how pathogens interact with hosts. This includes previous work on improving durable disease resistance in horticultural crops and studying pathogenicity of the associated *Phytophthora* spp.

Since 1967, the UK Cereal Pathogen Virulence Survey (UKCPVS), managed by Niab, has been monitoring virulence in populations of fungal pathogens, which cause major diseases in the UK cereal crops, including wheat yellow rust (*Puccinia striiformis* f. sp. *tritici*) and wheat brown rust (*Puccinia triticina*). Funded by AHDB and Defra the Survey provides information to assist disease risk management on farm and underpins AHDB Recommended List disease resistance ratings, assessing the threat that each new race poses to the full range of commercial varieties.

Across the meeting, the key messages converged on a single point: disease control through improved wheat genetic resistance and well-designed fungicide programmes remains one of the most valuable tools in cereal disease management, but also one of the most fragile. With pathogen populations dynamic and diverse, sustained surveillance, rapid intelligence sharing, integrated agronomy, and careful stewardship of both resistance genes and chemistry are essential to maintaining robust, durable control.

Chaired by Diane Saunders (John Innes Centre), the event programme ranged from UKCPVS surveillance updates and yellow rust resistance strategy through to gene stewardship, eyespot population change, and fungicide resistance monitoring (Figure 1).

Figure 1. Diane Saunders, Charlotte Nellist and Kostya Kanyuka addressing the UKCPVS stakeholder meeting at Niab in January 2026

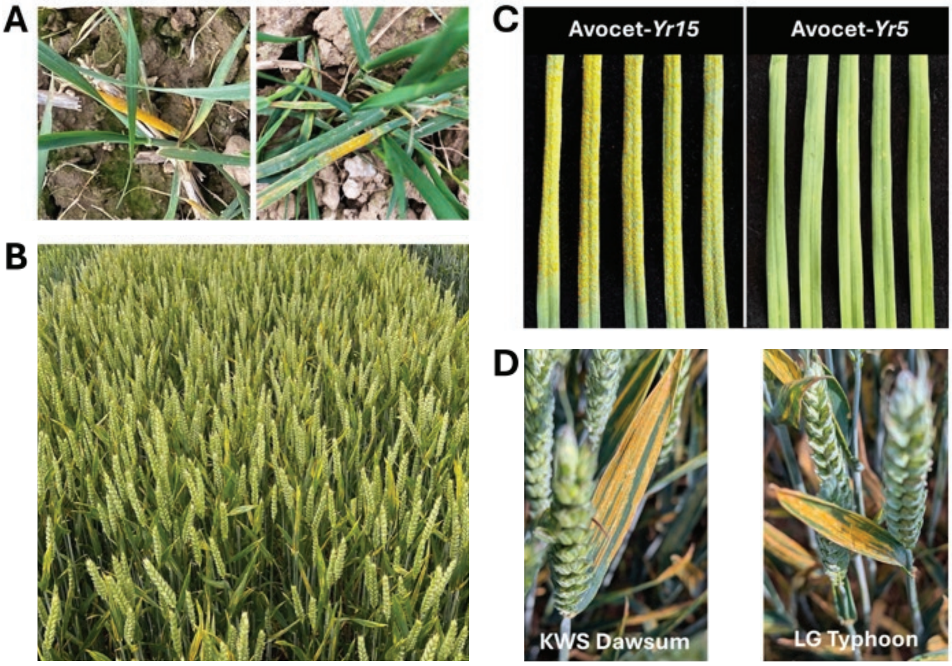
In the UKCPVS project update, Charlotte Nellist (Niab/UKCPVS) reported strong engagement in the national monitoring scheme, with 257 yellow rust samples submitted from 28 counties and one from Ireland, covering 36 varieties and 17 candidate lines. Their analyses reinforced an important development for growers and breeders: widespread deployment of the *Yr15* resistance gene in UK wheat has been accompanied by confirmed virulence to *Yr15* in the pathogen population (Figure 2). Genotyping indicated these isolates align with the European Warrior – (*PstS10*) lineage, highlighting how quickly established populations can adapt under selection pressure. The team also noted that some varieties are likely benefiting from additional adult plant resistance and/or minor genes, which may continue to contribute protection in the field even where major gene resistance has been compromised. Encouragingly, in a set of mixed isolates screened by UKCPVS, no virulence was detected for *Yr5*, *Yr8*, *Yr10* and *Yr24*, pointing to resistance sources that currently remain effective in these tests.

Research from the John Innes Centre in Norwich outlined the rapid research response to the breakdown of *Yr15*, aimed at identifying fresh and diverse sources of yellow rust resistance for breeding. JIC's Clare Lewis reported that, building on previously available datasets from the Watkins landrace collection, 33 lines showing resistance to the Warrior – (*PstS10*) race isolates had already been pinpointed. These same 33 lines have been screened with several yellow rust isolates virulent on *Yr15* and found that most remained resistant, offering an immediately useful set of candidate resistance donors. Early genome-wide association analyses suggest multiple distinct resistance sources are represented within this group, a promising sign that breeders may be able to stack different mechanisms to improve durability rather than relying on a single widely deployed gene.

This theme of durability and "not putting all our eggs in one basket" was echoed in a panel discussion on gene stewardship with Diane Saunders, with panellists Paul Nicholson, from JIC, KWS's Nick Bird and Paul Gosling from AHDB. The focus was on what the sector can do collectively to avoid repeating the situation seen in 2025 when the breakdown of *Yr15* affected a large number of varieties from different breeding programmes that shared the same major resistance gene. Themes explored included earlier visibility of resistance gene deployment, greater diversity in the genetic packages entering the market, and decision support that reflects vulnerability as well as how headline scores could all help reduce the risk of a single resistance failure being amplified across the national crop.

Figure 2. Breakdown of *Yr15*-mediated resistance to wheat yellow rust in 2024/25

A. Severe infection on the previously resistant variety blend KWS Dawsum/Champion in Northumberland, early in the season.
B. Plot-level symptoms on the previously resistant variety Mayflower in North Yorkshire.
C. Seedling susceptibility assay carried out under growth room conditions confirming virulence of the yellow rust isolate WYR25-001 (sampled from the previously resistant variety KWS Dawsum in North Yorkshire) on a differential line carrying *Yr15*.
D. High disease severity on previously highly resistant varieties KWS Dawsum and LG Typhoon in Lincolnshire, late in the season.



Eyespot

Attention also turned to changes in eyespot populations, a stem-base disease of wheat typically caused by two closely related fungi, *Oculimacula yallundae* and *O. acuformis*. Kevin King (Rothamsted Research) explained how infection leads to characteristic eye-shaped lesions on lower stems that weaken plants, increasing lodging risk and, in severe cases, contributing to white heads with poor grain fill. The two species differ in their growth characteristics in culture, with *O. acuformis* generally slower growing on agar than the faster growing *O. yallundae*, and *O. yallundae* typically the more aggressive pathogen on wheat.

Drawing on large numbers of diseased samples collected through the Defra Pests and Diseases Survey, managed by ADAS, analysed via both culture-based isolation and PCR, it has been shown that *O. yallundae* is currently the predominant species within the UK eyespot complex. It was suggested that the balance between the two species may have shifted over time, with changes in fungicide use potentially influencing prevalence, as the two species appear to respond differently to different fungicide groups.

Resistance

Fungicide resistance trends were reviewed by Niab's Nichola Hawkins, who stressed the need to assess laboratory sensitivity testing data alongside field performance to distinguish genuine resistance shifts from season-driven effects such as weather and disease pressure. The Fungicide Resistance Monitoring Programme draws on samples from the Fungicide Performance Trials (both funded by AHDB) and additional early season locations supported by industry partners, helping to detect emerging changes earlier than would be possible from field observations alone. Fungicide resistance patterns in Septoria differ by mode of action, with QoI (quinone outside inhibitors) resistance tending to arise as a single step change (one reason QoIs are no longer used for Septoria control in the UK) while azole sensitivity has shifted more gradually over time through stepwise change. For SDHIs, the newest actives remain highly effective against populations dominated by intermediate sensitivity genotypes, but the data show a risk of selecting for more resistant genotypes, underlined the importance of stewardship to reduce the risk. QiI (quinone inside inhibitors) monitoring has not detected resistance so far, but the message was clear that vigilance and best practice remain essential.

A new generation of crop scientists

For graduate students interested in studying for a PhD Niab has excellent resources for research in molecular plant science, quantitative genetics, breeding, transgenic technology and plant pathology both at our Cambridge and East Malling sites. The majority of our PhD studentships, in partnership with UK universities, are funded by grants from leading business, charities and other research providers. Niab also partners with European and overseas universities, hosting international students. More information is available on niab.com.

In this issue, *Landmark* is providing an opportunity for Niab PhD students James Woodward and Ian Tsang to introduce themselves and summarise their research.

James Woodward

Growing complementary crops and nutritionally rewarding cultivars to sustain insect pollinators and crop pollination on farms.

South Coast Biosciences Doctoral Training Partnership (SoCoBio DTP).

October 2021 to October 2025.

Optimising pollination for pollinator-dependent crops is valuable because these crops include many fruits, vegetables, seeds, nuts and oils which provide sources of micronutrients, vitamins and minerals for healthy diets. Crop pollination deficits, where yields are limited by inadequate pollination, have been reported in Europe. These deficits are exacerbated by declines in local pollinator abundance and, depending on the crop, pollinator diversity.

A strategy to increase pollinators on farmland, which is yet to be incentivised under European or UK agricultural policies, is the development of complementary cropping systems. These systems feature sequentially flowering melliferous crops which are grown in close proximity to extend the period of forage availability for pollinators. This approach addresses the challenge posed by monoculture-dominated agricultural landscapes that flower synchronously, creating only a temporary pulse of floral resources for local pollinators. By selecting cultivars that are more nutritious and attractive to wild pollinators, complementary cropping systems could become more effective at sustaining pollinators on farmland.

In collaboration with my PhD supervisors, Professor Dave Goulson (University of Sussex) and Dr Michelle Fountain (Niab), I collected nectar and pollen samples from commercial apple (cv. Braeburn, Cox and Gala), sweet cherry (cv. Kordia, Merchant and Regina), plum (cv. Juna, Opal, Toptaste and Victoria), red raspberry (cv. Bella, Majestic and Nobility) and strawberry (cv. Centenary, Favori and Murano) cultivars across farms in Kent, to determine whether some sequentially flowering crop cultivars were more nutritious to pollinators than others.

Within their respective crop group, Braeburn, Kordia, Opal, Bella and Favori stood out for having high values across the nutritional quality measurements: nectar volume, nectar

Figure 1. Potential UK complementary cropping system based on our findings. Cultivars are listed in descending order of floral resource nutritional quality. Only the two most nutritious cultivars from each crop group are presented. General flowering times for each crop were acquired from the Niab East Malling blossom records. Cultivar-specific floral phenologies were obtained from the National Fruit Collection website, with the first date indicating 10% flowering and the second marking 90% petal fall. Dates under consecutive months signify a flowering period that bridges these months. "x" marks a lack of cultivar-specific floral phenology records. March until September encompasses the flight period of most British pollinators

	Floral Phenology*						
Crop (cultivar)	Mar	Apr	May	Jun	Jul	Aug	Sep
Plum							
Opal		16-29					
Juna		X					
Cherry							
Kordia		X					
Regina		X					
Apple							
Braeburn			14-26				
Cox			9-20				
June-bearing strawberry							
Centenary			X	X			
Ever-bearing strawberry							
Favori			X	X	X	X	
Murano			X	X	X	X	
Raspberry (primocane)							
Bella					X	X	X
Majestic					X	X	X

* Flowering times vary slightly among cultivars and in different years due to weather conditions and geographical location

sugar concentration and pollen protein content (Figure 1). At the crop-level, the crops were ranked in descending order of nutritional quality using the same metrics: raspberry, plum, strawberry, apple, and cherry.

Following this, I fed bumblebee (*Bombus terrestris*) microcolonies one of four artificial nectar treatments resembling either Braeburn, Cox, Kordia or Regina nectar, to determine their effect on colony health. Interestingly, the sugar composition of Braeburn nectar supported healthier bumblebee microcolonies than those of the other cultivars, indicated by higher male offspring emergence.

These findings highlight that complementary cropping systems could be enriched by the inclusion of cultivars with nutritious floral resources for pollinators. Continued research is needed to identify further pollinator-friendly cultivars to enhance these systems.

Ian Tsang

PhD; Advancing high-throughput phenotyping and genetic understanding of root hairs in wheat (*Triticum aestivum* L.) via computational and bioinformatic approaches.

October 2022 to September 2026.

Funded by the Collaborative Training Partnership for Sustainable Agricultural Innovation (CTP-SAI) (with The Morley Agricultural Foundation, Niab and the University of Nottingham), with additional grants from Bayer AG Crop Science Grant with the University of Cambridge, UKRI+ PhenomUK 'Access to Facilities' grant with Rothamsted Research and a 'NERC spectroscopy' grant.

Google Scholar:

Root hairs are important for nutrient and water uptake and are, to date, under-studied in cereal crops. Through investigating a new root hair mutant in wheat (Figure 2) that produces very short hairs possible genes have been identified to target for future crop breeding efforts via bioinformatic approaches, that may aid downstream gene-editing approaches. Through various field trials and phenotyping approaches, I have found that root hairs are important in wheat for early establishment, and the role of root hairs are more important under water-logged environments compared to droughted conditions.

I have developed artificial intelligence (AI) guided software (pyRootHair) to rapidly extract root hair trait data from root images (Figure 3). With this, researchers and plant breeders can quickly screen crop varieties with more 'optimal' root hair architecture and make informed decisions about their germplasm.

Given the changing agricultural landscape, efforts to breed crop varieties with optimised root hairs parameters to promote increased nutrient uptake should be prioritised.

Collaborations with colleagues across the world have been key in the research, resulting in multiple publications. Placements are also an integral part of a CTP PhD. My placement was carried out at the European Bioinformatics Institute (EBI), where I was able to further my skills in software development, database management and bioinformatics. I developed pipelines to load pangenome IDs, enriching data availability for rice researchers. Furthermore, I tested and loaded a full pangenome collection of barley accessions, gaining insight into release cycles and production testing.

Figure 2. a) Wheat root hair mutant producing very short root hairs b) Heterozygote segregant with intermediate root hair length c) Wild-type with long root hairs

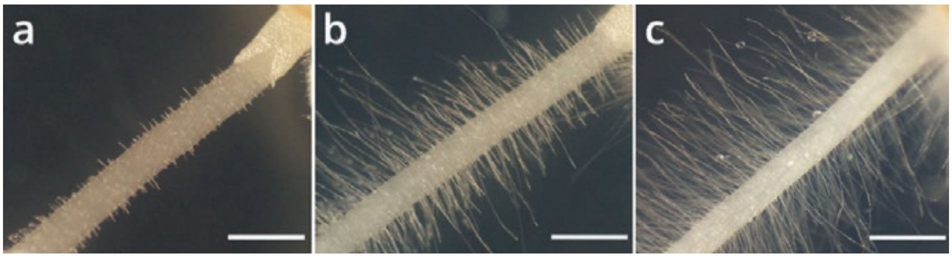
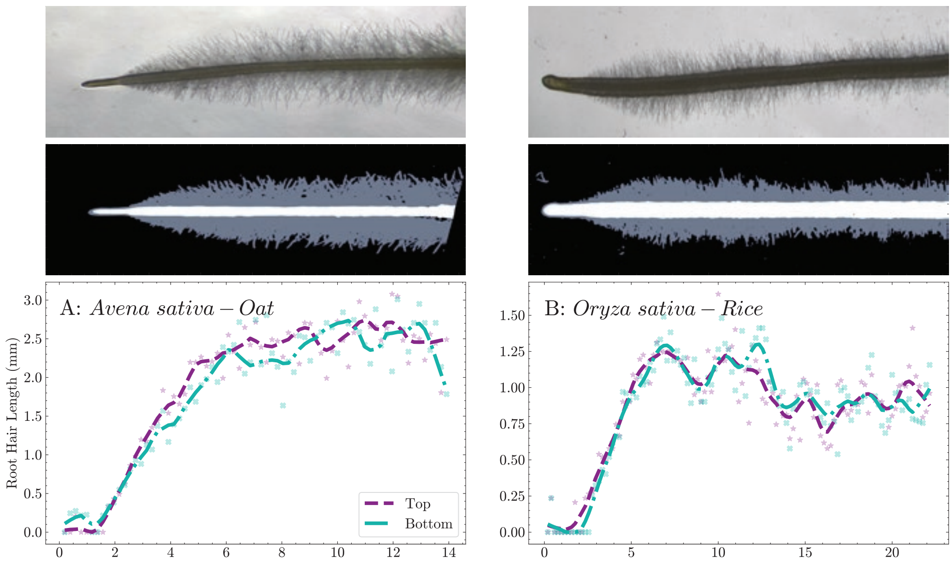


Figure 3. Demonstration of how the software extracts traits from an input image of a plant root



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Lessons learnt about wetter farming and paludiculture

A research and knowledge exchange specialist with a focus on sustainable land use and management, Dr Elizabeth Stockdale is Niab's Head of Farming Systems Research. She currently leads Niab's work in lowland peat landscapes and co-ordinates engagement activity for the Paludiculture Exploration Fund.

In its Autumn 2023 edition (Issue 53), *Landmark* introduced the challenge facing lowland peat landscapes where data on greenhouse gas (GHG) emissions show high emissions at high intensity in these landscapes (Figure 1). These emissions largely result from the aerobic decomposition of the organic soils releasing the carbon that was previous stable under anaerobic conditions as carbon dioxide (CO_2) to the atmosphere. 3-5% of the total GHG emissions from all sources in England are from lowland peatlands drained for agriculture. Detailed research work led by Professor Chris Evans at UKCEH has confirmed that it is the depth of aerated peat that is the dominant control on GHG emissions from managed peatlands. This work has shown that manipulating water table depths to near surface levels (0 to 10 cm below the surface) offers the optimal carbon derived GHG mitigation in lowland peat.

Over the last 300 years the aim has been to take water out of these landscapes, but now the aim is to enable a different approach to water level management. Significant reductions in GHG emissions can therefore be achieved if the water table can be maintained at a higher level through changes in agricultural water management and crops grown, even if land remains in crop production. Opportunities for wetter farming could include cultivation of wetland plants where these systems are known as paludiculture (Figure 2). As part of Countryside Stewardship Higher Tier, a range of rewetting actions are available to farmers paying £840-1,409/ha annually for a 10 year agreement (CSW 17, 18, 19, and 20) following an agreed implementation plan (PA1), often following funded feasibility studies (PA2).

For the past three years, Niab has continued its role in facilitating, partnering and leading a wide range of work to inform the development of policy and practice for wetter farming and paludiculture. In January 2026, visitors to the Low Carbon Hall at LAMMA, were invited to explore the emerging results of the 12 projects within the Paludiculture Exploration Fund (PEF) (Figure 3). This £5 million grant scheme, supported by Natural England, has focused on the key barriers preventing the uptake of paludiculture and wetter farming as a sustainable and profitable land use on lowland peat soils. PEF has supported some of the UK's first field-scale trials of wetland crops grown under raised water tables, including Typha (bulrush), sphagnum moss, willow, and vegetable crops. Trials across Somerset, Lancashire and Norfolk have shown that wetter farming systems can operate successfully on rewetted peat soils while delivering significant reductions in CO_2 emissions.

Funding through PEF has enabled farmers to explore new uses for willow, planted Typha seeds with drones and mapped their own landscapes to explore the options for future management. A key outcome has been the UK's first integrated and scalable Typha supply chain, spanning seed establishment, harvesting, processing, drying and storage. This has been unlocked by downstream market opportunities, including textile applications such as BioPuff® created by Ponda as a sustainable alternative to synthetic fibres and goose down for insulated clothing. Existing machinery has been adapted to enable harvesting of Typha seedheads; these projects have also delivered low-impact crop establishment techniques using heavy-lift drones and post-harvest drying, storage and processing systems with digital monitoring.

Niab has supported knowledge sharing between projects and wider knowledge exchange in its role as PEF engagement lead – for more details of projects see **paludiculture.org.uk**. The work has included a scoping review of the impacts of paludiculture on the natural environment which found that

Figure 1. Relative impacts of different cropping landscapes on greenhouse gas (GHG) emissions intensity (i.e. carbon dioxide equivalents (CO_2e) expressed per calorie produced) reveal the very high relative impact of cropping systems on drained peatlands largely in boreo-temperate regions (with hotspots in northern Europe) and in tropical areas (with hotspots in Indonesia).

Data from Carlson et al. (2016) Nature Climate Change. DOI: 10.1038/NCLIMATE3158

	% of global calories	% of global GHG	Emissions intensity (tonnes CO_2e per M kCal)
Overall for crop production			0.16
Dryland cropping systems	84	20	0.03
Paddy rice	15	48	0.58
Cropping systems on drained peatland	1.1	32	3.70

Figure 2. Farming with higher water tables (wetter farming) or growing wetland plants as crops (paludiculture) can provide options for productive lowland peat systems with low greenhouse gas emissions. In drained peatlands, microbes to oxidise organic materials that were stable under anaerobic conditions. This releases carbon dioxide (CO_2). Under completely waterlogged conditions in wetlands, anaerobic respiration leads to emissions of methane (CH_4). N_2O emissions are linked to the intensity of nitrogen inputs and wet-dry cycles in surface soils

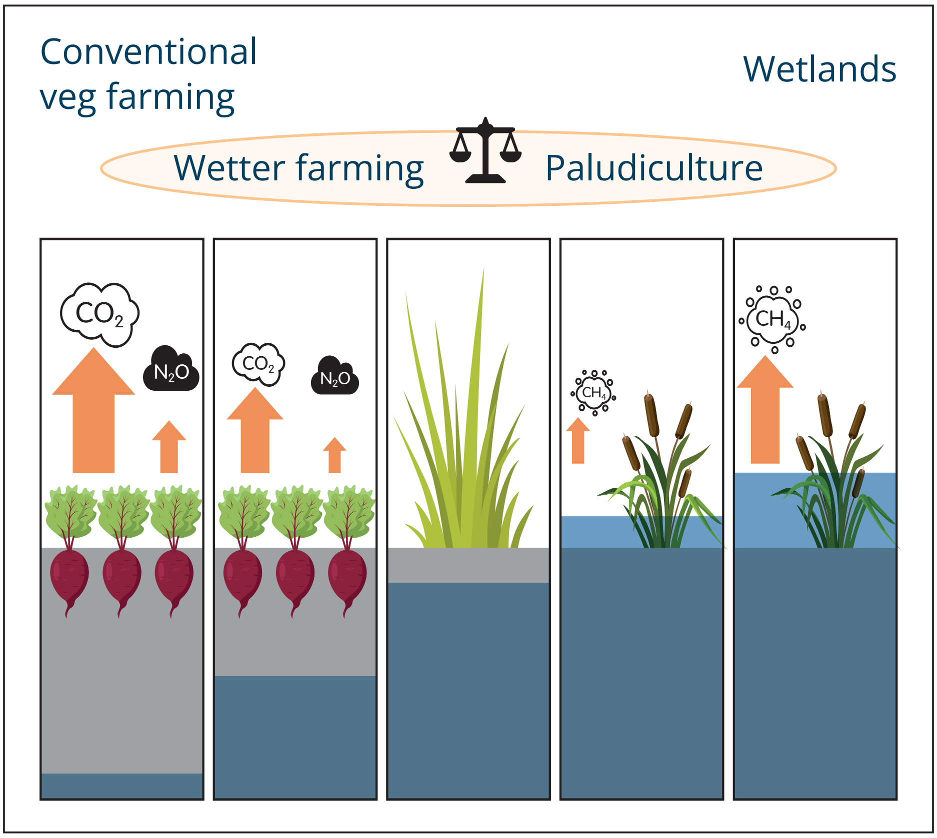
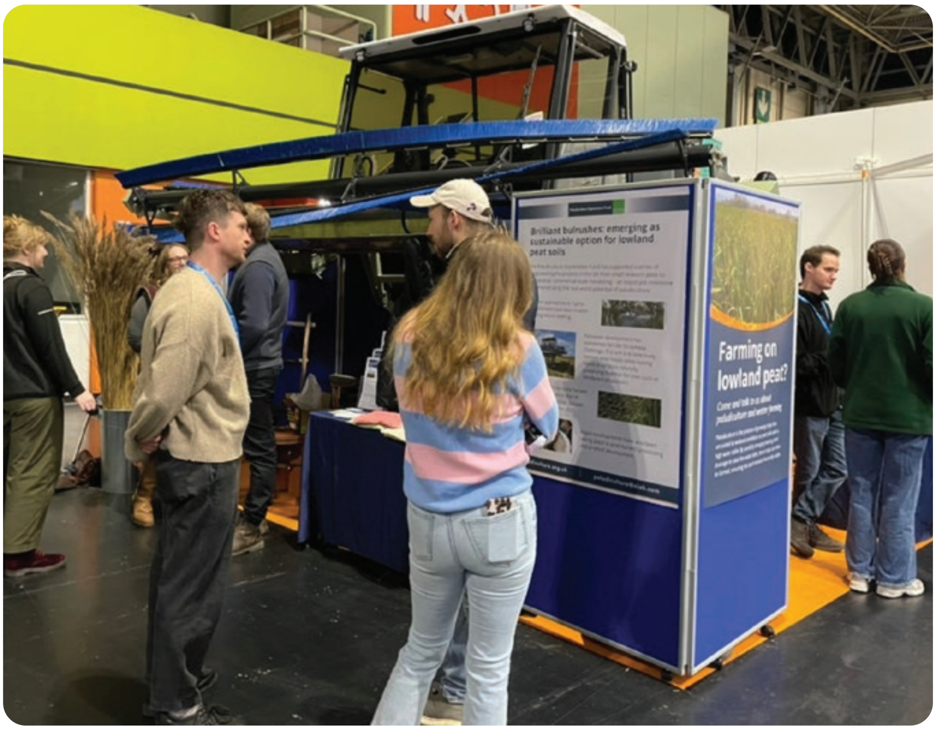


Figure 3. With a stand at LAMMA/Low Carbon Show in January 2026 Paludiculture Exploration Fund projects showcased their work on the Typha supply chain, including agronomy, harvesting and product development, as well as wider wetter farming projects



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Sphagnum moss field trials

paludiculture is likely to have mixed effects on the natural environment, depending on the outcome considered and precisely how it is implemented. The report, 'Impacts of paludiculture on the natural environment: a scoping report' creates a platform for further research that considers the impacts of paludiculture before implementing any significant changes to current practises.

Across the PEF programme, the work is helping to shift paludiculture from small-scale experimentation towards a credible, scalable peatland economy. By reducing emissions, restoring peat soils and opening up new rural markets, wetter farming can play a central role in the future of sustainable land management.

In 2022 Niab and Fenland Soil showed that the informal, fragmentary, and descriptive knowledge of land managers can be brought together with that of other experts to create an integrated evidence base and develop 'Opportunities Maps' where paludiculture, wetter farming and peatland restoration are most viable. Fenland Soil has continued to play a central role in convening regional partners and facilitating dialogue between land managers and researchers (www.fenlandsoil.org). More than 30,000 hectares of fenland have now been mapped and this is supporting strategic decision-making by landowners, advisors and policymakers.

Niab has also worked with WWF and Fenland Soil to explore and support more sustainable cropping systems on lowland peat soils.

This work brought together the best-available knowledge to show how farming practises can adapt to achieve more sustainable cropping systems, alongside other changes in lowland peat landscapes such as peatland restoration and new crops for the bioeconomy in paludiculture systems. Outputs include a guide to help farmers identify actions that can be taken to better manage cropping systems on these soils for a sustainable future. They give targeted guidance and bring together information to help plan first steps and are available on www.paludiculture.org.uk.

Farming on lowland peat areas

Resources and information

https://agricology.co.uk/resource/cropping-systems-on-drained-lowland-peat/

Managing for a sustainable future: Cropping systems on drained lowland peat

The Committee on Climate Change 7th Carbon Budget sets out the pathway to reach Net Zero by 2050 to inform Government and wider action. In the Balanced Pathway, the proportion of lowland peatland in restored or near-natural condition rises from 9% currently to reach 31% by 2040 and there is a target of 56% by 2050. Currently the expectation is that restoration will be the more important pathway to reduce GHG emissions from lowland peat.

However, the Committee on Climate Change recognises that lowland peatlands represent an important agricultural and horticultural resource, hence actions to change water level management (continuous and dynamic) with paludiculture and/or wetter farming might help reduce GHG emissions whilst supporting production. Ongoing and growing collaboration across academics, policy and practice reflect the shared ambition to support food and fibre production while protecting biodiversity, reducing GHG emissions to support a long-term future for productive lowland peat landscapes. A common vision for 2050 is therefore a combined, landscape-scale approach that is likely to have a mosaic of continued high value cropping systems under wetter conditions (arable and vegetable crops) integrated with alternative wetter land use opportunities and peatland restoration (e.g. carbon farming), underpinned by an integrated system of water management supporting over 65% of lowland peatland with near-surface water tables (10-30cm below surface).

Since 2023 we have come a long way by taking the ideas of paludiculture and wetter farming and demonstrating them at field and supply chain scale, but there is still further to go and the window for effective action is short. We are expecting that there will be a new government fund in spring 2026, similar in scale to the PEF, to support further development of paludiculture and wetter farming systems as a sustainable and profitable land use on lowland peat soils.

Typha is a perennial crop used in bioenergy and a raw product for building materials

Simon Barnes • simon.barnes@niab.com

A regional approach to a national challenge: how to create a healthy food system

Growing Kent & Medway is a five-year project, conceived to invest in innovation and R&D in the local horticultural sector. Funded by UKRI's Strength in Places fund and led by Niab, the programme is now reaching the end of its current formal funding period. Director Simon Barnes reflects on Growing Kent & Medway's successes, lessons learned, and plans for the future.

Simon Barnes is the Director of Growing Kent & Medway. He has a background in facilitating successful sustainable value chain collaborations across different sectors. Simon has held senior strategic business development roles at institutions including the University of Kent, the High Speed Sustainable Manufacturing Institute and IGD.

The mission at Growing Kent & Medway is simple but ambitious: to derisk investment in innovation, help scale new ideas more quickly, and bring forward new technologies to improve our food system. I joined Niab as the Director for Growing Kent & Medway back in May 2025. Over the last 10 months, I've heard directly from growers how the programme has helped dismantle the wall between brilliant innovation ideas and their implementation on farms. As we look to the future of the programme, the task is to ensure we can continue to drive innovation in the sector. To do so, we need to demonstrate the impact of Growing Kent & Medway's local activity on a national scale.

With over 35 years' experience working in different industries, there are many similarities in the challenges and opportunities facing businesses wanting to invest in innovation, regardless of their sector. Ultimately, it comes down to confidence and certainty in the future economic and political environment. It is recognised that there are specific challenges facing our fragmented food and drink sector, and the barriers this creates for innovation, not least the natural variabilities of weather and nature.

Tomatoes growing in East Malling glasshouse on trials funded by GKM for enhancing nutritional content of tomatoes

By bringing together industry, policymakers, and researchers, and investing in R&D capabilities, our ecosystem aims to foster a greater appetite for innovation and provide business owners with the confidence to invest. We want to create a culture of innovation in our sector and region.

The vast quantity of the research projects Growing Kent & Medway has funded to date has been analysed to understand what elements were common to some of the most impactful innovation projects. A new benchmark tool offers growers the opportunity to learn how to develop great innovation projects and is available at www.growingkentandmedway.co.uk.

Success

Since its inception, Growing Kent & Medway has engaged with over 700 businesses, funded more than 100 innovation projects, and brought over 70 new plant-based food and drink products to market. Growing Kent & Medway is more than just a regional funding body, creating a space for technical discussion, collaboration, mentoring, and business support. An independent brand evaluation review valued the brand at over £4 million, no small feat in just five years. The report recognised the positive, forward-looking, and solution-oriented environment created within our cluster, and described us as a 'one-stop shop' for horticultural businesses.

Niab staff teach children about careers in agritech at a STEM Hub & GKM Event

And while our support is targeted at driving growth in local individual businesses, success is measured by the impact had on the wider food system. We need to be producing more fresh produce locally to improve the health and security of our nation.

We are living through a pivotal moment in agricultural history, moving away from a sector dominated by chemical and carbon-based solutions toward one defined by biology and regenerative practices.

This transition is not just a trend; it is a necessity. But moving to more sustainable farming requires support. By working with Growing Kent & Medway, growers gain access to workshops and 'sandpits' – collaborative environments testing how to use less carbon and fewer chemicals while maintaining the productivity that keeps a business viable.

The Good Food Cycle

One of the most significant drivers of change in our industry is not a new plant protection product or technology – it is the consumer. Consumers drive change, and in the soft fruit and vegetable sector, we are uniquely positioned to lead a health revolution. Professor Chris Whitty, the UK's Chief Medical Officer, recently laid out a stark challenge: the UK needs to eat 30% more fresh fruit and vegetables and 50% more fibre. He told industry directly at a recent conference that "You need to lean into this challenge."

The impact of poor diet on the UK's health system is staggering, costing between £11 billion and £40 billion annually. Here in Kent, the statistics are even more sobering. There is a life expectancy gap of 17 years for someone growing up in Sheppey compared to someone in Sevenoaks, a distance of just 30 miles. Much of this is down to a lack of access to healthy, affordable food. As growers, we are an inherent part of the food system. We are not just producing a commodity; we are solving a national health crisis.

For a long time, the prevailing view from the Government was that the UK did not need to worry about food resilience. The logic was that "We're a top ten global economy; if we don't grow it, we'll just buy it."

That view has died. Recent global political shifts, tariffs, and climate change have made retailers realise the extreme vulnerability of their supply chains. They do not just want food; they want resilient food. The productivity gains in soft fruit over the last 20 years, for example, are being looked at to see how that growth can be harnessed to secure the UK's food future.

Niab's Matevz Rupar describes his coir recycling project funded by Growing Kent & Medway at an event at East Malling

The way the government funds innovation is changing. We are moving toward more 'place-based innovation with national impact'. If you want to build ships, you go to Glasgow; if you want to lead the world in horticulture and fruit, you come to Kent. Niab and its partners is currently applying for a £20 million fund over five years, which, when matched, will create a £40 million investment into the Kent and Medway region. The bid is based on the key attributes of the Kent and Medway region, driven by industry needs, and consolidated through the triple helix of industry, universities, and local government.

To guide this bid, four key areas for intervention and drivers for growth have been selected; 'digital change and data systems', 'energy efficiency', 'biotechnology', and 'investment', three of which are rooted in the government's industrial strategy. All are core to a functioning food system business model. These drivers will be harnessed to a series of co-ordinated industry led projects. The ambition is to establish a dedicated investment fund to exploit commercial opportunities resulting from the programme, designed to deliver a 'fail fast – learn faster' culture and identify the best opportunities for growth.

National impact from local roots

The ambition is to make Kent and Medway the global home of horticultural food innovation. But for this to work, it must be demonstrated that what happens in Kent benefits the whole of the UK. The successes of this approach can be seen in 'food valleys' in The Netherlands, Switzerland, and North America. We must continue to share our work, collaborate across institutions, and demonstrate that our innovations can scale.

We need a system-thinking approach to radically transforming our food system. One that balances resilience, profitability, growth, security and health at its heart. Growing Kent & Medway has shown what can be achieved by taking a place-based approach to these national challenges. And we're just getting started.

Dutch Embassy Agritech Mission to East Malling

Contact Growing Kent & Medway to get involved in future plans:
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GROWING KENT & MEDWAY

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Scott Raffle • scott.raffle@niab.com

Matching supply with demand for nutrients in raspberry fertigation

There is pressure on growers to use fertiliser products more efficiently. Not only have fertiliser costs risen sharply over recent years, but overuse is wasteful, percolative losses can contaminate water supply, and excess nitrogen can be converted to nitrous oxide which is deemed to be 300 times stronger than CO_2 at trapping heat in the atmosphere, and so there are strong environmental arguments for using nitrogen more effectively. In raspberry, too much nitrogen can also lead to excessive plant growth, which directly increases water use, cane management and picking costs, whilst also increasing the risk of fungal disease and reducing light levels in the crop canopy.

Dr Mark Else is Head of Crop Science and Production Systems at Niab's East Malling site in Kent, whose research focuses on understanding and manipulating crop and environmental interactions to deliver improved resource use efficiency, crop productivity and quality of fresh produce.

Scott Raffle is Niab's Senior Knowledge Exchange Manager, raising the profile of the research and commercial activities at Niab in East Malling and improving collaboration between researchers and the fruit and wider horticulture industry.

In a previous Innovate UK funded project, Niab adapted a mathematical model to predict the plant's nitrogen demand based on growth stage. Inputs are adjusted to account for the effects of environmental variables such as temperature on nitrogen demand and partitioning. The model gave rise to a 76% reduction in nitrogen use (Figure 1) compared to a commercial nitrogen fertiliser regime and a 37% reduction in water use, without affecting marketable yields or berry quality. In addition leaf and cane growth were reduced leading to lower harvest and cane management costs.

In a new project called SMARTFert+ funded by Innovate UK and The East Malling Trust, Niab teamed up with EDT DirectION, Netafim UK Ltd and New Farm Produce Ltd to develop this model further and improve the precision of nutrient delivery. Niab employed EDT directION's hand-held in-line NPK sensors to study nutrient delivery in real

Figure 1. N model (right) reduced N use by 76% compared to commercial control (left row)

time, which will in turn enable fertiliser formulations to be adjusted more readily to better match demand with supply.

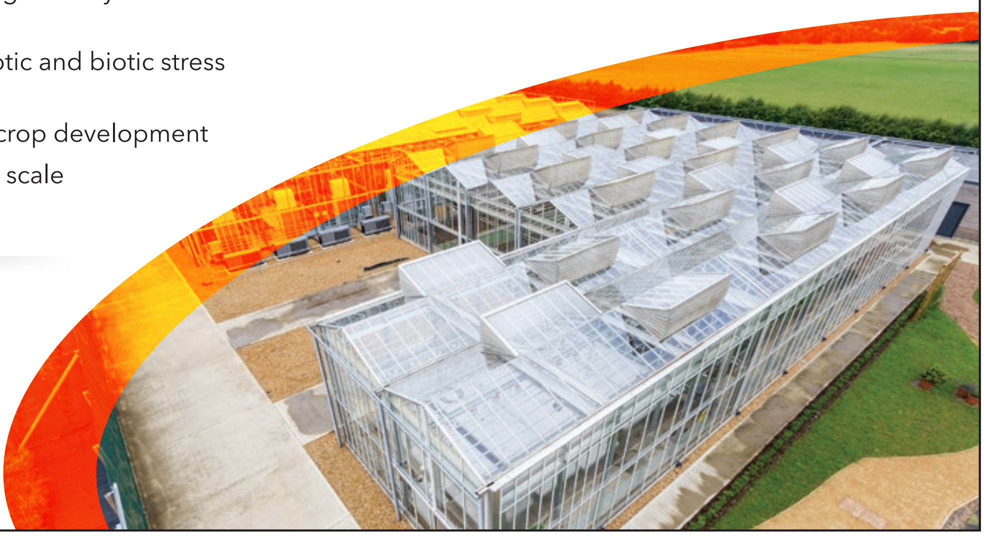
The nitrogen demand model was adjusted for a Malling™ Bella® primocane raspberry crop, to account for the biomass produced per hectare including the number of canes produced per pot and the planting density. The work also considered if current fertiliser recommendations are sufficiently accurate for modern production systems, whilst assessing the purity and consistency of made-up fertiliser formulations and consistency of fertigation delivery.

Using the nitrogen demand model during the vegetative phase of growth, nitrogen inputs from the model were compared to a commercial control. Total seasonal Class 1 yields of 5.2 kg/pot were picked from the control compared to 5.0 kg/pot from the nitrogen demand model. The model gave rise to water savings of 35% and nitrogen savings of 48% over the season compared to the commercial control. Dry matter (cane and leaf growth) production was lower under the nitrogen demand model in July and August.

In testing the in-line NPK sensors for checking the feed solutions being delivered (Figure 2), they were found to offer accurate and precise quantification of N and K concentrations with P concentrations measured using a two-step manual process. Measurement kits were launched by EDT directION for commercial use by growers in 2024.

Any future work will need to quantify any legacy effects of low-N treatments in subsequent cropping seasons, identify the optimum planting density or number of canes per linear metre of crop row in commercial production, whilst also automating real-time measurements of NPK & Ca. In addition, growers will need help and support to implement low-input growing of commercial varieties and this would require testing the nitrogen demand model on commercial sites, monitoring its performance and developing a user-friendly version for growers. Niab is also beginning to quantify the impact of low-nitrogen treatments on nitrous oxide emissions.

Figure 2. Nutrient delivery systems used for Malling™ Bella®



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Watching the stink bug

Niab is supporting the horticultural industry through a Defra funded surveillance programme for a new invasive pest of fruit crops. The brown marmorated stink bug (Figure 1) or BMSB (*Halyomorpha halys*) is a shield bug which originated in Asia and has become an invasive pest of fruit and other horticultural crops around the world including North and South America, North Africa, the Middle East and mainland Europe. It was first detected in Europe in Lichtenstein and Switzerland in 2004 and has established itself as a serious pest of fruit crops, most notably apple, pear, kiwi, peach, apricot, cherry and hazelnut.

It has become a particularly serious fruit pest in Italy where in 2019 it has been estimated that it led to total losses to fruit crops of €740 million. However, it is also a pest of residential and commercial properties where it leaves a rather unpleasant pungent odour, hence being labelled a stink bug. Historically it was not considered to be a major threat to UK crops, as the second generation of the pest each year typically causes fruit damage and the UK climate was not sufficiently warm to allow a second generation to develop to a stage where it might damage fruit. However, with climate change bringing longer, hotter summers, particularly in the south and east of England, it is likely that weather conditions will be better suited to developing a second generation in future.

BMSB lays eggs that hatch into nymphs of which there are five stages, before they develop into the adult stage of the pest. The fourth and fifth nymphal instars and the adults cause the most damage, feeding on flowers, leaves and developing fruits. On apple and pear, typical damage is misshapen fruits (Figure 2) that are rendered unmarketable, although internal corking of the tissue is also common. The pest also causes discolouration of the skin of tomato and pepper crops, feeding damage to the skin of runner beans, collapse and death of drupes on raspberry and blackberry, and swelling and a distinct odour on strawberry and blueberry fruits.

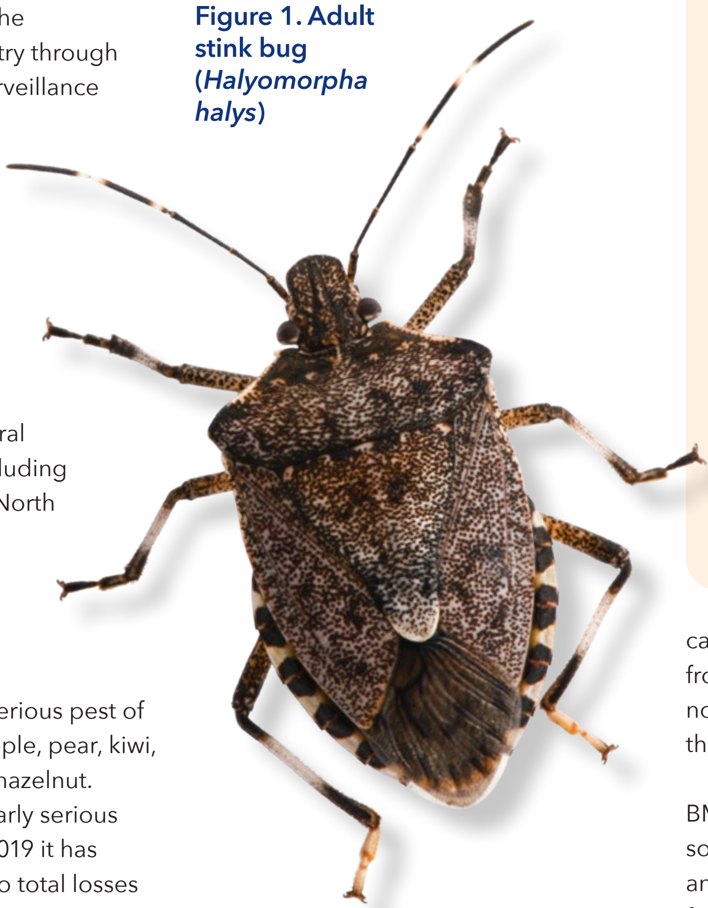


Figure 1. Adult stink bug (*Halyomorpha halys*)

Although BMSB was first intercepted at UK ports in 2010, sightings of adults were not made within the UK until 2018. Early sightings were exclusively male with the first female recorded in 2021. Defra has not designated it as a quarantine pest in the UK as it is not considered possible to regulate all the potential pathways that the pest could arrive on. It is also a well-known hitchhiker on packaging, freight and vehicles travelling from the continent, most notably campervans, lorries and cars. Consignments of new cars have been known to carry the pest from Asian countries to Australia, and it is not uncommon to fumigate these before they are transported by ships.

With climate modelling predicting that BMSB will be suited to establishing in southern and eastern England by 2050 and probably earlier, Defra has been funding Niab to conduct a surveillance programme across the UK to detect if and when the pest becomes established in the UK. Traps have been located in

Scott Raffle – see page 38.

Research leader Dr Francis Wamonje specialises in molecular and applied entomology and has led the Niab's surveillance work into the spread of the fruit pest brown marmorated stink bug across the UK since 2021. His molecular entomology work includes developing tools for early pest detection, molecular taxonomy to identify hard-to-distinguish 'cryptic' insect species, and environmental DNA (eDNA) methods for at-scale pest monitoring.

Figure 2. Mishapen fruits are unmarketable

Figure 3. Monitoring in municipal gardens

parks and gardens (Figure 3) within urban areas where temperatures are generally higher and more conducive to pest activity. Traps have also been located at caravan parks and at caravan storage sites where previous sightings have been regularly made as the pest hitchhikes back to the UK on these vehicles.

Since 2022, the numbers of annual sightings have increased with seven in 2023, 22 in 2024 and 35 in 2025, and the numbers of insects per sighting has also increased. In 2024, the first report of juvenile forms was recorded suggesting that the pest has now bred in the UK for the first time. In 2025, additional monitoring has been carried out around the edge of commercial UK fruit crops by British Apples & Pears Ltd (BAPL) and British Berry Growers (BBG), but to date no sightings have been recorded in commercial crops.

Although the pest is not yet considered to have established in the UK, the industry has been preparing for a time when crop damage starts to occur. Niab takes an active role in the BMSB Industry Working Group which includes a number of stakeholders including Horticulture Crop Protection Ltd (HCP Ltd), BAPL, BBG, Defra Plant Health, Fera the Royal Horticultural Society, Kew Gardens, Tomato Growers Association and other crop associations who have a strategic interest in the pest. Chaired by Harriet Duncalfe (H&H Duncalfe), its aims are to share findings of the surveillance programme, the latest research results, potential control measures and any other relevant information.

BAPL has funded Niab to produce a report on BMSB for its apple and pear growers while The Worshipful Company of Fruiterers is currently funding Niab to investigate if UK native parasitoids exist which offer a realistic sustainable form of natural control in the UK. HCP Ltd has also been gathering information for the industry on those products which offer control of the pest and in which countries around the world they are authorised for use.

The Working Group is also very interested in a parasitoid that is not native to the UK called the samurai wasp (*Trissolcus japonicus*) which is a highly effective parasitoid of BMSB that is proving to be working in Switzerland and Italy. The group is in discussion with Defra about the potential to apply for a licence for it use in the UK, should the pest become established here.

As part of Defra's surveillance programme, Niab has been actively raising the profile of BMSB amongst the public and through the caravan and campervan community. We have been encouraging the pubic to look out for it and seeking caravan and campervan owners to check their vehicles for the pest on returning to the UK. An infographic (Figure 4) has been circulated to caravan storage sites and adverts placed in the caravan and motorhome trade press. This has resulted in a great many samples being sent to Niab for correct identification.

BMSB has a number of features which distinguish it from other shield bug species that are commonly found in the UK, so many samples submitted by the public to Niab are not positively confirmed to be BMSB.

In 2026 Niab will raise the profile of the pest further by promoting its presence to the UK haulage industry and an arrangement has been made with the Port of Dover Authority to advertise on electronic display boards at the front of assembly lines where queues of vehicles form when entering ferry boats. We aim to raise awareness of the pest and encourage owners to check their vehicles when returning to the UK.

All the alerts signpost readers to further information about the pest at the Niab website niab.com/bmsb with information about how to distinguish BMSB from other shield bugs and how to submit samples of the pest to Niab for correct identification. There is also a link to a very helpful plant pest factsheet produced by Defra and free to view online.

The purpose of this combined surveillance and alert programme is to provide an accurate picture of how widespread the pest is becoming so that further measures can be implemented to prepare the fruit and horticultural industry for possible crop damage and how best to manage it. For growers who want to start to monitor for its presence, Russell IPM and other biocontrol companies are developing traps for use on commercial farms.

Figure 4. Infographic circulated to the caravan and campervan sectors

Defra BMSB factsheet

Scan the QR code below.

Staff profile – Sarah Arnold

sarah.arnold@niab.com

Dr Sarah Arnold is a research leader in applied entomology, based at East Malling in Kent. Her career, driven by a long standing interest in insects, spans from studying bumblebee behaviour to applied research at Niab focused on pollination of soft fruit crops in protected systems such as polytunnels and glasshouses.

Why is your work important?

Fruit plays a vital role in a healthy diet, and increasing UK production in a sustainable manner is essential. This requires reducing our reliance on pesticides and using alternative pest management strategies.

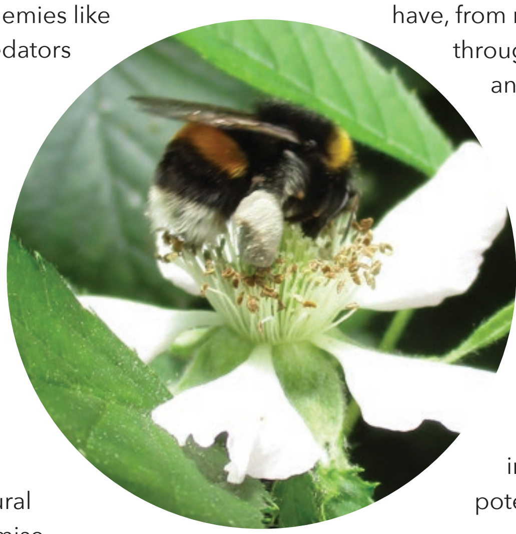
Many UK fruit crops depend on insect pollination, and we rely heavily on managed pollinators to ensure these crops are getting the pollination services that they need. However, managed pollinators do not always perform effectively in modern growing systems. I'm interested in exploring ways to improve pollinator performance so we can ensure high quality, nutritious, sustainable fruit production in our diets.

What are the biggest challenges in your research area?

The withdrawal of some crop protection products has left growers with fewer tools to manage pests in their crops. Future approaches may include biopesticides, biocontrols or novel solutions rather than reverting back to methods used in the past. Climate change and globalisation is also increasing the risk of new pests entering the UK. For example, *Drosophila suzukii*, the spotted wing drosophila, has swept through Europe and now it's so common in many fruit crops that it's very difficult to tackle. Sadly, it's just one of many invasive and exotic pests that are starting to come into the UK, and we need to find ways to tackle them.

How does your work tackle these challenges?

Our research at Niab is drawing on diverse range of expertise, from precision spraying technologies, using pesticides more accurately and in the exact amounts that each plant needs, to genetic tools for improved pest identification. But, we're also looking at habitat management that supports natural enemies like parasitoids and predators that can move into the crop and help to control those pests. The team also studies how a diverse pollinator community can improve pollination outcomes and fruit quality and ways to enhance these natural pollinators to maximise their potential.



How has your career led to Niab?

I started my scientific career looking at bumblebee behaviour in different lighting conditions and how they respond to colours of flowers. Over time, my interests shifted towards applied entomology including work on post harvest pests, cocoa and African bean crop pollination, and natural enemy interactions.

What most excites you about your role?

Partly it's just that I love working with insects. I find them fascinating, the diversity of behaviours that they show, the diversity of morphologies that they have, from massive bumblebees through to tiny midges, and there's just so much more to be discovered all the time. I think that what we're doing is making a real difference for the UK fruit industry. It's exciting to do something real and know what impact it has the potential to make.

What matters most to you about your role?

My priority is high quality science with real world impact; research that not only advances knowledge but also supports growers and environmental stakeholders.

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