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SOURCING FOR THE FUTURE:

How businesses are working to secure a resilient supply of fresh produce

About Footprint Intelligence

The ever-shifting sustainability debate makes it vital for businesses to have accurate intelligence to make informed decisions. Footprint Intelligence is Footprint Media Group's research and analysis division, helping companies develop successful strategies in the context of responsible business practices. Footprint Intelligence aims to drive, promote and share best practice by helping industry resolve pressing sustainability issues. It asks tough questions and finds answers. It uses research and industry insight to bring businesses together to identify solutions, opportunities, trends and challenges.

About Fresh Direct

Fresh Direct is one of Great Britain's leading foodservice wholesalers, specialising in fresh produce, supplying chefs with high-quality fruit, vegetables, dairy and prepared ingredients. As part of Sysco, it partners closely with British growers, champions seasonal sourcing and invests in sustainability across farming, logistics and packaging. With strong category expertise and a nationwide network, Fresh Direct supports operators with reliable availability, consistent quality and innovative solutions that help kitchens manage cost, complexity and customer requirements in a fast-changing world.

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Partner foreword

The fresh produce sector is navigating one of the most turbulent periods in its history. Climate extremes, geopolitical shocks and rising input costs are reshaping the global food landscape, placing unprecedented pressure on growers and supply chains. For the industry, these challenges are no longer distant trends, but the daily reality we share with the producers we work alongside across the UK and around the world.

Across the categories explored in this report, a consistent picture emerges: weather patterns are becoming more volatile, disease pressures are intensifying, and global supply routes are increasingly exposed to disruption. From extreme rainfall affecting UK field crops to drought reshaping Mediterranean production, growers everywhere are being forced to adapt at a pace that would have been unthinkable a decade ago.

These shifts underline the need for a more resilient, future-focused approach to how fresh produce is grown, sourced and supplied. Fresh Direct's role in this landscape is shaped by scale, responsibility and long-term commitment. As one of the UK's largest fresh food suppliers, we are providing growers with the stability required to invest in the future – whether that means trialling new varieties, strengthening water security, adopting regenerative practices or modernising production systems.

Multi-year contracting and deep technical partnerships give producers the confidence to make decisions that will safeguard supply not just for the next season, but for the next generation.

Assurance remains central to our purpose. Our technical teams work closely with growers to monitor crop performance, manage risk and uphold the standards our customers depend on.

In categories facing acute pressure – be it potatoes following prolonged rainfall, tomatoes challenged by emerging viruses, or leafy salads affected by pest surges – this partnership approach helps maintain continuity and protect quality through periods of volatility.

For customers, clarity is equally important. Our biannual Market Review, provides transparent insight into all categories and the factors affecting availability and emerging risks. In an environment where conditions can shift rapidly, this intelligence supports better planning, more informed decision making and greater operational resilience across the foodservice sector.

> *"We are providing growers with the stability to invest for the future*

This report demonstrates the ingenuity and determination of growers who are adapting to a changing world. Their work – whether in regenerative farming, varietal development, precision irrigation or controlled-environment production – shows what is possible when innovation and long-term thinking come together.

Fresh Direct is committed to playing its part in this transition. Our role is to stand alongside growers, support their progress and help ensure that fresh, nutritious produce remains accessible and affordable for the customers and communities we serve.

Building resilience is a shared endeavour, and it will define the future of our industry.

Introduction

Resilience

[rih-ZIL-yunss] noun

the ability of a system or organisation to respond to or recover readily from a crisis, disruptive process

There's a reason why resilience has replaced sustainability as the current watchword for those involved in the business of buying and selling food and drink. We have seemingly entered an era of 'permacrisis' where geopolitical instability and climatic extremes coalesce to create a world fraught with insecurity and uncertainty.

Farmers have found themselves on the front line of this paradigm shift. A model of food supply built on globalisation, specialisation, intensification and fossil fuels has had its shortcomings exposed by disruptive global events like the Covid-19 pandemic and conflicts in Ukraine and the Middle East, which have fractured supply chains and fuelled major hikes in the cost of key inputs like oil and fertiliser.

Running parallel to these sudden, unexpected shocks to the system, extremes in weather have seen their frequency and severity turbocharged by a warming planet as has long been predicted by climate experts.

UK citizens, who have become accustomed over many decades to eating a diverse range of global foods, face a future in which they can no longer take basic affordability and availability for granted.

The production to supply ratio for UK food – effectively a measure of self-sufficiency – was estimated to be 65% in 2024, according to government statistics[1]. Reliance on imports is especially pronounced in fresh produce with the UK producing just 17% of the fruit and 55% of vegetables consumed domestically. UK horticultural production is on a downward trajectory with output having dropped by 600,000 tonnes (16%) since 2015 amid pressures from water scarcity, energy volatility, labour shortages, and inconsistent planning approvals.

As such, the UK remains heavily reliant on imports to plug gaps in fresh produce supply, especially for non-indigenous foods. The effects of climate change, however, are impacting production all across the world including in key import markets like Spain, which is a major source of UK fruit and vegetables.

A 2025 climate risk assessment by industry body the Institute for Grocery Distribution[2] (IGD) found climate change to be the greatest threat to the UK food system that will define the future for years to come. "Record-breaking heat, persistent flooding, and water stress are disrupting yields, driving volatility, and putting pressure on costs," wrote IGD chief executive Sarah Bradbury in her



"Reliance on imports is especially pronounced in fresh produce





foreword to the report. “The food system is being tested in ways it hasn’t been before – and those pressures will intensify in the years ahead.”

The challenges are felt as acutely as anywhere in fresh produce. From the threat to bananas from Panama disease to the impact of extreme rainfall on potato growing, more so than ever hospitality and foodservice buyers need to work with producers and supply chain partners to insulate themselves against future price spikes and availability issues, and de-risk their future business models.

With the food system feeling the strain, building resilience has become a commercial imperative. “In a future world of volatility and scarce resources, the ability to consistently secure product will be a key area of competitive advantage,” wrote IGD.

There is growing realisation among policy makers and businesses that long term food security relies on the ability to foster a healthy natural environment, alongside sensitive deployment of cutting-edge science and technology. Biodiversity needs to be returned to farms to provide natural ecosystem services such as pollination and pest control.

Degraded soils need to be nursed back to health through cover cropping and other regenerative techniques. Science needs to be applied to the process of crop breeding to create varieties better equipped to withstand an era of floods, droughts and heatwaves.

Policy makers have a key role to play too. Analysis by IGD[3] found that with the right support and reforms, UK horticulture holds clear potential for revitalisation and future growth, offering the opportunity to reverse recent declines in domestic production and strengthen food security.

In this report, we look at the challenges facing fresh produce production through the lens of nine everyday ingredients: bananas, potatoes, beans, lettuce and leaf, avocado, tomatoes, citrus fruit, brassicas and mushrooms. For each, we explore how growers, in partnership with supply chain partners, are taking action to ensure a long-term, resilient supply of nutritious, affordable foods.

Fresh produce is the cornerstone of a healthy, sustainable diet. With decisive action now, it can remain so long into the future.



> *Fresh produce is the cornerstone of a healthy, sustainable diet*













Bananas

Variety is the foundation of life



Bananas are one of the most consumed fruits on the planet. The average UK consumer alone munches their way through almost 100 bananas each year. They're a staple of the out of home sector in smoothies, milkshakes and breakfast buffets. They're also facing an existential threat to their future.

More than 1,500 varieties of banana are known to exist but just one, the Cavendish, accounts for almost all of the bananas traded globally each year. Such a level of specialisation has created huge efficiencies in the production and distribution of bananas, for which the price in real terms has remained largely the same for decades. But it's also created acute vulnerability to disease. Across the banana growing world, plantations are being decimated or killed off entirely by pathogenic diseases like Tropical Race 4 (TR4), commonly known as Panama disease, and Black Sigatoka.

Historically, banana producers have been able to deploy an arsenal of cheap chemicals to help control pests and diseases. "What we haven't had in bananas at any point is varietal development, we have a monocrop," explains Peter Stedman, sustainability director for Chiquita Brands International, one of the world's biggest suppliers of bananas including to the UK hospitality and foodservice sector.

The war in Ukraine has pushed up the price of fertilisers and pesticides at a time when TR4 and Black Sigatoka are developing increased resistance. This helps explain why Stedman believes we are in a "generational moment" for bananas, much as took place during the mid-20th Century when the Cavendish's forerunner, the Gros Michel, was almost entirely wiped out by fungal disease.

Work is well underway to develop a Cavendish replacement, which Stedman expects to see on shelves within the next four to five years. Longer-term, the focus of suppliers like Chiquita is to build even greater resilience into banana production by expanding the genetic diversity of crops. "Within the next 10 to 15 years, I think we'll see a proliferation of different varieties that are specific to the environment they're grown in," Stedman says. "We will start to develop a better understanding of the availability, within the genome, of things that help with drought tolerance, cold tolerance and heat stress [and] that are potentially more efficient in their use of fertilisers."



> *"What we haven't had in bananas at any point is varietal development, we have a monocrop*

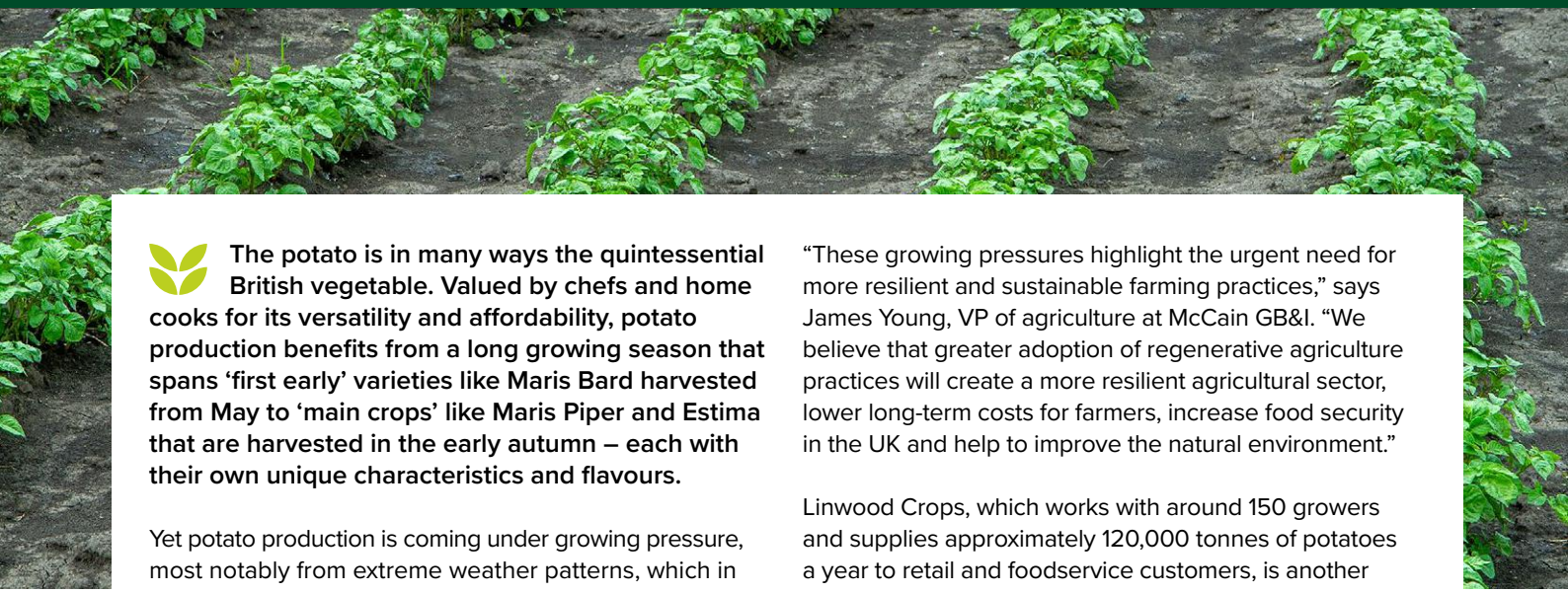
Chiquita is working on a project, dubbed the Yelloway initiative, with scientists at Wageningen University and Research in the Netherlands, along with research company KeyGene and startup MusaRadix, with the aim of producing the next generation of bananas. The goal is to produce banana varieties that resemble the Cavendish in taste, appearance and storage ability, while at the same time reducing carbon emissions associated with banana production. The initiative involves genome mapping, plant breeding, laboratory testing and field testing, with the first batch of bananas currently being deployed in the Philippines and Indonesia for field trials.

Stedman foresees a future where two to three varieties of banana are grown within the same plantation to improve biodiversity. He also hopes to see the commercial environment evolve in such a way that varietal development ultimately becomes a point of difference in the market, much as it has in recent years for berries. "We may see an orange banana in the Netherlands to celebrate the Queen's Birthday or a super sweet kids' banana," he suggests.

Potatoes

Digging for climate-resilient solutions





The potato is in many ways the quintessential British vegetable. Valued by chefs and home cooks for its versatility and affordability, potato production benefits from a long growing season that spans 'first early' varieties like Maris Bard harvested from May to 'main crops' like Maris Piper and Estima that are harvested in the early autumn – each with their own unique characteristics and flavours.

Yet potato production is coming under growing pressure, most notably from extreme weather patterns, which in recent years has led to lower yields and higher wholesale prices. Waterlogged fields can delay plantings in early spring (as has already been the case in 2026) and later on can lead to tubers rotting in the ground. Heavy rain can also wash soil off the ridges under which potatoes are grown, leaving the tubers exposed and liable to green. A warm, dry growing season, while generally more favourable, can make potatoes drier inside which in turn causes them to bruise more easily. Warm, wet weather, meanwhile, heightens the risk of potato blight, which can decimate a crop and is the number one problem facing UK growers.

This wide range of challenges was laid bare by E. Park & Sons, which has been packing potatoes for over 100 years and has strategic partnerships with more than 100 growers spread across the whole of the UK. The business has been working with its growers to put in place measures to build resilience into the potato growing process. Many have installed reservoirs on their farms that fill with water over the winter that is then used to irrigate fields during the drier growing season. Potatoes are rotated with other crops, like legumes, with the aim of breaking pest and disease cycles and supporting nutrient cycling, while growers are also encouraged to create biodiverse field margins and habitat features that support insects, soil organisms and natural pest control.

Potato growing has historically relied heavily on the use of chemicals to maintain short-term productivity, but with soils at risk of degradation, and the cost of fertiliser rising sharply in the wake of wars in Ukraine and more recently Iran, major potato suppliers are looking to support growers to transition to more regenerative approaches that reduce reliance on artificial inputs. McCain, one of the world's biggest buyers of potatoes, has committed to implement regenerative agricultural practices, such as cover cropping, across 100% of its potato acreage worldwide by the end of 2030, citing the challenge presented by erratic weather patterns, rising input costs and geopolitical uncertainty.

"These growing pressures highlight the urgent need for more resilient and sustainable farming practices," says James Young, VP of agriculture at McCain GB&I. "We believe that greater adoption of regenerative agriculture practices will create a more resilient agricultural sector, lower long-term costs for farmers, increase food security in the UK and help to improve the natural environment."

Linwood Crops, which works with around 150 growers and supplies approximately 120,000 tonnes of potatoes a year to retail and foodservice customers, is another business investing in resilience measures to secure supplies long into the future. These include the development of new potato varieties selected in part for their sustainability credentials. Joint managing director James Ragg explains that, during breeding trials, the resilience of the crop to pests, diseases and extremes of weather has to be balanced with consumer acceptability of new potato varieties. "Just getting [a good] yield and being able to cope with more extreme weather and pest levels doesn't necessarily mean it's a suitable variety," he says. "If the eating experience for the consumer is not good, we're not doing our job properly."

> *"These growing pressures highlight the urgent need for more resilient and sustainable farming practices*

E.Park, whose potato breeding programme is now in its 13th year, reiterates the need to strike a balance between financial viability, consumer acceptability and environmental performance. "We get some fabulous varieties come through, but they taste of nothing," says the company's commercial manager Heather Burns.

Potato suppliers consistently make the point too that a shift to longer-term contracting with retail and foodservice buyers can act as a buffer to future challenges, with certainty in pricing and demand feeding back up the value chain and giving growers the security they need to invest for the future.

Suppliers like Fresh Direct say they are responding to the needs of producers by developing longer-term partnerships; programming crop volumes in advance by helping growers decide what and how much to plant, and when to sow; and by offering reliability with payment terms.

Beans

A health and environmental powerhouse



High in nutrients and low in environmental impact, it's little wonder beans are being championed as a critical ingredient for future human and planetary health.

The charity, The Food Foundation, recently launched a 'Bang in some beans' campaign, in partnership with Veg Power, with the aim of doubling UK bean consumption by 2028. Businesses, including those in the eating out of home sector, are being encouraged to make a pledge to increase bean sales – BaxterStorey, for instance, has committed to double volume sales for all bean products by 2028.

The term beans is often used as a catch-all for leguminous crops that range from fresh peas and green beans to dried pulses like chickpeas and lentils.

Beans are generally high in fibre, protein and other important micronutrients, making them a good alternative to animal-source foods. They are also an affordable source of nutrition; a report by The Food Foundation from November 2025 found that beans cost on average 4.5 times less per 100g than other plant-based meat alternatives.

Beans have a low carbon footprint and growing them as part of a rotation can improve soil structure thus improving the waterholding capacity of the land. Working together with soil bacteria, beans can also fix nitrogen from the air into the soil, reducing the need for synthetic fertilisers – hence their common use as a cover crop.

Their versatility means beans are attractive to caterers both as a base ingredient in a variety of recipes like dal and hummus, and to partly or entirely replace meat in dishes such as stews and Bolognese.

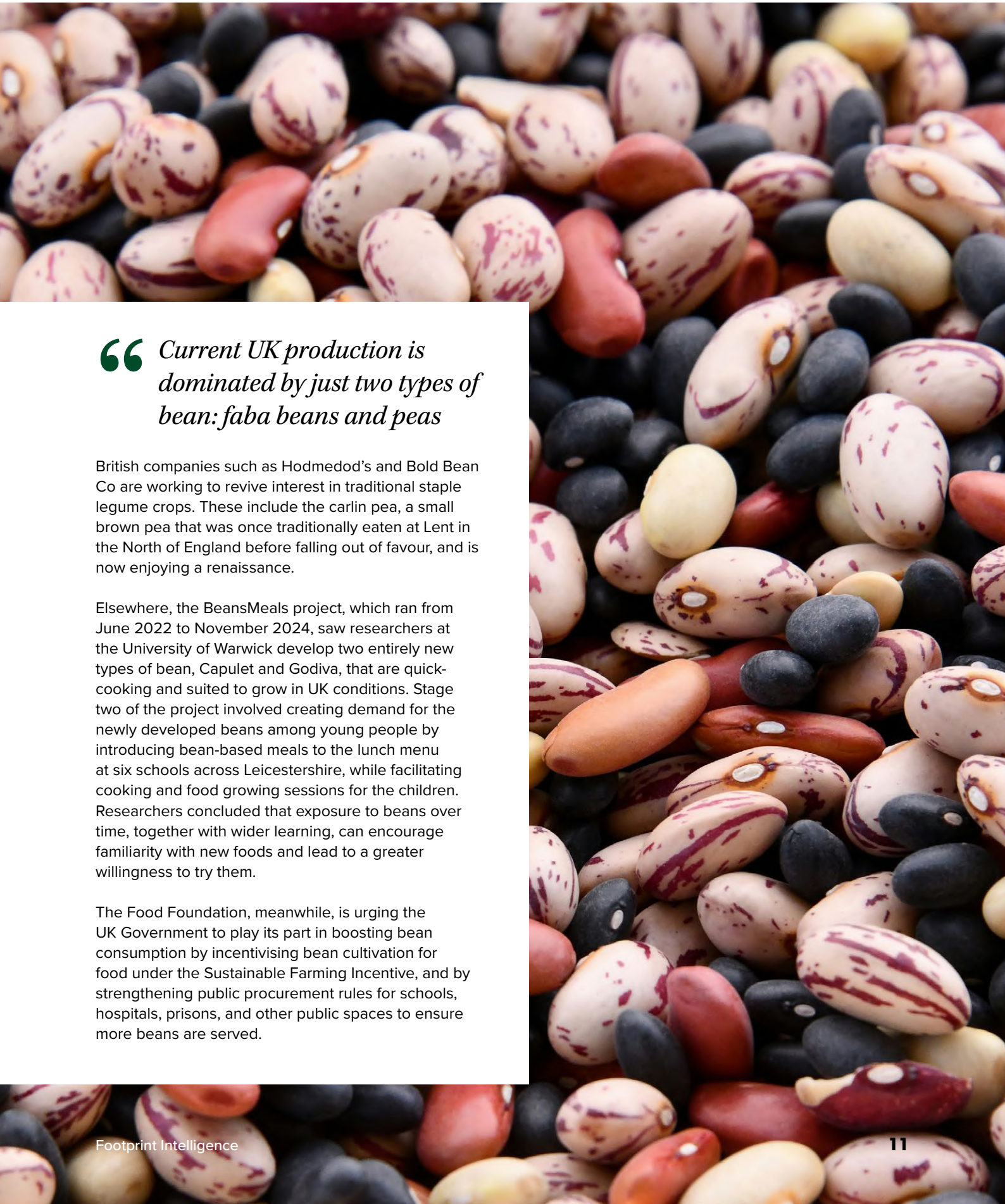
"Foodservice is in an extraordinary position to make this happen...because the lesson from Europe is that if you change how people eat in an institutional context, you change how they eat at home," says Josiah Meldrum, co-founder of Hodmedod's, a supplier of British-grown pulses.

Achieving the 2028 goal will not be easy, however. Although interest in beans is rising, UK production for human consumption remains relatively underdeveloped. The UK grows about 800,000 tonnes of beans annually but most of these are exported or used as animal feed.

In order to scale bean consumption, structural barriers to supply will need to be removed. Speaking at Groundswell 2025, Meldrum noted how a lack of scale could act as a barrier to farmers accessing highly specialised supply chains built for efficiency. Consolidation in businesses providing seed cleaning services, for example, has created challenges in accessing logistics infrastructure where farms are producing small volumes of pulses. "The unit of measure for most farmers is 28 tonnes, which is a full load. Any less than that, it starts to get expensive," Meldrum explained.

Current UK production is dominated by just two types of bean: faba beans (also known as broad beans) and peas, with most other types of bean imported. Increasing the number of varieties of bean grown domestically and finding a market for them will be key to achieving that overarching 2028 target.





> *Current UK production is dominated by just two types of bean: faba beans and peas*

British companies such as Hodmedod's and Bold Bean Co are working to revive interest in traditional staple legume crops. These include the carlin pea, a small brown pea that was once traditionally eaten at Lent in the North of England before falling out of favour, and is now enjoying a renaissance.

Elsewhere, the BeansMeals project, which ran from June 2022 to November 2024, saw researchers at the University of Warwick develop two entirely new types of bean, Capulet and Godiva, that are quick-cooking and suited to grow in UK conditions. Stage two of the project involved creating demand for the newly developed beans among young people by introducing bean-based meals to the lunch menu at six schools across Leicestershire, while facilitating cooking and food growing sessions for the children. Researchers concluded that exposure to beans over time, together with wider learning, can encourage familiarity with new foods and lead to a greater willingness to try them.

The Food Foundation, meanwhile, is urging the UK Government to play its part in boosting bean consumption by incentivising bean cultivation for food under the Sustainable Farming Incentive, and by strengthening public procurement rules for schools, hospitals, prisons, and other public spaces to ensure more beans are served.

Lettuce and leaf



Looking down and growing up

2025 was a challenging year for UK producers of lettuce and leaf. The warm, dry weather experienced across much of the country throughout the spring and summer created a perfect set of conditions for pests to thrive. Aphids, particularly Nasonovia ribisnigri (Nas) and Myzus persicae (Myzus), presented a serious challenge for lettuce growers, according to the British Leafy Salads Association (BLSA).

The BLSA said that despite the best efforts of growers, infestations had rendered substantial volumes of crop unmarketable leading to rejections of produce at various points in the supply chain.

Climatic variability, both at home and abroad, is baked into the future of lettuce and leaf production. Imported lettuce accounts for more than half (54%) of lettuce consumed in the UK, according to Defra, with Spain a key exporter. Yet Spanish growers have faced their own set of challenges as weather extremes – from heavy rains to long periods of drought – put pressure on supplies.

Simply relying on countries like Spain to plug gaps in UK supply is no longer a viable strategy for buyers. Growers and their supply chain partners are having to





> *GrowUp Farms grows, harvests and packs fresh salad leaves from its flagship vertical farm in Sandwich, Kent, built on the site of an old car park.*

explore ways to build financial and ecological resilience into their business models.

Varietal development has a role to play, especially for a product that can be bred to be visually attractive. As Marion Regan, managing director of Kent-based producer LJ Betts, told the *Fruitnet* website[4]: "Salads are a highly photogenic product – you can do lots of fun things with leaves."

Growers are also looking to evolve traditionally intensive farming methods in a way that harnesses nature rather than battles against it. Len Wright Salads grows a wide range of commercial salad crops including lettuce, celery and spinach at its farm near Preston, Lancashire. The business is investing in nature-based solutions with the aim of building a more resilient ecosystem that benefits both wildlife and the surrounding community. New wildlife habitats are being created around the edge of an existing irrigation reservoir to increase biodiversity. A mix of plants, shrubs and native tree species like willow and oak will be planted around the perimeter of the reservoir to encourage wildlife activity and create a thriving local ecosystem.

Birds such as chiffchaffs, robins and blue tits will find nesting opportunities and food sources among the new vegetation. Berry-producing shrubs like hawthorn and blackthorn will provide important foraging resources for birds and small mammals, while aquatic plants like bulrushes and sedges will create new habitats along the water's edge for insects and amphibians such as frogs and newts. The diverse mix of flora will also help attract pollinators including bees and butterflies.

Alongside a more nature-based approach to growing, high-tech vertical farming is expected to form another key part of the future mix for lettuce and leaf.

GrowUp Farms grows, harvests and packs fresh salad leaves from its flagship vertical farm in Sandwich, Kent, built on the site of an old car park. Leaves are grown hydroponically in a controlled environment, enabling a predictable supply of produce.

Although a reliance on artificial climate control and light creates a high energy demand (met at GrowUp by 100% renewable energy), in other ways vertical farming can win out over conventional farming on key sustainability indicators. All GrowUp's leaves are grown without the use of pesticides, while wastewater is captured and treated to remove nutrients that would otherwise pollute the environment. Vertical farming also uses less land – GrowUp says in 2024 it produced the equivalent of 78 hectares of crops grown conventionally on farmland.

Avocado

‘Rock star’ of fruit category revels in diversity

“The avocado is the celebrity of the fruit world,” says Matthew Churchill, global brand manager at Westfalia Fruit. “It has unparalleled diversity and is a health bomb,” he adds.

Providing meal options from breakfast to supper, the fruit is certainly versatile. As celebrity chefs and food influencers have shown over the years, it’s also wonderfully photogenic.

“The avocado’s journey from obscurity to ubiquity is a testament to the power of strategic marketing and innovation,” noted the MarketingSage website in 2024. “By highlighting its unique qualities and repositioning it as a premium product, marketers changed consumer perceptions and drove demand.”

And there is more to come. France is the leader when it comes to per capita consumption of avocados in Europe (2.31kg), but the UK is not far behind, holding steady at 1.71kg, according to the most recent data from the World Avocado Organisation (WAO) released in February 2025.

However, there remains plenty of untapped potential. Only 47% of British households buy the fruit at least once a year, with young parents (aged 28 to 44) with school-aged children the key demographic for further growth. “It’s time to recognise them [avocados] as a sustainable option in the shift toward plant-rich diets that benefit both people and the planet,” according to WAO.



Whether avocados are indeed a sustainable option is a hot topic. As the fruit has grown in popularity, scrutiny has unsurprisingly increased. Rock star fruit they may be, but avocados also have a drink problem and have recently become the scapegoat in emotional discussions about high water usage in countries like Spain where agricultural production is suffering from persistent drought conditions.

This is “unfair”, says the WAO, which was established to help address the negative perceptions that have grown in tune with the fruit’s ‘star’ status. The water footprint of avocados compares favourably with many animal products, noted Julio Berbel, agricultural and water expert and professor from the Universidad de Córdoba, Spain, at the Avocado Congress at the international trade fair FruitAttraction in October 2024.

Negative headlines are not the only issue facing avocados. The entire supply chain is facing “immense challenges” from climate change and geopolitics, to exploding costs for energy, says Westfalia’s Churchill. Excessive heat is a headache for growers, as is extreme weather, with some crops stripped of leaves and fruit following heavy hail storms.

Stress testing crops in the face of these challenges has become crucial, and Westfalia boasts the largest privately-funded subtropical fruit research organisation in the world. At its heart is the ‘Orchard of the future’, spanning 13 hectares at the estate in Tzaneen, South Africa. “It’s a living laboratory,” Churchill explains, “allowing researchers to bridge the gap between lab studies and real-world agricultural challenges”.

Water usage, environmental management, disease control and genetic efficiency are the four critical areas of research. Disease-resistance has been the major breakthrough with Westfalia’s Dusa, resistant to root rot (Phytophthora cinnamomi), currently the leading avocado rootstock sold worldwide. “Our research has benefitted the entire industry,” says Churchill.

> *The entire supply chain is facing immense challenges from climate change and geopolitics, to exploding costs for energy.*

There is a feeling of collective responsibility; of the need to collaborate in order to face the 'perfect storm' of challenges in 2026 – challenges that will only intensify. Collaboration with growers has become more important than ever with learnings and experiences shared to support long-term resilience.

At Tzaneen, for example, the responses of the trees to what nature throws at them can be closely monitored, and the findings applied and tested in diverse climatic zones and soil types. Several of Westfalia's farms in Portugal, Chile and South Africa use precision-irrigation to carefully control water use. Every drop is measured, says Churchill, with water footprints cut by 43% in some cases. Artificial intelligence, as ever, offers potential in spades.

Westfalia is testing more than 7,000 unique avocado seedlings from crosses of more than 140 avocado varieties, and using DNA markers and AI-driven analysis to select 'superior' offspring and dramatically cut development timelines for climate-resilient trees.

Resilience also comes from the fruit's adaptability, with cultivation possible in a variety of climates across the globe. Diversification of the supply chain to "non-traditional" regions like the Cape in South Africa and Valencia in Spain extends seasonality windows, increases efficiency and provides flexibility to respond to changes in supply and demand.

This may also help to relieve pressure in areas like Mexico, where expansion of the fruit trees is impacting forests. Deforestation-free compliance schemes are bearing fruit, but scrutiny will not go away, especially for the rockstar of fresh produce.



Tomatoes



Supply struggles require investment in resilience

Discussion over whether it is a fruit or a vegetable has been about as controversial as it gets for the tomato. Originating from the Andes, tomatoes are grown the world over – from Iceland to the Falkland Islands, and even in space – without ever attracting a lot of attention.

Until recently that is. "From Spain to the English Channel, tomatoes are on the verge of an unprecedented migration due to global warming," reported the *TomatoNews* website in 2024[5]. "Field-grown tomatoes, mainly intended for processing, are the most exposed to climatic hazards. But in the medium term, all crops, whether tomatoes or other vegetables, will have to adapt, or even move to other regions."

Tomatoes grown in glasshouses cannot hide from the effects of global heating either as growers struggle to regulate temperatures. In one of the first studies of the damage caused by climate change to greenhouse tomato production, all the high-tech greenhouses surveyed in Turkey lost yield, ranging from 6% to 53%, with an average of 12.5%. Survey data revealed that irrigation and fog system water consumption increased by 29.3% and 31.4%, respectively, while fertiliser and electricity consumption rose by 23.7% and 19%.

More than three in four (76.5%) of the growers declared difficulty in climate control, 11.7% reported tomato cluster losses with no information on yield



> *From Spain to the English Channel, tomatoes are on the verge of an unprecedented migration due to global warming*





loss, 9% experienced yield losses despite no cluster losses, and 61.7% observed a decline in tomato quality, leading to reduced sales prices. "[...] greenhouses must adopt advanced climate control technologies, expand fog system capacities, and integrate renewable energy sources to enhance resilience against climate-induced challenges", the researchers from Akdeniz University wrote in their 2025 paper for *BMC Biology*[6].

That is easier said than done: improvements in the greenhouse or in the field require significant investment, and there is little wriggle-room within current margins. The increasing cost – and quality – of labour is a particular problem for tomato growers on the Canary Islands, for example, and every part of the food system is being squeezed by the impacts of conflict in the Middle East.

"What we do is massively more reliable than [crops from] Morocco, but we are more expensive," explains Hernán Cortes, from the trader and importer Cortes, which supplies large tomatoes into the foodservice sector through the likes of Fresh Direct. "There was a spike in prices after Russia's invasion of Ukraine and nothing ever came down," he adds.

Now, following conflict in Iran, prices for inputs like fertiliser and energy, plus transport, are rising higher still. Cortes has just returned from visits to his suppliers on the Canary Islands. Asked about the challenges being faced by the tomato growers and the supply chain, he cites labour, war and viruses. Weather-wise the climate is "fairly stable" here, he explains, but not much else is.

Tomato brown rugose fruit virus (Tobamovirus, ToBRFV) was first detected in Israel in 2014. Since then it has spread across the globe, including the UK and Spain. Symptoms of the virus include mosaic patterning, deformation, narrowing and blistering of leaves; uneven ripening and reduced number of fruits, and in severe cases, wilting, yellowing, and death of the plant. An entire crop can be infected, with yield losses of between 25% and 70%.

Most growers on the Islands will produce to a contract; with each passing year meeting them gets tougher. As the virus spreads, and a changing climate further exposes the plants to infection, growers on the Canary Islands are looking seriously at investing in more expensive seeds marketed as disease-resistant. However, as the *Fruitnet* website reported last year[7], there is no proverbial 'silver bullet' – no genetics, spray, or management method that is perfect and will completely stop the infestation of ToBRFV.

That's why, for Cortes, the time has come for the government to step in to protect the few, small tomato farmers that are left on the Canary Islands. Efficiency in packhouses, ventilation in fields and reuse of water are all proven technologies that could help bring back rosier times to growers of this red fruit.

Citrus

Farming with nature helps fight climate change



The UK food system is exposed to £2.6bn in additional food costs if current unsustainable practices continue, according to IGD. The organisation's climate risk model, launched in 2025, revealed that imported horticulture is in the eye of the storm with citrus, together with bananas and tomatoes, facing "the greatest risk".

Spain, a key sourcing region for UK citrus fruits, is particularly exposed to a changing climate. As researchers from the Jaume University in Spain put it[8]: "Current citriculture is threatened by climate change."

That is putting it mildly. Temperature rises, together with other adverse climate phenomena, are modifying the environmental conditions in the regions where citrus varieties are currently being developed. And the detrimental effects of these environmental factors on citrus physiology and production – such as drought or augmented soil salinity – are only likely to increase because of elevated temperatures, which will jeopardise crop production and, in extreme cases, even plant survival.

It is often forgotten that plants are sessile organisms meaning they must adapt to the environment rather than flee or find shelter from adverse conditions. However, these adaptation responses have a physiological and energy cost to plants, and when the plants in question are crops, this means yields fall.

Resilience in the face of adverse weather is more crucial than ever, and citrus sellers are more attuned than most to the benefits of more sustainable approaches to agriculture. Bollo Natural Fruit, a third-generation family company, has been growing citrus fruit for over 50 years in southern Spain. Its 'bio-inclusive' approach is centred on biological control (without pesticides, plant protection products or chemicals), not only on the fruit but also in



the soil and the surrounding environment. The taste and quality of the resulting fruit is better, according to the company, thanks to “an optimal balance between soil, water, and crops”. Soils are regenerated and ecosystems are strengthened.

Like others, Bollo is leaning into regenerative approaches. A key element is ground cover on the farms, which makes it possible to regulate pests naturally and supports ecosystem restoration, encouraging the natural return of flora and fauna. The pioneering approach — first implemented at El Cerro Farm in Seville — has been scaled to more than 2,000 hectares across 67 farms. Bollo has reduced water usage by 25%, energy consumption by 20%, and phytosanitary treatments by 70%. The world is constantly changing,” said Bollo CEO Antonio Alarcón as he published the company’s latest sustainability report. “We want to guide the change to turn it into something positive."

> *“Regenerative farms are between 24% and 38% more productive than the average European farm according to a landmark study*

Bollo is also improving refrigeration systems and fruit-handling lines, investing in renewable energy projects, and implementing a sustainable mobility strategy for more efficient transportation. Greenhouse gas emissions have been cut by 14%, while pesticide and fertiliser use on its own farms has been slashed by 51% and 32% respectively.

Regenerative farms are between 24% and 38% more productive than the average European farm, according to a landmark study published last year by the European Alliance for Regenerative Agriculture[9]. EARA benchmarked 78 regenerating farms in 14 countries, including the UK, covering over 7,000 hectares against neighbouring and average conventional farms. The results are impressive – especially in terms of yields. These are farms that will also have been partly sheltered from fertiliser and energy cost hikes as the war between the US/Israel and Iran disrupts agri-food supply chains, as happened when Russia invaded Ukraine too.

In Greece, EARA farmer Sheila Darmos is producing olives, oranges, limes and lemons with 280% higher yields per hectare, using zero fertiliser or pesticides and 78% less fuel than national averages. This has not happened overnight, taking years of hard work and an appetite for risk.

For decades “we’ve been doing things differently [40 years of organic and 10 years of regenerative agroforestry] ... doing everything the opposite to our neighbours and the advice of the agronomists,” she explained. Lime yields were 178% higher than the national average – her gross margin more than double that of the average. The organic agroecological farm also has native weeds and nitrogen-fixing plants, which adjoining growers routinely fight off with chemicals.

The conflict in the Middle East gives further grist to the mill for regenerative approaches that not only reduce the need for chemical inputs, but benefit the soil and improve resilience in the face of a changing – and chaotic – climate. Customers, too, will not only appreciate the continuity of supply of their lemons, limes and oranges, but also the health halo provided from those grown with fewer chemicals.

Brassicas

Weathering climate extremes to meet rising demand

"Disastrous fruit and vegetable crops must be 'wake-up call' for UK, say farmers." This was a headline from The Guardian in July 2024 as Defra data was published showing year-on-year vegetable yields down by 4.9% to 2.2m tonnes in 2023. Farmers said they were not able to plant due to the wet weather: the growing area of vegetables fell by 6.5% to 101,000 hectares, as a dry early summer in 2023 added to the woes of producers.

Last year, growers faced difficulties again as the UK entered its fourth official heatwave of the summer. The likes of Peloton Produce, a leading UK brassica grower, reported yields down by 15-20%, and even as high as 30% in some cases. The hot weather also led to reduced demand, leaving Peloton's director Nigel Clare to call the entire 2025 brassica season a "write-off", with growers losing so much money in June and July there was little hope of clawing it back in August[10].



Last year's crops of cauliflower, broccoli, savoy cabbage, sweetheart cabbage, Bellaverde broccoli, cavolo nero, kale red cabbage and white cabbage all had a dramatic reduction in yield, according to Clare.

Those growing brassicas, like many in horticulture, are in desperate need of investment to help them deal with climate adaptation and establish resilient crop varieties. IGD has noted that horticulture should be a powerhouse of the UK food sector given its health and environmental credentials, something the UK Government appears to have recognised having promised to develop a bespoke sector plan for horticulture later this year.

Barriers to growth in the horticulture sector include water scarcity, volatile energy costs, unstable seasonal labour access, and limited government support, which is deterring investment. This is undermining resilience: repeated product shortages and price spikes expose the UK's vulnerability to climate shocks and import volatility, IGD said, as it called on the UK Government to "revitalise" the sector.

Key among the proposals is for a national water strategy that "prioritises horticulture, with streamlined planning to cut reservoir approval times to under 12 months". Indeed, with the prevalence of floods and droughts increasing, capturing water is crucial.

Major UK brassica growers like Barfoots are investing in water infrastructure, soil holding capacity (improving soil structure supports resilience to flooding and drought), and technology for precise water application. Following last summer's drought, Barfoots invested in additional water storage at Sefter Farm, the company's main site and one of five farms operating in Hampshire and West Sussex, cultivating over 30 crops. Rain water is



> *Brassica growers are in desperate need of investment to help them deal with climate adaptation and establish resilient crop varieties*

collected but the new 125,000m3 reservoir is also fed by a water treatment plant which converts waste water from the factory into irrigation water. Wildflowers and trees have been planted around the reservoir to further improve soil health and build biodiversity.

The farm is also in the process of establishing a 300-metre diverse hedgerow and a wildflower meadow. The hedgerow project aims to encourage a diversity of wildlife onto the farm by creating habitats for a variety of bird species alongside small mammals like hedgehogs and rabbits and insects including bees, butterflies and ladybirds. The hedgerow has been established with dense native shrubbery that will create a nature corridor across the farm and will also help build soil health by increasing organic matter. The wildflower meadow complements the hedgerow's biodiversity, boosting pollinator populations, encouraging natural pest control, and contributing to an all-round more robust ecosystem.

Resilience on farms is only half the story, however. Vegetables from the brassica family, which include broccoli, cabbage, rocket, cauliflower and kale, suffer from short shelf lives – up to 50% of harvested vegetables are currently wasted as they make their way through the supply chain from farm to fork. Post-harvest, leafy vegetables also rapidly lose nutritional value, suffer from dehydration, and often end up rotting as diseases strike.

Researchers at the University of Edinburgh recently secured funding to bio-engineer brassica vegetables to improve their health, quality and longevity post-harvest, whilst ensuring these new traits do not negatively impact their growth in the soil[11]. The ‘Post-harvest boost’ project builds on previous research by the group which found that Brassica vegetables respond differently to their environment after they have been harvested.

Mushrooms

Digging deep to reduce reliance on peat



Mushrooms have been having more than a moment – among both consumers and chefs. Popularity of the fungi (they are not vegetables, but are nutritionally similar to them and therefore count towards the government's 5-a-day target) has been driven by the plant-based boom, umami-rich flavour profiles, and sustainability credentials.

Mushrooms don't contain as much protein as meat, but they have more than most vegetables, making them a good source of plant-based protein. Along with their diverse textures and rich savoury flavour, they are a great low-fat alternative to meat. Varieties like King Oyster, Shiitake, and Lion's Mane are used as 'meaty' vegan alternatives, with a number of chefs reportedly cultivating them in-house to boost freshness and reduce food miles.

Fresh Direct has tapped into the trend and simultaneously reduced food waste with its mushroom 'meat' made from the stalks of mushrooms. Rather than waste the so-called stipes, specialist Irish mushroom grower, Umi Foods (part of Tiernaneill Mushrooms) harvests, cooks and shreds the surplus products. "With the fibrous root of the mushroom there is a natural texture, which gives a satisfying eating appeal," says Fresh Direct head of food development Ian Nottage. It's also suitable for vegans, he explains, with soya protein, tapioca flour and coconut oil the only additions.

Meat and mushroom blends, for example in burgers, are also attracting a lot of interest from foodservice companies keen to reduce levels of red meat in order to cut their greenhouse gas emissions. The 50-50 beef-mushroom mix used by Levy, part of Compass Group, produces a "nutritionally superior" burger – lower in saturated fat and salt, less calorific and higher in fibre than a standard beef burger. The carbon savings are also considerable: 2.54kgCO2e rather than 3.8kgCO2e per burger[12].

This doesn't mean mushrooms are perfect environmentally. The use of peat to grow fungi has been a long-term problem for the professional fresh produce sector. UK horticulture, for example, is getting through 760,000m3 of peat every year, with 880,000tCO2e released from horticulture peat extraction in 2020 alone[13].

The extraction also damages peatland habitats and weakens the natural defences peatlands provide against extreme weather events like flooding and wildfires. Besides their climate benefits, healthy peatlands store and slow water flows, reducing flood risk and creating a rich mosaic of habitat that helps prevent the spread of wildfires. Healthy peat bogs also provide a home to much-loved and iconic wildlife such as curlews and the large heath butterfly.

Progress to reduce reliance on peat is being made – not least where regulations are soon to come into force. In Ireland, peat casings are to be phased out by 2030. Goldcircle Mushrooms (also part of Tiernaneill Mushrooms), an Irish-based mushroom marketer and producer, is heavily involved in climate-related initiatives aimed at reducing the carbon footprint of commercial mushroom production. Its recent research using peat-free casings showed that "industrial-scale, sustainable mushroom production is achievable without compromising quality or efficiency". And that was despite a tricky 2025 summer of warm weather, high disease levels and inconsistent compost.

> *"Meat and mushroom blends are attracting a lot of interest from foodservice companies*

Tiernaneill, which grows 200 tonnes of white and brown mushrooms a week, partnered with Harte Peat to conduct the large-scale trial across 118 mushroom tunnels on two farms, replacing traditional peat casing with a 100% peat-free alternative (previous trials had used 30% and 50% peat-free casing mixes). The latest trial, pushed as much by consumer demand as the 2030 ban, covered 97 white and 21 brown mushroom crops. Life cycle assessments showed the mushrooms grown on the peat-free substrate had a 75–77% lower carbon footprint compared with traditional peat casing. When electricity use during production is included, overall emissions were still around 68% lower.

A key question moving forward will be whether growers can stomach the extra costs of moving to peat-free casings. A UK-wide Royal Horticultural Society survey in 2023 identified a 15–25% higher average cost for peat-free compared with peat-reduced growing media among responding businesses[14].

Six key takeaways

1 Work with nature, not against it.

As the cost of energy and associated inputs continues to soar the weakness of farming systems that rely heavily on chemical applications has been exposed. While removing chemicals entirely may be unviable in the short-term, growers should look to those adopting regenerative techniques for inspiration on how to take advantage of natural ecosystem services to build on-farm resilience.

2 Show support for varietal development.

Large-scale laboratory and field trials are taking place for new varieties of crop to assess how they perform under modern climatic conditions. The results are promising, showing how an increase in genetic diversity can be a key part of the solution to building long-term resilient supply.

3 Security is strength.

Currently, growers take on the majority of the risk both of crop failure and in funding the transition to more sustainable, regenerative practices. By helping fund research and development, and by offering secure, long-term contracts where possible, fresh produce suppliers and buyers can give growers the security they need to invest with confidence for the future.

4 Demand ambitious policy support.

UK horticulture has suffered from years of underinvestment and diminishing returns. All those within the value chain – from growers to foodservice operators – should demand the government delivers an ambitious growth plan for the sector that supports investment in technology and infrastructure, protects jobs and positions the industry to meet the challenges faced by climate change and energy cost volatility.

5 Understand your vulnerabilities.

Businesses like caterers and restaurants at the end of long supply chains can no longer take a consistent supply of affordable fresh produce for granted. By working with partners across the value chain, businesses can map key sourcing regions, identify vulnerabilities and make contingencies that help protect against future system shocks.

6 Make fruit and veg the star.

Fruit and vegetables sit at the sweet spot of positive nutrition and environmental sustainability. Businesses selling to the end consumer should seek to grow consumer demand for veg-led meals by experimenting with novel ingredients and varieties, marketing 'hybrid'products like 50-50 mushroom-beef burgers, and promoting the benefits of fresh produce consumption at the point of sale.

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