School of Sustainable Food and Farming
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Water Security for UK Fresh Produce

What is needed to deliver future food security in the UK

November 2026



Harper Adams University

Morrisons

Without intervention, England could face a water supply shortfall of up to 5 billion litres per day by 2055, with a further 1 billion litres per day required by sectors including agriculture.

(Environment Agency, 2025)



Water resilience is becoming one of the defining challenges facing UK agriculture and the long-term security of our food supply.

Climate change, insecurity of imports and regulatory constraints place further pressure on an already squeezed UK fruit and vegetable produce sector.

Water resilience is at the heart of the food system and it's about the quality of the water supply as well as how much and where it rains. Water availability and water quality are increasingly recognised as critical risks to the future of domestic food production. There are solutions, and actions taken now will be more effective, and less costly, than if we delay.

Given that our key overseas suppliers are facing even greater climate related water constraints, there is an imperative to strengthen fruit and vegetable production in the UK. The Farming Roadmap **promises prioritising food production** and the high value of the fresh produce sector is recognised by Government; the Horticulture Sector Growth Plan is now underway bringing together expert industry groups.

Through this project, Morrisons brought together growers, industry and policymakers to identify practical solutions that can support both environmental outcomes and sustainable food production.

It's been a year-long collaboration with leading growers and Harper Adams University's School of Sustainable Food and Farming (SSFF), and comes at a critical time. More than two-thirds of England was declared officially in drought this summer following record low rainfall and exceptionally high temperatures. Our farmers are reporting impacts on crop production, water availability and long-term planning.

The recommendations highlighted here have been informed through stakeholder interviews, industry workshops and an extensive review of existing evidence, bringing together perspectives from growers, retailers and water experts.

What has been particularly encouraging is the strong consensus emerging from across the sector. There is widespread recognition that food production and food security must be given greater prominence within water policy, alongside the regulatory certainty needed to unlock investment in resilience.

Retailers, growers and government all have a role to play. **Collectively we can build a more resilient and productive food system for the future,** one that provides the confidence and stability to take the required actions.

Morrisons commissioned this work as part of a shared commitment to supporting the long-term resilience of UK fresh produce production. This project seeks to better understand the risks and identify practical opportunities for industry and policymakers to work together to strengthen water security.



Morrisons

Alice Liddle
Agriculture Manager at Morrisons

Introduction from the School of Sustainable Food and Farming

Morrisons is a founding partner of the School of Sustainable Food and Farming (SSFF) at Harper Adams University. SSFF acts as a bridge between science, policy and practice, translating academic research into practical actions that can be implemented on farm and throughout food supply chains. It brings together farmers, industry, supply chains, retailers, researchers and policymakers to address complex long-term challenges affecting food production.

We wanted to present a clear picture on the importance of water security for fresh produce. Water in the UK is so often taken for granted but climate change modelling is now being played out on the ground. The last few years has exposed the weaknesses in the food system for growers, the supply chain and consumers.

The pressures facing the fresh produce sector are varied. Water availability in a changing climate is more erratic and at the same time competition for water resources is growing. Many growers depend on irrigation, and abstraction licences, designed to protect the environment, are at odds with crop needs.

This project seeks to better understand these risks and identify practical opportunities for industry and policymakers to work together to strengthen water security.

We wanted to understand the available evidence from different viewpoints. What does the evidence tell us about the water demand on farm, and then, how does it feel to growers who are experiencing the reality of water stress and needing to make investment decisions.

The project has three objectives:

- To synthesise current academic, industry and policy thinking on agricultural water security.
- To understand the practical experiences and concerns of fresh produce growers.
- To identify priorities for future policy development and industry action.

The first part of the project was a comprehensive desk-based literature review. This provides a robust summary of the current evidence across: Government policy and regulation; modelling data on rainfall and water availability; assessment of specific crop water requirements; review of crop specific studies and analysis of on-farm impacts of water availability.

The second part of the project was qualitative involving a face to face interviews and xx workshop discussions with some of the major growers in the sector.

The School of Sustainable Food and Farming (SSFF) was established at Harper Adams with the mission of securing a sustainable and profitable farming and food system through educating, inspiring and empowering current and future farmers to work towards reducing emissions, enhancing nature and developing more climate-friendly businesses.

The SSFF is a community of organisations and people with a desire to see a profitable, productive and sustainable future for the UK agricultural industry.

Our aims:

- Equip farmers with **skills, knowledge and training needed** to become **fully sustainable** on all parameters: economic, environmental and social.
- Be a trusted source of information to demystify the journey to **net zero and sustainable farming** - speak a common language about sustainable agricultural systems.
- Work to **improve** farm practice and farm data to track progress on greenhouse gas emissions reduction, sequestration, and broader sustainability metrics such as biodiversity, water and soils.
- Encourage **new entrants** into the farming and food industry, and a diversity of entrepreneurial talent to support our aims.



Simon Thelwell
Strategic Director

Alex Hardie
Business Development Manager



Executive Summary

A year ago, Morrisons embarked on this collaborative project with leading growers and Harper Adams University's School of Sustainable Food and Farming (SSFF). The aim was to explore practical solutions to water insecurity for fresh produce that support both environmental outcomes and sustainable food production.

Maintaining a reliable, quality domestic supply of fresh produce matters economically, for national food security and for public health.

UK production of fresh produce crops is geographically concentrated in regions already classified as seriously water stressed, particularly eastern and south-eastern England. Many fresh produce systems are dependent on irrigation for crop quality and marketability as crops are sensitive to water availability during key developmental stages. The lack of reliable irrigation can impact commercial quality standards and contractual supply obligations.

This summer **more than two-thirds of England was declared officially in drought** following record low rainfall and sustained exceptionally high temperatures. Farmers are now reporting impacts on crop production from the lack of water availability, so how do we plan for the future?

The UK is a net importer of fruit and vegetables; domestic production supplies **16% of fruit** and **53% of vegetables** consumed nationally. Field vegetables alone were valued at **£1.6 billion** to the UK economy in 2024.

It was also clear that there was little readily available evidence about individual crop water requirements to make informed decisions about the effects of water stress on farm. This raises an important question: Are we planning future water resilience using evidence gathered for a different climate?

This project synthesises academic, policy and industry evidence. It explored the issues from two different perspectives:

Part one was a literature review of evidence of Government policy and regulation; climate and hydrological projections on rainfall and water availability; an assessment of specific crop water requirements across different soil types; the effects of water stress on fresh produce crops; the impacts of water availability on farm.

Part Two involved structured interviews and workshops to gauge opinion of leading UK growers on the pressures of water insecurity on growing fresh produce.

Both sources of research have informed these recommendations.





Recommendations

The UK's current approach to water policy must evolve to recognise the strategic importance of domestic food production and ensure growers have the confidence to invest in long-term resilience measures. Growers remain confident in the technical ability of UK horticulture to adapt to future water challenges. However, future resilience depends on increased water storage, proportionate regulation, long-term policy stability and stronger recognition of food production within national water planning.

Priority 1: Food security and regulatory reform

a) Place food security at the centre of water policy decision making.

b) Provide greater certainty for businesses through regulatory reform, ensuring that growers and supply chain partners can invest with confidence in long-term water resilience measures.

Proposed action

Develop clear policy recommendations that demonstrate how water resilience underpins UK food security and identify key regulatory barriers requiring reform.

Priority 2: Make water storage a national priority

Recognise water storage as critical national infrastructure and support investment, planning reform, and policy frameworks that enable greater on-farm and regional water storage capacity.

Proposed action

Compile examples of current storage constraints, investment requirements and best-practice schemes to support a national case for water storage.

Priority 3: Address water quality and water availability together

Develop integrated approaches that recognise water quantity and water quality are interdependent challenges, and should be addressed through joined-up policy and catchment-level management.

Proposed action

Identify opportunities for integrated catchment management approaches, and gather case studies demonstrating the link between quality and quantity.

Priority 4: Invest in future-focused research and evidence

Increase investment in research, innovation, and data collection to support evidence-based decision-making and the development of practical solutions for the future.

Proposed action

Review current evidence gaps and prioritise research requirements that would support future policy development and investment decisions.

Priorities

Priority 1: Food security and regulatory reform

a) Place food security at the centre of water policy decision making.

b) Provide greater certainty for businesses through regulatory reform, ensuring that growers and supply chain partners can invest with confidence in long-term water resilience measures.

Proposed action

Develop clear policy recommendations that demonstrate **how water resilience underpins UK food security** and identify key regulatory barriers requiring reform.

What the evidence tells us

The Government's **'A New Vision for Water'** focuses on water quality issues but recognises concerns over water availability and that significant changes in water management, allocation and efficiency are needed. The Environment Agency's 'National Framework for Water Resources' **projects a shortfall of up to 5 billion litres a day** in public water supply alone by 2055 without further action, with a **further 1 billion litres a day** likely to be needed by other sectors, including agriculture.

Water security is a strategic **agricultural risk**, and conflict can arise between environmental and agricultural policy goals. Water policy in all four nations prioritises environmental protection, resulting in tighter regulation of irrigation water access.

Abstraction is being **squeezed** by environmental flow requirements, and emergency drought powers are able to restrict supply when crops need it most. An existing abstraction licence offers **no guarantee** and can be amended or revoked, leading to uncertainty and low confidence in **long-term investment.**

Water insecurity, rising capital costs, complex planning and regulation limit growers' ability to invest in resilience measures and compound an already stretched sector.

Summary from grower interviews

Food security should have greater policy recognition: Growers are concerned that food production is **not sufficiently prioritised** within national water policy. Many argued for domestic food production to be recognised as strategically important infrastructure and given greater consideration within future water management decisions.

Regulation and planning are major barriers: Greater flexibility, collaboration and catchment-scale approaches were widely supported. Participants frequently described water governance systems as slow, inflexible and poorly aligned with practical farming needs. Concerns centred on planning delays, uncertainty around abstraction licensing and limited ability to utilise high-flow water events.

"If we want to maintain a strong domestic food sector, we need policies that support investment in water storage, provide regulatory certainty and recognise food production as a national priority. The findings from this project show there is broad agreement across the sector on the need for action." - Jon Hammond, Director of Hammond Produce

"To get new irrigation licences changed or adopted is probably an 18-month process. We need to move a bit quicker than that."
- James Thorp, COO at Riviera Produce

"Agriculture is a critical industry. Water and resilience need to be depoliticised and become a long-term action that everyone works on."
- Stephen Kingdon, Sustainability Manager at PDM Produce



Priority 2: Make water storage a national priority

Recognise water storage as critical national infrastructure and support investment, planning reform, and policy frameworks that enable greater on-farm and regional water storage capacity.

Proposed action

Compile examples of current storage constraints, investment requirements and best-practice schemes to support a national case for water storage.

What the evidence tells us

Water risk for fresh produce is multi-layered and cumulative. It is affected by reduced river flows, declining groundwater and tightening abstraction which can all occur in the same season and regions.

Drier summers and wetter winters are projected especially in southern and eastern England. Scotland, the South West and Wales face a comparatively lower but still growing risk. **Droughts will become longer, more severe and more frequent.**

Low river flows and groundwater levels are declining most sharply in key growing regions, including East Anglia, the South East and Lincolnshire. Summer and autumn deficits of up to **50%** for groundwater recharge are likely to delay aquifer recovery. The result is likely to put irrigation reliability at increasing risk precisely where horticulture is most concentrated; nearly **20%** of growers already operate in over-abstracted areas.

Where licensed abstraction is unreliable, many growers have turned to on-farm water storage. However, this requires high upfront capital expenditure, and involves complex planning and regulatory requirements.

Planning can be a significant obstacle to on-farm storage. Growers can face lengthy and complex approval processes involving planning authorities, the Environment Agency and other regulators before projects can proceed. These requirements **increase costs, extend development time-scales and add further uncertainty to investments** that could improve both agricultural water security and environmental resilience through increased winter water storage.

Summary from grower interviews

Future resilience depends on storage rather than efficiency: Most growers already use sophisticated irrigation tools including moisture probes, weather stations, remote sensing and irrigation scheduling systems. While further efficiency gains are theoretically possible, growers consistently identified increased water storage (particularly winter-filled reservoirs) as the single most important adaptation strategy.

Investment requires long-term policy stability: Consistent long-term policy signals were viewed as essential for future adaptation. Water infrastructure requires substantial capital investment and has long repayment periods. Several growers noted that short-term tenancy agreements can limit investment in water infrastructure. Growers emphasise that policy uncertainty reduces confidence to invest in reservoirs, irrigation systems and other resilience measures.

Water security is a future concern rather than a current crisis: Most growers reported that current water supplies remain adequate. However, confidence in future availability is declining due to climate variability, abstraction restrictions and uncertainty surrounding future licensing arrangements. The key concern is long-term water security.

"As the seasons have changed and we are experiencing climate change and these longer, warmer, drier spells, it is 100% a topic of conversation within the business now. We've also expanded a lot of our fruit production and continue to do so. It's not just having access for existing crops, it's for future expansion plans." - Liam Stewart, Managing Director of Stewarts of Tayside

"The legislation around planning needs to be urgently addressed because that's, quite often, a major stumbling block to putting a reservoir in." - Ellis Luckhurst, Technical Manager at Riviera Produce

"One of the reasons for building the latest reservoir was to be able to cope with the potential loss of licence volume" - Andrew Blenkiron, Managing Director at Elveden Farms

A severe drought is estimated to cost UK irrigated agriculture around £29 million in on-farm losses, rising to more than £250 million during extreme drought events.

(Salmoral et al., 2019)



Priority 3: Address water quality and water availability together

Develop integrated approaches that recognise water quantity and water quality are interdependent challenges and should be addressed through joined-up policy and catchment-level management.

Proposed action

Identify opportunities for integrated catchment management approaches and gather case studies demonstrating the link between **quality** and **quantity.**

What the evidence tells us

The desk review focuses on water availability although recognises the links between quantity and quality. Water quality is a critical issue within the UK Government's paper, 'A New Vision for Water' proposing reforms such as consolidated national pollution standards and increased farm inspection frequency. Measures addressing irrigation water availability are not a central focus of the policy agenda, and are limited to continued support for on-farm water storage, improved resource planning and the proposed transfer of abstraction and impoundment regulation into the Environmental Permitting Regulations. To support both environmental objectives and agricultural resilience, integrated approaches to water governance are required. **Further research would inform policy and management recommendations.**

Catchment management and collaboration are identified as effective models for managing water and already work to improve water quality. Water policy focuses on managing abstraction at catchment scale, with regulation becoming increasingly restrictive in many.

Research shows that water sharing within groups can significantly reduce water deficit and the risk of a serious annual shortfall. Water Abstraction Groups (WAGS) are forming in water-stressed catchments; the proportion of England's irrigated area covered by a WAG grew from **52% in 2001** to **60% by the late 2000s.**

Catchment-scale working brings better relationships with neighbouring landowners and benefits for flood risk and biodiversity.

Summary from grower interviews

Water quality remains a key consideration: While water availability dominated discussion, several growers highlighted water quality as an equally important factor for some production systems. This was particularly relevant for ready-to-eat crops, where strict microbial standards require significant investment in treatment, monitoring and water management systems. Growers noted that opportunities to increase water reuse or capture alternative water sources are often constrained by quality requirements.

"Without a very long-term and planned approach to water availability for agriculture, alongside the environmental needs and the needs of public safe, clean water supply, it's going to be very, very challenging to have confidence in the food security that UK growers can provide." - Jon Hammond, Director of Hammond Produce

"We're monitoring that all the time just to make sure that we're not piling poor quality water into the system. The quality has just as much of a detrimental impact as lack of water."
- Liam Stewart, Managing Director of Stewarts of Tayside

"Agricultural water and public supply water need to merge together. They've been seen as two separate entities until now."
- Andrew Blenkiron, Managing Director at Elveden Farms



Priority 4: Invest in future-focused research and evidence

Increase investment in research, innovation, and data collection to support evidence-based decision-making and the development of practical solutions for the future.

Proposed action

Review current evidence gaps, and prioritise research requirements that would support future policy development and investment decisions.

What the evidence tells us

The review sought to establish a crop-level reference point for understanding water dependency and stress effects across fresh produce. Published UK field study evidence is extremely limited for many fresh produce crops, and the review draws on European field studies and controlled environment experiments to assess potential risks. Additionally, existing UK guidance on crop water requirements is largely based on historic climatic conditions and water availability which needs updating to reflect increasing weather variability and changing abstraction constraints.

Evidence is concentrated in a small number of crops. The highest volumes relate to peas, beans, herbs, chicory, strawberry, lettuce, and broccoli. No evidence was found for leek, beetroot, baby leaf, pumpkin or many other fresh produce crops.

Some crops are almost entirely negatively affected by water stress (e.g. celery, artichoke and asparagus) whereas others show a more mixed picture and are potentially lower risk (e.g. strawberry, chicory and carrot).

Drought was the most frequently investigated type of water stress. It has harmful but variable effects, with some positive outcomes seen, such as increased antioxidants or essential oils. Salinity stress produces the most consistently negative results. Waterlogging, high temperature and combined drought with high temperature have very little evidence.

The operational and economic impacts of water availability on farms point to high production risks, greater yield variability and potential question on the future viability of come crops. Water stress affects fresh produce yield, quality, biomass, growth, nutritional content and disease susceptibility.

Summary from grower interviews

Climate volatility is increasing production risk: Growers consistently reported more frequent weather extremes, including prolonged dry periods, heat stress and intense rainfall events. The challenge is increasing unpredictability and seasonal variability rather than declining annual rainfall.

"There seems to be more heat events, wet events. They're very hard to predict and there seem to be more of them." - Matt O'Hagan, Technical Director at ESG Drysdale

"We've just won an ADOPT Innovate UK award to do what we're calling a smart irrigation trial. Sensors will automatically increase or decrease the rate on the application equipment for more efficient use of the water.
- Andrew Blenkiron, Managing Director at Elveden Farms

"We're trying to get ground sensors linked with weather forecasts and local river flows so we can understand how much water capacity is in the soil."
- Stephen Kingdon, Sustainability Manager at PDM Produce

"Over the last few years, that has probably reduced water use by about 30% because we're understanding better what depth of soil profile those crops are drawing water from."
- Jon Hammond, Director of Hammond Produce

Key findings from desk research

The desk review examined current evidence relating to water security, climate change, abstraction policy, crop water requirements and the impacts of water stress on fresh produce production.

1. Water security is recognised as a strategic risk for agriculture

- Increasing competition for water resources.
- Tension between environmental and food production objectives.
- Increasing uncertainty around future abstraction access.
- Reduced confidence in long-term irrigation investment.

2. Climate change will increase regional water pressure

- Greater weather volatility with drier summers and wetter winters.
- Increasing frequency and severity of droughts.
- Declining river flows and groundwater availability in key production regions.

The greatest risks are projected in East Anglia, Lincolnshire and south east England, which are also among the UK's most important fresh produce growing regions.

3. Water risk is multi-dimensional, interacting and cumulative

- Reduced river flows.
- Reduced groundwater recharge.
- Increased abstraction pressure.
- Water quality concerns.
- Climate volatility.

These risks frequently occur within the same geographical areas and seasons.

4. Water stress is predominantly harmful to crop production

- Yield losses under drought conditions (**50-80%** in peas and beans, up to **65%** in cabbage).
- Reduced biomass and plant growth.
- Increased crop defects.
- Significant impacts on crop quality in potatoes, carrots, lettuce, broccoli and cauliflower.
- Greater production risk and yield variability; pressure on viability of certain crops in a more drought prone climate.
- Nutritional content can increase in some crops and reduce in others (peas, beans and radish).

5. There are substantial gaps in UK evidence

- Evidence is concentrated in a small number of crops including peas, beans, herbs, chicory, strawberries, lettuce and broccoli.
- No evidence was found for leek, beetroot, baby leaf, pumpkin.
- Limited evidence for many commercially important vegetables.

There is a lack of UK-specific field evidence available for many fresh produce crops relative to Europe. This raises questions about whether the current evidence base is sufficient to support long-term decision-making under future climate conditions.

6. Much existing guidance is built on historic conditions

- Weather volatility is increasing.
- Water availability is changing.
- Regulatory conditions are evolving.

This raises an important question:

Are we planning future water resilience using evidence gathered for a different climate?

What did farmers tell us?

Structured interviews were undertaken with experienced fresh produce growers representing major UK production businesses. Despite operating in different regions and production systems, there was remarkable consistency across interviews.

1. Water security is a future concern rather than a current crisis

Most growers reported that while water supplies currently remain largely adequate, confidence in future availability is declining. The greatest concern is not today's water supply but long-term access to water under future climatic and regulatory conditions.

2. Climate volatility is increasing production risk

- Longer dry periods.
- More heat stress events.
- Heavier downpours.
- Greater seasonal unpredictability.

Interviewees were generally more concerned about variability and unpredictability than simply declining rainfall totals.

3. Water quality matters as much as water quantity

- Meeting microbial standards.
- Water treatment requirements.
- Monitoring costs.
- Restrictions on water reuse.

This was especially important in ready-to-eat crop production.

4. Storage, not efficiency, is the biggest future priority

Many businesses already use:

- Soil moisture monitoring.
- Weather stations.
- Irrigation scheduling systems.
- Remote sensing technologies.

Growers generally reported they had already made substantial efficiency improvements. Future resilience depends more on increasing water storage capacity than on marginal gains in irrigation efficiency.

5. Regulation and planning are major constraints

- Abstraction licensing.
- Planning timescales.
- Regulatory complexity.
- Limited flexibility during high-flow periods.

Many believed future resilience would require a more flexible and collaborative regulatory approach.

6. Long-term investment requires long-term stability

- Policy uncertainty reduces confidence.
- Regulatory uncertainty delays investment.
- Long-term signals are essential for adaptation.

Reservoirs and water infrastructure require significant capital investment and long repayment periods.

7. Food security needs greater recognition

Growers consistently stated that domestic food production is not sufficiently recognised within water policy and planning, and should receive greater strategic consideration in future water allocation decisions.

Methodology

This report draws on both quantitative and qualitative research, which has been conducted by the School of Sustainable Food and Farming at Harper Adams University.

Quantitative research

Quantitative desk research review of current evidence across the policy and regulatory context; collation of modelling data on rainfall and water availability; assessment of specific crop water requirements; review of crop specific studies and analysis of on-farm impacts of water availability.

Qualitative interviews and workshops

Qualitative research captured the personal perspectives of fresh produce growers from some of the UK's major horticulture businesses. The School of Sustainable Food and Farming devised a survey questionnaire with Morrisons and carried out face to face interviews as well as a workshop discussion held at Great Yorkshire Show in summer 2026. The team gathered insights from farmers in a conversational and open format.




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