# The Spark

## SEFARI Gateway's Newsletter

January 2026

Welcome to the January 2026 edition of The Spark, your update from SEFARI Gateway (Centre of Expertise for Knowledge Exchange & Innovation) on the latest research developments from the Scottish Government's Environment, Natural Resources and Agriculture (ENRA) strategic research programme. The ENRA Research Portfolio provides evidence for policy and practice across environment, climate change, biodiversity, land use, agriculture, food, and rural community agendas.

Scotland is playing a central role in developing environmental solutions to the global climate and nature crises, and the Scottish Government response is based on the strongest possible scientific evidence. The Environment, Natural Resources and Agriculture research programme is key to achieving this.

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SEFARI Gateway

Scottish Government
Riaghaltas na h-Alba

## Faster, cheaper breakthrough diagnostic aims to prevent future drinking water parasite outbreaks

Providing safe drinking water is challenging for water industries because single-celled parasites (Cryptosporidium, Giardia and Toxoplasma), which can infect people, are difficult to detect. Detection methods for these parasites must be very sensitive, because the parasites may occur at very low numbers and cannot be cultured for diagnosis. Current detection methods are expensive, time-consuming and require skilled workers. At the Moredun Research Institute, we are working with Scottish Water and have developed a DNA-based diagnostic test to identify human infectious Cryptosporidium species. We are also in the process of developing further new technologies that will help drinking water companies, like Scottish Water, to detect single cellular parasites in their drinking water. The consequences of failing to detect these parasites in drinking water can be disastrous, as was seen in the 2024 Cryptosporidium outbreak in Devon, where over 100 people became infected. Dealing with this outbreak cost the responsible water company £16.3m. In addition, the local economy suffered a loss of £34m because tourists cancelled their vacations to the affected area (4).

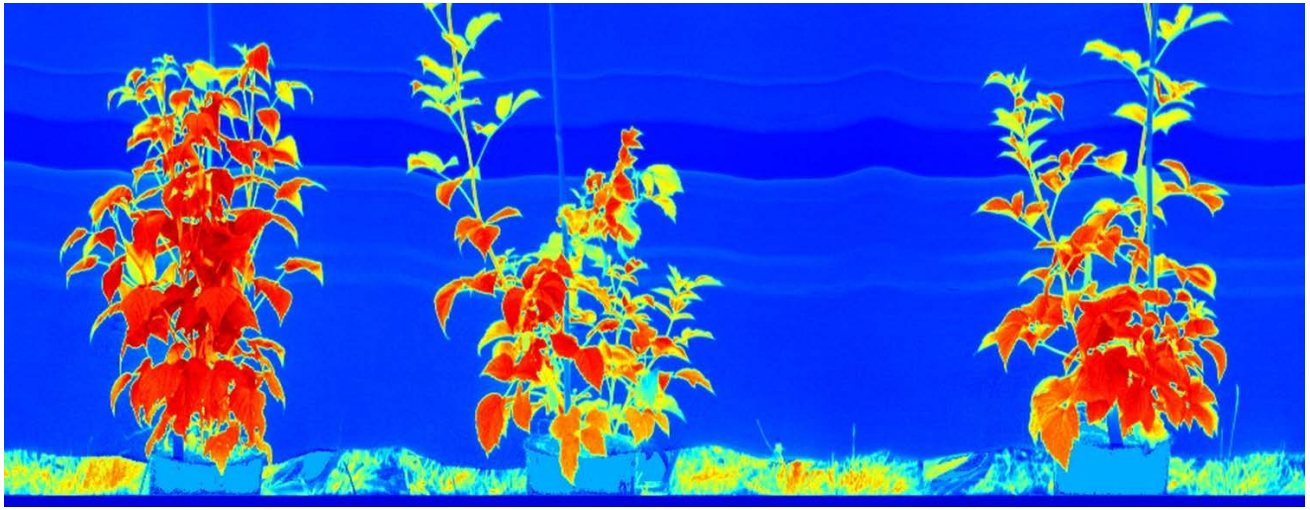
# Sustainable disease and pest control in key Scottish crops

Researchers at the James Hutton Institute are helping future-proof Scotland's potato and soft fruit industries by developing innovative and sustainable solutions to disease and pest threats. By integrating plant genetics, pathogen biology, and environmental factors, the project supports more resilient and productive crops.

Key outcomes include identifying resistances to late blight, viruses, and potato cyst nematodes, and delivering molecular markers now used in breeding through advanced genetic technologies. These markers are commercially proven and already accelerating the breeding of resilient, high-value potato varieties for leading UK and global producers while strengthening the innovation pipeline that serves Scotland's potato sector. Hyperspectral imaging enables early, non-destructive disease detection in soft fruit, improving targeted control.

In-depth understanding of pathogen biology—particularly late blight and nematodes—is unlocking new approaches such as spray-induced gene silencing and hatch disruption. These methods target infection-critical processes with greater precision and sustainability.

Beneficial microbes like Pseudomonas and Trichoderma are further reducing disease pressure. In combination, these tools reduce chemical use and support Scotland's goals for biodiversity, sustainability, and climate resilience.



Hyperspectral image of raspberry plants grown in a polytunnel. Red colours show areas of plant with higher chlorophyll content (Credit: The James Hutton Institute).

## Disease Losses and Pesticide Use

### Value for GB

**POTATO**
**£4.3b**

**SOFT FRUIT**
**£2.2b**

### Pesticide use in Scotland

**POTATO**
**193 tonnes**
→ over 99% of all potatoes

**SOFT FRUIT**
**13 tonnes**
→ 92% of all soft fruits

### Losses due to disease

**POTATO**
**15-25%**

**SOFT FRUIT**
**15-25%**

# On-farm tech uptake could cut emissions - if backed by stronger incentives

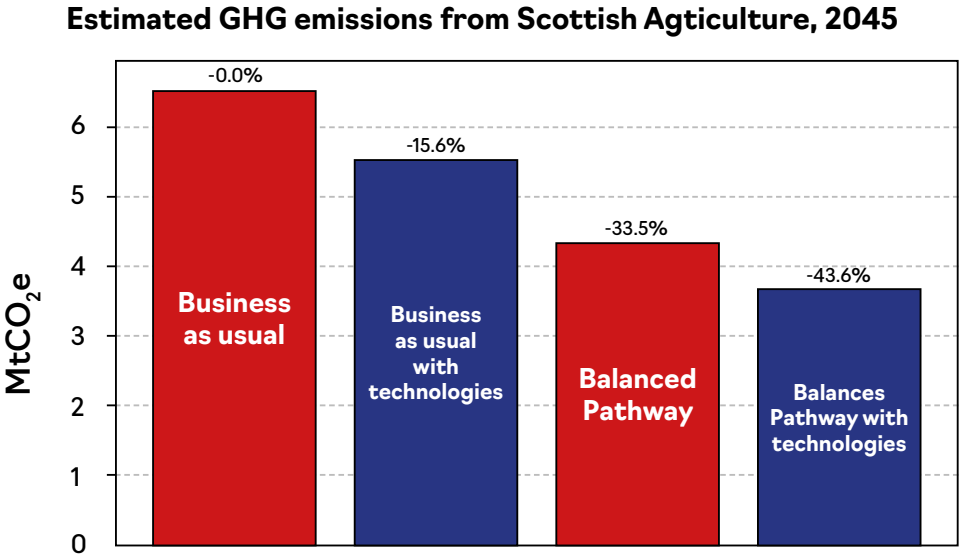



**Figure 1**: GHG mitigation achievable by on-farm technologies and practices and by changes in the food system. Potential carbon sequestration from land use change is not included. (Scenario summaries: Business as Usual: current food consumption and production patterns; Balanced Pathway: milk and crop yield increase, decrease in livestock product consumption and increase in plant consumption. For detailed description see the report.)

Greenhouse gas (GHG) emissions from Scottish agriculture only decreased by 12% between 1990 and 2022. As the Climate Change Committee have pointed out in its latest Scottish Progress Report, they are not on track to support net-zero targets and current policies fall short of the level needed to achieve the required mitigation.

SRUC's new report on future agricultural GHG mitigation options reiterates that a strong (60-70%) uptake of on-farm technologies and practices can reduce GHG emissions by around 15% annually, to 5.5 $MtCO_2e$ emissions, by 2045. While such a reduction is welcome, further action (such as changing consumption patterns and reducing food waste) will be required to meet our GHG reduction targets. With these food chain changes, Scottish agricultural emissions would be 4.3 $MtCO_2e$, and the uptake of technical mitigation measures could reduce this further to 3.7 $MtCO_2e$ i.e. providing, in total, 43.6% mitigation (Figure 1).

Most practices assessed in the work are already available for implementation (e.g. clover-grass mix, feed additives for housed animals) and some more, promising practices are in development (e.g. low-methane breeding goals). However, this transition will require stronger incentives and an environment supporting overcoming financial and other barriers.

Some of the mitigation measures can reduce emissions by improving production efficiency (increasing yield). It needs to be noted that these emissions reductions would only be achieved in practice if production does not expand.

The Climate Change Committee (CCC) commissioned Scotland's Rural College (SRUC) to update the abatement potential from a range on-farm measures covering behavioural practices and technological options.

The UK results, which have been used to support the development of the 7th Carbon Budget, are published in this report.

## Segmented consumer profiles offer roadmap for Food Standards Scotland's sustainable diet goals

ENRA consumer research co-created with Food Standards Scotland will help inform their new strategy: Healthy, safe, sustainable: driving Scotland's food future 2026-2031.

Despite a picture of fragmented views and a lack of knowledge of sustainable diets amongst some consumers, the Rowett Institute-led research provides a clear picture of audience segmentation and profiles of those consumers most likely to adopt a sustainable diet. Other measures could encourage sustainable diets. Addressing cost concerns, improving information accessibility, and linking sustainability with personal health could broaden appeal. Such targeted strategies have greater potential to influence behaviour and support both environmental and public health goals.

Using Q methodology for the first time, the answers people gave allowed the researchers to divide them into seven distinct categories, which would allow future targeting. Examples include: Supporters – those who trust the information available and want more education, and Aspirational but struggling – those who want to eat sustainably but find changing habits tough.

## Scottish government-backed fellowship to develop roadmap for DNA-based environmental monitoring

Understanding which species live where is crucial for nature recovery, but traditional wildlife surveys are time-consuming and often miss hidden organisms. New DNA sequencing tools now allow scientists to detect species from tiny traces they leave behind—known as environmental DNA (eDNA)—found in water, soil or even air. These methods can reveal the presence of fish, plants, microbes and other species without ever seeing them.

DNA-based monitoring offers a more cost-effective way to track biodiversity and ecosystem change, and is already being used in parts of Scotland. A new Gateway fellowship, in partnership with the Scottish Government, Scottish Environment Protection Agency (SEPA) and the Co-ordinated Agenda for Marine, Environment and Rural Affairs Science (CAMERAS), will develop a strategic route map for using DNA and other biomolecules to monitor and understand Scotland's environment. A fellowship team led by, David Cooke at the James Hutton Institute, was appointed. Work is underway and the first workshop was held on 4th December.