



# Hutton Highlights

## June 2023

**Hutton sustainability  
recognised in first King's  
Award for Enterprise**

**Changing gender roles in  
Scottish farming – shifting  
the balance**

**Scottish field trials show cost  
of shift to sustainable farming**



The James  
**Hutton**  
Institute



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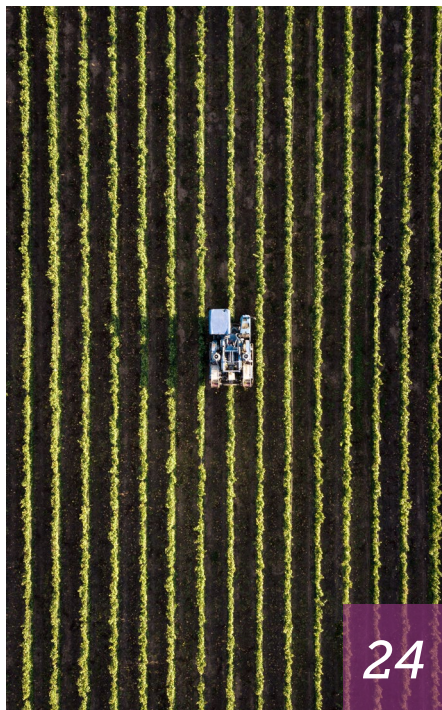
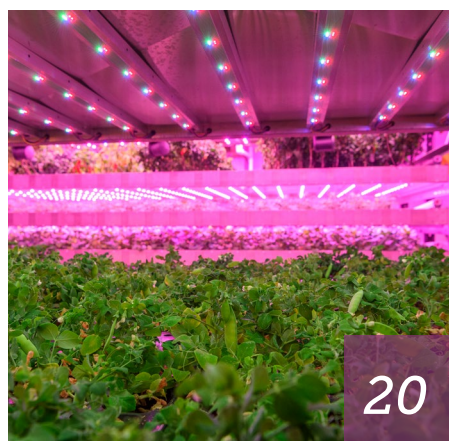
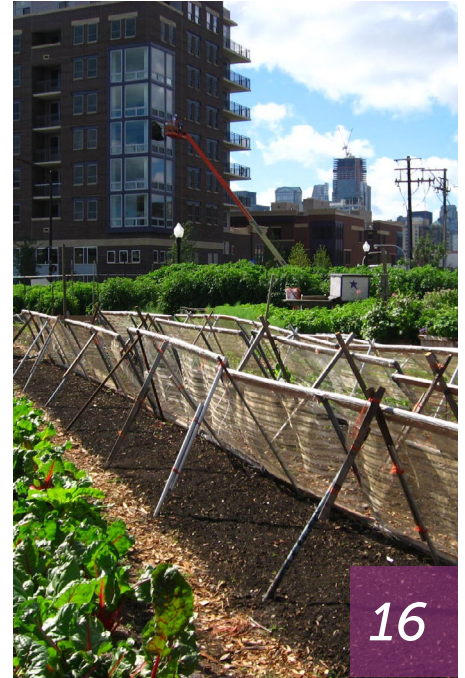
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The James Hutton Institute is a well-respected and globally recognised research organisation delivering fundamental and applied science to drive the sustainable use of land and natural resources.

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# Introduction

## Many reasons to celebrate, but always more we can do

*Professor Colin Campbell, Chief Executive of The James Hutton Institute*

Welcome to our summer 2023 Hutton Highlights. In this issue we have many reasons to celebrate. Sustainability is at the heart of what we do so it was wonderful to be recognised with a King's Award for Enterprise in Sustainable Development. This achievement reflects on everyone in the organisation and all those associated with us. Thank you.

Our major new build projects, the Advanced Plant Growth Centre (APGC) and International Barley Hub, are also progressing at pace and you will see in this issue new colleagues, new recognitions for our people, new board members and news on the transition to a new Chair later this year.

There is always a lot more to do. With yet another record year of global temperatures forecast, there's every reason to double down on the climate and nature challenges. You'll read about how our science is about finding solutions to these challenges too, including protecting our peatlands and endangered species like the freshwater pearl mussel, while making sure we support communities as land use changes and adapts.

As the cost-of-living bites, we're pushing forward with helping to establish Scotland as a leader in global food security and crop resilience, whether that's improved varieties of the humble potato or through more ecologically friendly farming, while

fostering entrepreneurialism by sharing our space and expertise.

It's a Hutton Group effort, across our people, partners and stakeholders and we thank you all for your support and contributions. Thank you for your continued interest and as we enter the summer events season do come and see us in person at Arable Scotland, Fruit for the Future, Potatoes in Practice and on Avenue Q (Q is for questions) at the Royal Highland Show.

## The insect collections – a research resource

The James Hutton Institute holds live cultures of a unique collection of important pests that pose specific threats to Scottish and UK agriculture.

The [collection](#) reflects existing and historical pest diversity and forms an integral part of the institute research programme and a resource for research by external users.

The cultures are maintained in dedicated facilities at the Institute. We add new cultures to the collection of clones or genotypes important to Scottish agriculture.

**Watch the video to take a look around the collection:**





# News highlights



Colin Campbell, The James Hutton Institute's Chief Executive, and Stefan Jindra



## Hutton sustainability recognised in first King's Award for Enterprise

**The James Hutton Institute has become one of the first recipients of the new King's Award for Enterprise in Sustainable Development.**

The award recognises the institute's world-leading research on sustainability across land, food and natural resources and how it's addressing its own sustainability as major scientific research establishment.

The Hutton, which employs more than 300 scientists across sites in Dundee, Aberdeen and its three research farms, plays a pivotal role in delivering interdisciplinary science across agriculture, food security, ecosystems and resilient communities.

Colin Campbell, Chief Executive at the Hutton Institute says, "We're honoured to be a recipient of one of the first King's Awards for Enterprise. Sustainability drives our research and we recognise the urgency with which we must all act.

"One of the major areas we focus on is agriculture, which is responsible for approximately 7.5 MtCO<sub>2</sub>e, or 19%, of Scotland's emissions. To move towards UK and Scottish Government net zero ambitions, innovation is needed and

through our initiatives like the International Barley Hub (IBH), the Advanced Plant Growth Centre and our Climate-Positive Farming Initiative, Scotland is at the forefront of tackling these issues.

"The connectivity of the climate, nature and food crises also means we need systems change. Our interdisciplinary research helps to underpin policies for sustainable land-use working with communities and supporting future generations' wellbeing."

UK Government minister for Scotland, John Lamont, said: "It's great to see Scottish businesses recognised in the first ever King's Awards. These are considered among the most prestigious business awards in the UK, and each should rightly be proud to be named among the winners.

"The James Hutton Institute is already well-known for their research into making sure we use our natural resources more sustainably, and this is a just reward for their amazing work. It just goes to show some of the fantastic organisations we have operating in Scotland, and I hope this award can inspire them to even greater achievements in future."



The King's Award for Enterprise recognises a wide range of activities that The James Hutton Institute undertakes to address global sustainability challenges, all of which are aligned with the UN's Sustainable Development Goals. This includes establishing the IBH, creating the world's lead centre of excellence in barley science, and the Advanced Plant Growth Centre, delivering commercial and environmental benefits through precision controlled environmental technologies.

The Hutton is also leading by example through several projects, including its Climate-Positive Farming Initiative, which seeks to achieve negative emissions through transforming farm activities. This includes planting 110 ha of trees in 2020 alone, peatland restoration, catchment scale water management and the HydroGlen project, which will demonstrate the first green hydrogen-powered commercially run farm in the UK.

In addition to its scientific research, the Hutton is also focused on its own financial and environmental sustainability.

"We have been reporting and reducing our own emissions since 2013, through alternative and energy saving measures, from solar power to biomass, and have met and even exceeded our short-term targets," says Stefan Jindra, Sustainability Coordinator at the institute. "We also have biodiversity plans and are addressing recycling, waste and travel across our sites, while our Just Transition Hub project in Aberdeen, we'll be helping build capacity and share expertise in the transition.

"There is more to come too. We now have a target to be net zero in carbon emissions by 2035, for scope 1 and 2 emissions, and 2040, for scope 3, in line with the Science Based Target initiative. We're excited about what meeting those targets will involve."

## Appointments for Hutton's Just Transition Hub

**Architectural practice jmarchitects has been chosen to support the design of the Hutton's multimillion pound Just Transition Hub project in Aberdeen.**

The new hub will create a state-of-the-art virtual and physical collaborative facility in the heart of the institute's Craigiebuckler campus to drive engagement, training and innovation around nature-based net-zero solutions in the northeast and across Scotland.

This will include acting as an incubator for "spin out" companies, drawing on the Hutton's expertise in environmental, crop and food science, as well as wider public engagement, including a café.

The hub, which has the backing of the Scottish Government's Just Transition Fund, is expected to create 200 new jobs and draw £1.6 million into the local economy.

Professor Lee-Ann Sutherland, project lead on the Just Transition Hub at the Hutton, says, "We're already really excited by the design proposals we are working on, including remodelling areas of our existing building, which would result in lower lifecycle carbon dioxide emissions."

**Faithful+Gould has been selected as the project manager for the £7.2 million Just Transition Hub. As project leader, Faithful+Gould, part of the SNC-Lavalin Group, will be appointing and leading a multi-disciplinary team providing quantity surveying and supervisory roles for the design and build of the Just Transition Hub.**

In addition to Jmarchitects and Faithful+Gould's appointments, Goodsons Associates and CCDP have also been chosen to join the design team, providing civil and engineering services and mechanical and electrical engineering respectively.

Professor Lee-Ann Sutherland, Director of the International Land Use Study Centre (ILUSC) and project lead on the Just Transition Hub, says, "It's great to have Jmarchitects and Faithful+Gould and the rest of the team onboard with this project.

We have an ambitious programme and timeframe, with construction targeted for 2024. Ultimately, the new development will expand our capacity – and that of the region – to progress nature-based and net-zero solutions where the community is part of the solution."

Yunming Thomson, from jmarchitects (far left), with Just Transition Hub project lead Lee-Ann Sutherland (far right), alongside Tara Gavan, project manager Faithful+Gould, and representatives of Goodsons Associates and CCDP.





# Awards, accolades & appointments

## Hutton welcomes new chair and board members

The James Hutton Institute has welcomed three new leading figures to its board of directors, with a new chair due to take up post in early September.

Well-known and respected Scottish environmentalist Susan Davies will become the institute's chair having been a trustee since 2017.

Davies, who has been chief Executive of the Scottish Seabird Centre since 2019 and is also a former Director of Conservation at the Scottish Wildlife trust. She will replace Ian Gambles, who has been in the role as Chair for nine years.

The new members of the board are Dr Rebekah Widdowfield, Vice Principal at St Andrews University, Professor Ian Wall, former CEO of The EDI Group, and David Gray, Chair of The Gannochy Trust.

Together, they bring a wealth of experience from across government, education, academia, finance and public engagement to the Hutton's work across land, crops, water and the environment.

Davies says: "I couldn't be prouder to be taking over as chair of what is quite rightly considered one of the world's leading research institutes. The Hutton helps societies across the globe respond to ever-growing challenges around food security, sustainable management of our natural resources and net-zero.



*Susan Davies*

"We are all at a milestone moment in working together to build the economic, environmental, and societal resilience to climate change and tackling nature loss. I look forward to working with the team at the Hutton to ensure science continues to have a positive and lasting impact for us all."

Ian Gambles welcomed the new board members and thanked outgoing members, Elizabeth Wade and Archie Gibson for the contributions they have made.



*Dr Rebekah Widdowfield*



*Professor Ian Wall*



*David Gray*



## Hutton forensic soil scientist awarded RSE medal for earth science

**Head of forensic science and principal scientist at The James Hutton Institute Professor Lorna Dawson has become the first winner of the Royal Society of Edinburgh's (RSE) medal for earth and environmental sciences.**

The new medal, named after the institute's namesake and RSE founder member James Hutton, recognises Professor Dawson's exceptional achievements in soil and environmental science, including developing and pioneering the use of soil science to solve crime in the UK and further afield.

Professor Dawson was brought up on a farm in Forfar, where she went to Forfar Academy before studying geography at the University of Edinburgh and then gaining a PhD in soil science at the University of Aberdeen. She started her career with The James Hutton Institute in 1985, when she joined its predecessor, The Macaulay Institute.

Since then she has also supported countless police investigations, been an expert witness on more than 20 cases, including the recent Sheku Bayoh Public Inquiry, advised the National Crime Agency, published more than 100 scientific papers and has played a major role in public engagement in soil and forensic science.

Professor Dawson says: "One of the main achievements in my career has been in developing, pioneering, and communicating the application of soil science within the Criminal Justice System both in the UK and abroad. But this award is thanks to the many people I have collaborated with at the Hutton and across all the Scottish institutes and universities I've worked with, in particular Robert Gordon University."

## James Hutton Institute scientist appointed Commissioner on Food, Farming and Countryside

**Professor Dawson has also been appointed as a Commissioner on the UK's Food, Farming and Countryside Commission (FFCC).**

The FFCC, which delivered the landmark Our Future in the Land report, before becoming an independent charity, is a leader in tackling the challenges faced by rural communities across the UK.

The Hutton has already been supporting the work of the FFCC, both during the FFCC Inquiry hosted by the RSA (Royal Society for the encouragement of Arts, Manufactures and Commerce) and now as an independent charity.

Professor Dawson especially has contributed to the FFCC's work, including its Scotland Inquiry and subsequent report. As a Commissioner and Co-chair, Scotland, Professor Dawson leads the FFCC's work in its food, farming and countryside devolved Scotland programme. She also sits on the body's research advisory group.

FFCC Chief Executive Sue Pritchard, says, "I am delighted to welcome Lorna to join the FFCC Commission as a Commissioner. Lorna has led our work in Scotland as Co-Chair for FFCC Scotland for the last five years. This change reflects the Commission's intention to strengthen our work across all four UK nations."

Professor Dawson says, "It's so important that we work together across the UK, while treasuring our many differences, and we work towards achieving a vibrant future for our farming systems, diverse food quality and our beautiful countryside. I'm delighted to contribute to the FFCC, a wonderful organisation making real positive differences on the ground."



*Professor Lorna Dawson*



# Major review paves way for expanding peatland restoration

PEATLAND  
CODE 







A major review by UK scientists has led to an update in how greenhouse gas emissions from peatlands are estimated and a significant expansion of the [Peatland Code](#), making more UK peatland restoration schemes eligible for private finance.

**The evidence review, led by the UK Centre for Ecology & Hydrology (UKCEH) and supported by experts from The James Hutton Institute in Aberdeen, was produced for the Department for Environment, Food and Rural Affairs (Defra).**

It led to an update in how greenhouse gas emissions and removals from different types of peatland in the UK are estimated for use as part of the UK's national [Greenhouse Gas \(GHG\) Inventory](#), leading to an improved estimate of emissions from peatland in the UK.

The review also paved the way for the Peatland Code, a voluntary certification scheme for peatland restoration, operated by the International Union for the Conservation of Nature ([IUCN UK Peatland Programme](#)), to be aligned with the GHG Inventory.

The changes will enable a better assessment of how much funding is needed for peatland restoration as part of the UK's efforts to meet its 68% emissions reduction target, known as nationally determined contributions ([NDCs](#)), by 2030 (compared with 1990).

The alignment of the Defra-backed Peatland Code with the updated peatland inventory will also mean better estimates of the abatement potential that individual restoration projects can generate, providing greater confidence to project developers and potential investors.

Rebekka Artz, senior research scientist at The James Hutton Institute, says,

**“Every year, we understand more about peatland emissions and how to reduce them through restoration or better management. Through our increasing knowledge of peatland emissions, and by aligning the Peatland Code with our latest emission factors used in the UK GHG Inventory, we are better equipped to understand the scale of the issue, while more avenues are opened to green finance investment to deliver peatland restoration.”**

The Peatland Code is the primary mechanism for private funding and generation of carbon credits for UK peatland restoration.

It provides a voluntary certification standard for UK peatland projects wishing to market the greenhouse gas reduction benefits of peatland restoration. It also provides assurances to voluntary carbon market buyers that the climate benefits being sold are real, quantifiable, additional and permanent.

Renée Kerkvliet-Hermans, Peatland Code Co-ordinator for the IUCN UK

Peatland Programme said, “The Peatland Code has grown in recent years and now has 157 registered projects on bog peatland delivering 21,921 ha of peatland restoration and securing almost 5 million tonnes of CO<sub>2</sub>e predicted emissions reductions over the life of those projects.

Peatlands occupy 12% of the UK's land area and store vast quantities of carbon. Healthy peatlands capture carbon dioxide (CO<sub>2</sub>) from the atmosphere and deposit a small amount of carbon as peat each year. However, around 80% of the UK's peatlands have been significantly affected by the way they are managed.

The UK Government has committed to invest more than [£50 million in peat restoration](#) by 2025 and is currently consulting on banning the sale of peat and peat containing products. The Scottish Government has pledged more than £250 million in peatland restoration up to 2030, predominantly via NatureScot's [Peatland ACTION](#), and there are also peatland-specific initiatives in Wales and Northern Ireland.

However, the IUCN UK Peatland Programme/ Kerkvliet-Hermans points out that a significant barrier to peatland restoration is still financial. It says current public funding is both limited and competitive, while a £560 million gap in the funding needed to restore the UK's degraded peatlands has been estimated, which makes attracting investment important.





## The humble potato is a marvel – but science can still improve it

Tatties, taters, spuds - whatever you call potatoes probably reflects your cultural and geographical background. Since first introduced to the world from South America, they have lifted millions of our predecessors out of food poverty and fuelled the industrial revolution. The loss of the potato harvest in the 19th century to potato blight disease also precipitated mass migration from Ireland and Scotland to the north Americas and beyond.

**Summary of piece written by Professor Lesley Torrance, Director of Science at The James Hutton Institute. This article first appeared in The Herald on 6 April 2023.**

So, the humble tattie has already had a major impact on world history, and together with the fascinating science underlying how we use them, makes me wonder why they are considered so humble.

As the cost-of-living crisis continues to bite, horticulturalists expect the number of us growing our own veg this year could hit the highest levels in decades; and our old favourite the spud - if you have a bit of space to play with, even as small as a corner of your garden - is likely to top that list.

“Growing your own”, of course, is something we have traditionally done well and in vast numbers in the past, especially in times of national need.

Scotland has always been good for growing potatoes and at The James Hutton Institute, right in the heart of Scotland’s prime potato country, in Invergowrie just west of Dundee; we are undoubtedly the national experts leading research into what can be done

to improve the supply, quality and resilience of this beloved national crop.

The world’s dramatically changing weather will cause more heat stress which, alongside drought and flooding, will vastly increase the occurrence of potato diseases and pests. Add in more difficult trading caused by Brexit alongside the ramifications of the war in Ukraine on our various supply chains, and the British potato isn’t just under threat - it is facing possible extinction within our lifetime if we don’t adapt.

The value of UK potato products, both fresh and processed, is around £3 billion annually, with potato production worth more than £700 million in income to farmers. Growing and processing of potatoes accounts for just under a third of the country’s entire planted crop area. However, yield gains in potatoes have failed to keep pace with those achieved in other crops, largely down to their complex genetics. Brexit has sliced around £42 million worth off annual UK exports.

Researchers, growers and breeding companies must adopt the new breeding technologies to dramatically improve the production of new varieties and sustainable practices which can withstand the changes in climate. To this end, the James Hutton Institute is proposing the urgent creation of a National Potato Innovation Centre (NPIC) that brings all UK science and industry together to help the sector.

Detailed plans and goals for the NPIC are already in place - “oven-ready”, as the politicians might say, to focus on the fast adaptation of existing and creation of new breeds, better suited to improved and more sustainable modern production systems, while also pioneering nature-based approaches for optimum crop and pest management.

Already, our scientists have made major global breakthroughs in developing new potato varieties resistant to several of the most-damaging natural enemies. This includes a highly-destructive pest – the potato cyst nematode (PCN), a





## Scientists discover potato varieties resistant to pests

The findings of a ground-breaking farm trial investigating potato varieties resistant to crop-destroying potato cyst nematodes (PCN) were revealed last week at the Hutton in Invergowrie.

The PCN Action Scotland Winter Conference welcomed delegates from the Scottish farming community and shared updates from a 2022 trial to tackle the threat of the major potato pests.

Thanks to scientists from Hutton, SoilEssentials, Scottish Agronomy, SRUC and SASA working collaboratively on this Scottish Government-funded project, new varieties of potato have been shown to be both highly resistant to PCN, and suitable for growth in Scotland's climate.

Dr. Philip Burgess, Scottishpotatoes.org (a Hutton and SRUC partnership) lead, said, "Although we are already aware of potato varieties that do not allow PCN to multiply as they are resistant to infection, they can still cause significant yield losses as despite the resistance, the root systems can still be eaten away by the pests. Therefore, farmers are experiencing reduced yields or are reliant on a PCN pesticide (nematicides) which may not be available in the future.

"What we need are potato varieties with both resistance and high levels of tolerance to the pest, and this is what we found in the field trial."

During the trial, some potato varieties were discovered to not only stop the multiplication of PCN, but also grow well under high pest pressure, leading to a more sustainable rotation. As well as this vital finding, the varieties are suitable for production in Scotland's climate and are consumer friendly.

Dr Burgess added, "It is really pleasing to note that some of these varieties are now being stocked by major retailers and we hope others will follow suit soon.

"Our goal is to deliver potato crops with resistance and tolerance to PCN, to ensure a sustainable seed potato sector in Scotland and thereby deliver food security without damaging nature or forcing more climate change."

More information about the findings of the farm trial can be found at [pcnhub.ac.uk](http://pcnhub.ac.uk)

parasitic roundworm that feeds and reproduces on potato roots.

The amount of land used for seed potatoes in Scotland infested by PCN is doubling every seven years, so tackling it is urgent. Our team has succeeded in creating a new pipeline of potato varieties better able to withstand the evolving threat of PCN, and capable of meeting exacting standards of growers, buyers and consumers in terms of yield and taste.

It has also played a critical role in alerting farmers worldwide to the emergence of new and aggressive strains of what's called 'late blight' – the especially virulent potato disease, that led to the Irish Potato Famine more than two centuries ago.

It's caused by a fast-spreading type of water mould known as the "plant destroyer" (Phytophthora) which can infect both potatoes and tomatoes, swiftly killing plants. It is the single most serious threat to potato production, resulting in estimated annual global industry costs of up to £8 billion from a combination of loss of crops and treating the disease with fungicides and other measures.

We have also demonstrated heat, drought and disease resilient potato lines that meet market needs and are adapted to growing in the warmer climates in Sub-Saharan Africa which could lift more millions of people out of food insecurity.

So next time you hold a potato in your hand, think of the power it provides to people. With the modern tools and the vast variation in types of potato held at the James Hutton Institute, we have the means to improve the resilience and sustainability of our future potato crops.



*Dr. Philip Burgess*

# Rare freshwater pearl mussels discovered in Scottish lochs

Critically-endangered freshwater pearl mussels are known to live in Scotland's rivers, but new research supported by The James Hutton Institute has revealed that they are also in our lochs.

**Using remotely-operated underwater drones and snorkelling equipment, a small number of pearl mussels were discovered in two lochs in Sutherland and the Trossachs. The survey was carried out by [NatureScot](#) and funded by the Scottish Government's Central Research Fund.**

The discovery, made by using underwater drones, means conservation management for these rare creatures will be extended to lochs as well as rivers.

The mussels are likely to have entered the lochs by clinging to the gills of a host fish, either a young trout or salmon. They spend the first year of their lives harmlessly attached to the fish, before falling off to live independently.

Freshwater pearl mussels are rare in Scotland, mainly due to ongoing, illegal pearl fishing, poor water quality and habitat damage. The mussel's over-exploitation for centuries, and the intensification of land use, are the main reasons for the massive historic decline in its numbers and range.

As filter feeders, freshwater pearl mussels are also extremely vulnerable to water pollution and engineering work in rivers. The effects of these threats mean that, in Scotland, the species is on the brink of extinction in some rivers. NatureScot is leading efforts to conserve this important and iconic species.

Dr Susan Cooksley, a river catchment ecologist at The James Hutton Institute and scientific advisor on the project, says: "While Scotland is a strong hold for the species, we are losing them at a significant rate. They mostly live in fast flowing

highland rivers, with only a handful of rivers now known to have living colonies. So finding them in a new habitat, in our lochs, means there is more we have to learn."

NatureScot's Iain Sime, who led the latest project, said: "Other mussel species, including the much more widespread swan and duck mussels, are known to live and breed in Scottish lochs, but up until now we've had no evidence to suggest that pearl mussels routinely do this too.

"This project was an exciting first step in exploring our lochs and we're keen to do further surveys to better understand more about this critically-endangered species. We don't yet know whether they can breed in lochs and we want to learn more about a loch pearl mussel's relationship with their host fish"

"As a result of the research we'll be extending our conservation management advice for freshwater pearl mussels to include lochs as well as rivers."

It's illegal to disturb, injure, take or kill a freshwater pearl mussel. Despite this protection, illegal pearl fishing continues.

The River Dee in Aberdeenshire is one of 19 Scottish rivers designated as a Special Area of Conservation (SAC) for freshwater pearl mussel.

Read more about the latest research in [NatureScot Research Report 1315 - Life in our Lochs - are there freshwater pearl mussel populations in our lochs as well as our rivers?](#)





## Green tech start-up takes tenancy at institute in Aberdeen

**Fast-growing green hydrogen technology start-up sHYp has moved into offices and laboratory space at the Hutton's Aberdeen campus, with plans to expand to five staff on site.**

The move gives sHYp access to the institute's specialist analytical equipment and expertise, helping it to develop what could be the first electrolyser able to produce hydrogen from sea water, without the need for desalination.

sHYp says its technology, which splits seawater into hydrogen and oxygen using renewable electricity, would also be able to extract by-products such as carbon dioxide and magnesium hydroxide, used in building and pharmaceuticals, adding valuable income streams and reducing the cost of green hydrogen.

The technology could help any power users close to or at sea,

such as ports and offshore vessels and facilities, to harness any surplus offshore renewable energy they produce by turning it into hydrogen.

Professor Deborah Roberts, Deputy Chief Executive and Director of Science at the Hutton, says, "We believe that having leading-edge companies like sHYp co-locate here will benefit us both and, ultimately, help to stimulate innovation for the benefit of Aberdeen and our wider society as a whole."

Jennie Morrison, director for sHYp BV in Scotland, says, "We're really happy to be here at the institute where we will be able to work on and develop our technology and grow our team in-house. Laboratory space and access to specialist analytical and characterisation equipment can be challenging, but it will be invaluable to us as we develop our technology here in Scotland."

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## Hutton's entrepreneur in residence, George Lindsay



*George Lindsay, entrepreneur in residence*

**At the beginning of this year, the James Hutton Institute appointed a new entrepreneur in residence – a man with more than 30 years of global business experience, George Lindsay.**

In this new role, he will be working with the scientists at the institute to commercialise their discoveries, taking them from concept to commerce.

Over a long and varied career, Lindsay has gradually honed in on agricultural technology as one of his areas of interest, which made the position particularly relevant. Among other things, he's currently working on projects helping to certify carbon credits for businesses and developing applications for gene sequencing.

Lindsay worked with several growing Scottish firms and also got involved with the Edinburgh Climate Change Institute at Edinburgh University, where he was assigned a few young companies to help.

"My background was in agricultural software and it just so happened that I met with Jonathan Snape, the managing director of the commercial arm of the institute.

"After that, he called me to help on a couple of small projects looking at agritech trends, and before long it came to the point where he asked me to join them, as someone to help possible spin-outs.

**"I was given the opportunity to take these wonderful ideas from clever scientists, looking at them to see if they have any commercial legs, with the possibility of adding value to the institute, their founders and wider society."**

In the work Lindsay has been doing so far, the big trends are sustainability and carbon management.

"The agritech sector is almost totally focused on improving the way we farm, driven by consumer demand," he explained, noting that the company he worked with in the US - Adopt-Ag - specialised in predictive analytics, helping to pick the best field to plant a given crop.

"We were trying to create models to improve yield, sustainability and quality of the crop; the latter is becoming increasingly important, as demand increases around what people are eating and whether it's good for them."

Lindsay adds: "Another big project I'm currently working on is a potential spin-out on RNA sequencing, taking DNA strands and cutting them up - to be honest, the first pitch is often somewhat incomprehensible, so I'm there to help the scientists put things in layman terms, polishing their first few presentation slides - explaining that what they're really doing is 'curing cancer' or 'finding a new way to feed the world' - working out the key applications, rather than the technical details."



## Changing gender roles in Scottish farming – shifting the balance

The role of women in Scotland's agricultural sector is under the spotlight, for good reason. For a long time, there has been a lack of women in leadership positions in the sector, under representation in leadership roles in farming organisations, cultural barriers and significant unconscious gender bias.

It's a situation the Scottish Government has been looking to redress. Based on research by The James Hutton Institute and Newcastle University the government launched the Women in Agriculture Taskforce in 2017. Now, following further research by the Hutton, the government is looking to form a leadership programme for women, through its Women in Agriculture Programme.

The good news is that the latest research shows that there is change in the right direction. But, as our researchers have found, the challenges can be deeply embedded.

### Succession planning on Scottish farms

One area that has been highlighted as a particular barrier is succession planning on farms – who gets to inherit.

Professor Lee-Ann Sutherland – a social scientist who was brought up on a farm in Canada – says that research shows that women often get overlooked in preference to male siblings, from an early age, when it comes to inheritance planning on Scotland's farms. But when a woman is chosen as a successor, it is a critical turning point as they are then much more likely to make a balanced choice over who then takes over from them.

These findings, outlined in the journal *Rural Sociology* last month, found that succession isn't the only way that women enter farming – they also enter farming by marrying a farmer;

leaving the farm they were brought up on to take on another farm; or become a farmer following a previous career.

But that these other routes usually result in them having more marginal or home-based role or on smaller farms, rather than the larger family farm, due to the high cost of entering into farming.

### Farm successors identified from childhood

"Our research shows that succession planning is a critical turning point for achieving the aims of increasing the role of women on farms in Scotland," says Professor Sutherland. "Potential successors are often identified as children and specifically trained or offered opportunities to develop social networks and skills, making their, often male, succession, seem like an automatic next step, while others, typically women, accept it as a natural order of things.

"This isn't to say women aren't encouraged into agriculture. They often move into higher education and have successful careers within agriculture, but not as successors to the family farm, underscoring the dominance and image of men as farmers."

The most recent Scottish Agricultural Census says 40% of farm owner occupiers are women. But when asked to identify a "primary farmer", just 8% of farms in Scotland identified women, according to Eurostat. This is close to the bottom





Lee-Ann on her farm in her early days

of the European league table, lagging behind England where 14% of women were identified as the primary farmer.

The Hutton and Newcastle University study involved women and men from around Scotland. It involved a survey, focus groups and individual interviews, with more than 450 people. The research included women who were due to or had inherited farms; had left family farms to set up their own; married into farming, from farming and non-farming backgrounds; or made a career change and had decided to become farmers. Most, except the career change group, had some farming-related background.

## The barriers of inheritance patterns to farming

According to the latest findings on the study, more than half agreed that “inheritance patterns were a barrier to women’s choices about farming careers”, with successors (those inheriting a farm) agreeing most, followed by those who left their family farm to start their own.

“Women who were due to or had inherited their farms were far more likely to identify their daughters as successors, with women representing about half of the identified successors to women-run successor farms,” says Professor Sutherland. “Women raised on farms who did not inherit, but went on to establish farms of their own farm, also established more gender-balanced succession plans.”

## Womens’ role on the farm

The study also found that of all the groups, women who were due to or had inherited their farms were most likely to be involved in operating machinery (52%), with women brought up on farms who had married farmers being the least likely (23%).

According to the research, although the majority of participants in all groups agreed that it was important for women to be seen as farmers, no more than 56% of any cohort—including identified successors—saw themselves as farmers. Only 18.4% of successors identified themselves as career women.

***“It was encouraging that the largest group involved in the study group were those who had or were expecting to take over family farms, suggesting that rates of women farmers were increasing”***

adds Professor Sutherland. “However, this group was also the largest to agree that inheritance practices were a barrier to women’s choices about farming careers.

“The women on the largest farms were also the least likely to identify female successors and only 39% of the women in the study identified themselves as “farmers”. So there is still some way to go in achieving egalitarian gender relations within the Scottish agricultural sector.”

## Focusing on larger farms

Both women raised on farms who were not successors and women from non-farming backgrounds who married into farming were much less likely than successors or new generation farmers to have identified female successors. This was seen as concerning because the study respondents who married into farming were also typically located on larger, potentially more viable farms. It suggested that Scotland’s largest,



Lee-Ann this year at the Hutton

potentially most profitable farms, were continuing to primarily identify men as successors. It was on the smaller, potentially less viable farms, where women were more likely to be identified as successors.

More than half (51.4%) of new generation farmers, who had left a family farm to start their own, were likely to discuss decisions with their spouse, but would defer decision making to them.

New entrants to farming tended to come into it later in life, with grown-up children. They had a stronger decision-making role, with just 32% deferring decisions to their spouse, but fewer had identified a successor. They also had far smaller farms than other groups. It is thought that this could be because they often come into farming later in life (and have missed the opportunity to socialize their children into farming) or may see farming as a vocational choice rather than an identity in which their family is embedded.

## Further reading

The paper, [Breaking Patriarchal Succession Cycles: How Land Relations Influence Women’s Roles in Farming](#), has been published in *Rural Sociology* and had funding from the Scottish Government.





# Urban farming – a heavy metal health risk?

Not washing vegetables grown in urban environments before eating them could increase people's intake of heavy metal contaminants like lead by up to 130%, according to a new study.

**The study, led by researchers from Sweden and Scotland, says that growing greens in city gardens has grown in popularity, but it can mean they more contain contaminants, including heavy metals, compared with shop-bought produce.**

It found that washing the vegetables, such as lettuce and kale, could reduce contaminants by up to 56%, but that more could be done, such as covering the plants and paying attention to the soil they're grown in.

The study, by Swedish researchers from Linnaeus University, Luleå University of Technology and ALS Laboratory Group, and colleagues from The James Hutton Institute in Aberdeen, found that average household washing removed anything between just 5% (barium) to 56% (lead) of contaminants from produce.

In comparison, not washing the leaves before consumption could increase the average daily intake of lead by 130% – or 2.3 times the recommended exposure limit – or just 5% for barium (based on average high vegetable consumers).

Other increases in daily intake by not washing were found in cobalt (126%/2.26 times the daily recommended limit), chromium (121%/2.21), arsenic (82%/1.82), antimony (55%/1.55), nickel (50%/1.5), copper (16%), zinc (8%), cadmium (7%) and barium (5%).

The research, to be published in the journal *Science of The Total Environment* this March, was based on

studying samples of chard, kale, lettuce and parsley grown near a heavily trafficked road in Malmö, Sweden's third largest city.

Rupert Hough, Information and Computational Sciences Group Leader at the James Hutton Institute, says, "There's been an increasing interest in urban cultivation, with vacant land being reclaimed for gardening and an increasing number of households consuming urban-grown vegetables," he says. "This can increase the metallic compounds we see in produce. Studies have shown that urban crops have shown higher concentrations of several metals than supermarket equivalents and that in some instances these have exceeded health guidelines.

"However, very little research has been done into how beneficial washing produce is before we eat it, in terms of removing these metals. The research conducted in Sweden found that there is a benefit. This helps to remove aerial contaminants which come from dust from roads or nearby industrial areas.

"We've shown this only goes so far, so further measures could be creating barriers between crops and nearby roads and/or covering soil with mulch. Some contaminants come from the soils the plants are grown in, so we can also look more closely at the soil. Where there are known point sources of contaminants, more specific measures should be taken."

The vegetables in the Swedish study were grown on open land at a sustainable farming initiative, in an area



*“ There’s been an increasing interest in urban cultivation, with vacant land being reclaimed for gardening and an increasing number of households consuming urban-grown vegetables ”*

*- Rupert Hough, Information and Computational Sciences Group Leader, The James Hutton Institute*



with a high degree of ethnic diversity and socio-economic deprivation, 60-90 m from an inner ring road trafficked by around 70,000 vehicles per day.

The land, which is not considered contaminated land, had metal concentrations below the Swedish national guidelines and relatively low compared to concentrations on other urban soils used for cultivation. Unwashed and washed samples were compared.

The research focused on 50 elements found in leafy vegetables. The concentrations were highest in lettuce and lowest in broad leaf parsley – indicating that these two crops were the ones that captured particles the most and least.

The elements found in the vegetables were considered “fairly representative” for vegetables grown under conditions found in urbanised

regions of northern Europe and north America.

However, growing conditions, such as soil acidity, organic matter and plant type can all influence plant uptake of heavy metals. The Swedish site had base pH and soil organic matter, which would restrict the solubility of most metals.

More broadly, while lead is the most abundant heavy metal in soils, it’s solubility and mobility restricts its uptake by plants, so high concentrations of lead on plants is thought to more likely come from the air or water, says the study. Cadmium, in comparison, is mostly absorbed by plant roots, which reduces the effect of washing.

To read the full paper, go to: [Managing health risks in urban agriculture: The effect of vegetable washing for reducing exposure to metal contaminants – ScienceDirect](#)



# Contract signed for construction of £28.7 m combined Advanced Plant Growth Centre and International Barley Hub

The James Hutton Institute and [McLaughlin & Harvey](#) have signed construction contracts worth £28.7 m for the next stage of the ongoing redevelopment of The James Hutton Institute's Invergowrie estate.

This new contract comprises the construction of a combined Advanced Plant Growth Centre (APGC) and International Barley Hub (IBH). Procured via the SCAPE Scotland Construction Framework, and part-funded by the Tay Cities Deal, this next phase is part of a masterplan to create two institute-led innovation centres at Invergowrie, helping to establish Scotland as a leader in global food security and crop resilience.

The Tay Cities Region Deal is a partnership between local, Scottish and UK governments and the private, academic and voluntary sectors which seeks to create a smarter and fairer Angus, Dundee, Fife and Perth & Kinross under the headings Inclusive Tay; Innovative Tay; International Tay; Connected Tay and An Empowered Tay.

The Scottish Government and UK Government will each invest up to £150 million in the Tay Cities Region Deal over 10 years, subject to final approval of robust business cases. This investment has the potential to lever in £400m of investment over 15 years.

Enabling works for the IBH and APGC are ongoing on-site with a number of older buildings demolished to make way for the new facility being built in the heart of the Invergowrie Campus.

Colin Campbell, Chief Executive at the James Hutton Institute said: "Moving into the next phase of the International Barley Hub's construction is a significant milestone in this project, which aims to futureproof the barley sector across Scotland and the UK. This new facility will serve as the key research hub of the facility and is set to bring around £60 million benefit and over 1,200 jobs to Scotland over the next 10 years."



Scottish Government Business Minister Ivan McKee said: "The Scottish Government is investing £17 million towards the redevelopment of the James Hutton Institute's facilities at Invergowrie, alongside our ongoing support for the Institute and its work to support innovation in the food and drink sector. Innovation in food and drink and more widely is being supported through the Scottish Government's plan to transform the economy, the National Strategy for Economic Transformation."

UK Government Minister for Scotland Malcolm Offord said: "These new facilities will undertake vital research that will support food security and the future prosperity of our farming industry, while also creating new jobs for the region. The UK Government is investing £45 m at the James Hutton Institute through the Tay Cities Deal, which is part of more than £2 billion for initiatives levelling up communities across Scotland."

Robbie Clark, Operations Director at McLaughlin & Harvey said: "We are delighted to be continuing our strong relationship with the Institute. Having recently completed the state-of-the-art Barley Field Centre facilities, our highly experienced project team will now move seamlessly on to the delivery of the new Advanced Plant Growth Centre and International Barley Hub. By procuring the new facilities through the SCAPE Framework, the Institute will also provide measurable tangible benefits to the local community and economy as part of the build."



# Hutton awarded £1 m from the Wolfson Foundation to support Phenotyping Centre

The James Hutton Institute has been awarded £1 million by the [Wolfson Foundation](#), for equipment to support a new Molecular Phenotyping Centre. The Foundation is an independent charity with a focus on research and education. Its aim is to support civil society by investing in excellent projects in science, health, heritage, humanities and the arts.

Our researchers will use the phenotyping equipment to understand how different environmental conditions affect plants at the molecular level. This knowledge can then be used to inform crop-based solutions to sustainable food, energy and environmental security.

Professor Colin Campbell, CEO, The James Hutton Institute said: “We are very grateful to the Wolfson Foundation for this funding, which will be used in setting up of the Hutton Molecular Phenotyping Centre at our site in Invergowrie.

“Aligning with the funding we have received from the Tay Cities Deal, this new Centre with its state-of-the-art technology, will enable us to have unrivalled ability in creating, translating and applying science for the benefit of all.”

Paul Ramsbottom, chief executive of the Wolfson Foundation said: “The James Hutton Institute is recognised as a global leader in crop science, with an impressive track record of innovations that have been widely adopted in plant breeding and agriculture.

“It is a huge pleasure to be announcing Wolfson’s first ever grant to the Institute as they expand their much-needed research into sustainable food production, which will help to tackle the ugly challenges of climate change and biodiversity loss.”

In its latest round of awards, the Foundation has awarded over £19 million in grants to capital projects – buildings, refurbishments and equipment. Some of the other projects to be awarded funding include hospices and historic buildings, laboratories and a supported living accommodation, classrooms and a cathedral.

Since it was established in 1955, some £1 billion (£2 billion in real terms) has been awarded by the Foundation to more than 12,000 projects throughout the UK, all on the basis of expert review.

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## Hutton invests £1.75 m in hi-spec lab equipment

The James Hutton institute has invested more than £1.75 million in new, state-of-the-art laboratory equipment to enhance its leading independent scientific research capabilities across food, plant and soil health and quality.

The largest investment is in what is the only one of its kind Scotland, a combined ultra-high-performance liquid chromatography (UHLC) and high-resolution mass spectrometer (MS).

The high precision instrument, based at the independent research institute’s Invergowrie campus, near Dundee, allows scientists to perform extremely detailed analysis on individual plant and organic compounds faster and with far less manual work than its predecessor machine.

A second machine, based at the institute’s Craigiebuckler campus in Aberdeen, is an advanced scanning electron microscope (SEM), which can image down to nanometre-scale – or a billionth of a meter – plant tissues and other materials.

Dr William Allwood, metabolomics facility lead at The James Hutton Institute, says, the [ThermoFisher](#) UHLC Orbitrap IQ-X high resolution MS is the most powerful of its type currently available. It allows scientist to separate plant, fruit, vegetable or processed food extracts into their individual biochemical components.

“With this system we can compare the content of health beneficial metabolites, such as vitamins and antioxidants, as well as flavour relevant compounds, such as those that provide bitter or sweet flavour,” he says.

“That means we can compare the nutritional and flavour quality of fruits, cereal grains and vegetables that have been grown in different ways, we can assess the effects of storage and processing on foods and we can also assess the effects of different agricultural practices on the growing plants.

The new Gemini 300 [ZEISS SEM](#) is sensitive enough to allow scientists to obtain high resolution images of parts of plants down to a nanometre scale. This means they can see, from observing the detailed structure of tissues and cells, how plants react to changes in their environment, from heat stress from climate change to the fertiliser they use, so that plants can be bred for future conditions.

They can also look what minerals are present and where they are in plants to understand, for example, the nutritional value of its different parts. Scientists can also use this to observe interactions of microplastics with components of the soil.

Additional investments by The James Hutton Institute include a carbon and nitrogen analyser, used for understanding the content of these elements in soils and plants, which can help to understand how much carbon is being stored in or lost from soil.







*“ Our work means Scotland is punching well above its weight when it comes to discovering genuinely ground-breaking practical solutions to making this giant global industry greener and more sustainable. ”*

- Colin Campbell, Chief Executive of the James Hutton Institute

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## Scotland is firmly at the forefront of agricultural innovation, securing global food supplies

By Colin Campbell, The James Hutton Institute. This article appeared in The Herald on 26 January 2023.

**Global food security is going to be a dominant economic theme over the next decade. Since the Russian invasion of Ukraine a year ago, we have all seen just how fragile the food ecosystem really is to acute shocks, as well as the chronic effects of climate extremes and pandemics.**

The food industry accounts for nearly a third of the world's greenhouse gas emissions, so it is also one of the single largest contributors to climate change, illustrating just what a huge influence everyone's diet has on what's becoming a planet where natural resources – plant, animal, and mineral - are being consumed too much and too fast.

Turning this dangerous situation around dominates the agendas of everyone at The James Hutton Institute, and it needs both natural science and social science working together to solve it.

We are focused on re-thinking everyone's - not just Scotland's - relationship with food; how it's produced and how it affects nature. We're looking at how to grow and manufacture a more diverse range of quality food locally all year-round, reducing the need for imports; how produce could be transported by simpler supply chains less prone to shocks; how we can fight back against the ravages of centuries of over-consumption; and discover better ways of feeding ourselves without further damaging our environment.

We have already done pioneering work on finding new climate-positive food and drink products; piloted revolutionary technologies for crop management to leave less of a footprint on the land, such as using precision agriculture sensors and drones, indoor farming techniques, and creating

more nutritious crops such as potatoes that are not only climate adapted, resistant to disease but even use less energy to cook.

This research is essentially a national investment in our 'natural capital' and safeguarding our future in a very uncertain world. We are inspired by nature to produce more nature-based solutions that truly transform the way we grow food.

The opening last month of the first phase our new £62 million Advanced Plant Growth Centre and International Barley Hub will help us further. The latter aims to bolster barley growing by researching new varieties and techniques to increase yield, resilience, and the climate-change credentials of Scotland's biggest grain crop, which alone supports 40,000 jobs, largely down to its pivotal role as a food, feed and main ingredient in whisky and beer.

James Hutton himself was one of the first to write in the 18th century about the potential for potato in Scotland to lift many more people out of food poverty, and it is still the case today given potatoes produce more calories per unit area than other crop. In this vein, we have blueprints in place for a dedicated International Potato Innovation Centre, focused on finding smarter potato growing systems and diagnostics, modelling for vastly improved pest and disease control, and making potato production more climate and environment friendly.

Our work means Scotland is punching well above its weight when it comes to discovering genuinely ground-breaking practical solutions to making this giant global industry greener and more sustainable.





# Intercropping: ecological, economic food production at its modern best

By Dr. Alison Karley a research leader in Agroecology at the James Hutton Institute. This article first appeared in The Herald on 13 April 2023.

Allotments conjure up a mix of images in people’s minds – quiet havens for getting away from domestic noise or pressures; mini family food factories; or even prize-winning vegetable nurseries.

From the air, allotments must look like mini patchworks of farmland, of no-fixed design.

In stark contrast, of course, to how sprawling fields across Scotland are starting to look from this time of year onwards, with their orderly rows of identical produce, impeccably planted, all set to uniformly sway in the spring breeze.

But this apparent cultural and functional divide between small-scale cultivated patchworks and large-scale industrial order isn’t as wide commercially or scientifically as you might think.

Field trials currently being led by The James Hutton Institute (the Hutton) have been looking closely at how cultivating often-very different crops together, side-by-side in the same field at the same time, can actually make agricultural production more resilient and environmentally sustainable.

The farming term for the practice is “intercropping”, and at these times of economic strife this “growing happily together” concept is gaining traction, and the science and methodology behind it is being examined in more detail than ever.

Intercropping is a hot topic within our own fields and labs in Invergowrie, where we have a particular focus on how we can better cultivate legumes - plants that produce seeds in pods, such as beans, peas, and lentils.

Along with our own world-leading scientists, we work with other top crop scientists, breeders, food producers, crofters

and farmers, from Scotland and around the world, who have already demonstrated the potential for multiple positive impacts of intercropping, to see how the process can be scientifically improved.

The work has shown, for instance, it can help improve soil fertility, use less water, reduce weed growth, and allow a more diverse range of quality food to be grown locally all year-round. In turn, this reduces the need for imports, thus cutting transport costs, with or without the effects of economic shocks.

The work on soil health is especially exciting, as intercropping has been shown to allow more and different types of nutrients to be left in the ground to help the following season’s crop, as well as reducing the need for artificial fertilisers. Even better is the fact that intercropping increases the diversity of the crop and, as a result, the diversity of organisms the crop supports. This includes beneficial organisms such as pollinators and natural enemies of crop pests, which can reduce the need for pesticides.

Successful intercropping can take many forms - from simply sowing several crops simultaneously next to each other, to including “companion crops” that help protect a main cash crop from damage by weather, weeds, pests, or diseases. It can also involve growing carefully chosen ‘cover crops’ over winter to improve soil structure and protect against soil erosion.

An example of a perennial-annual intercropping match in this country is when cereals are grown in between orchard plantations, known as silvo-arable cropping. In tropical regions, coffee or coconut and bananas make a popular perennial combination.

But crop pairing to enable two or more crops to flourish side by side and yield a better crop than when grown alone is not revolutionary. Intercropping was common in Scotland in past decades, the most traditional with oats and pea or beans grown together - an early intercrop known as a “mashlum”.

***“This wet-sounding combination was said to provide better stability of yield in bad years, and have a higher protein content than oats alone, and was first reported here as far back as the 1440s.”***

The preference for single cropping year after year on the same land - intensive farming with the sole purpose of maximising yields - is largely blamed as lying at the very heart of many of the environmental problems associated with modern agriculture. Concerns over food security are adding huge pressure on Governments to look for alternative solutions.

Mix in a serious shortage of critical fertilisers – such as phosphorous and potassium – and how synthetic nitrogen fertiliser production is considered hugely energy-intensive and a major contributor to GHG emissions, and how a war in Europe is spiking energy prices and leaving global food supply chains at breaking point, we now have a multi-directional perfect storm in the agricultural sector that has intensified the need for agroecologists and farmers to work together to develop and trial urgent solutions.

Two key international research projects we were involved in are called “TRUE” (Transition Paths to Sustainable Legume-based Systems in Europe) and DIVERSify (Designing InnoVative plant teams for Ecosystem Resilience and agricultural Sustainability).

These sister projects looked at ways of increasing legume growing in Europe, including intercropping. This can greatly increase farm biodiversity and create a more diverse landscape for animals, as well as more diverse food crops. A unique attribute of legumes is their ability to act as natural fertilisers, absorbing nitrogen from the air and adding it to soil in a usable form through their roots. Good for farmers and for the environment, natural fertilisers can reduce the need for synthetic ones.

Working with farmers in Scotland, the Hutton is also blazing a trail in demonstrating how intercropping with legumes can create new and diverse sources of income. We helped the Stirling family - fourth generation farmers in Arbikie in Angus – create the world’s first carbon-neutral, climate-positive gin, Nadar. The clear spirit - now served in London’s Savoy hotel and other top hotels and bars around the world - is made from peas, and includes juniper, lemongrass and citrus leaf botanicals, all grown together on their own farm. Less glamorous, but equally important, the leftover pea residue is used as animal feed.

## Escape to the country

**A shift to hybrid working practices following the Covid-19 pandemic has led to some people swapping city living for country life. Now an international project will explore the scale, and pros and cons, of urban migration into rural, island and coastal communities across the globe.**

The project, by Scotland’s Rural College (SRUC) and The James Hutton Institute in Aberdeen, will look at how increased migration to rural and island areas offers opportunities for the future sustainability of these communities. It will also look at the challenges they face in adapting to a period of rapid change.

The project, which has been awarded nearly £20,000 by the Royal Society of Edinburgh, will bring together researchers from across the world, including Japan and Turkey, to share evidence and identify emerging policy and practice.

Co-Investigator Ruth Wilson, Social Scientist at The James Hutton Institute, said: “Our research in Scotland during the Covid-19 pandemic showed an increase in demand for rural and island properties. This was prompted by moves to home working, but also widespread reassessment of life and work priorities. This brings unprecedented opportunities for communities in these areas, but also huge challenges.

“This new network will bring together international expertise to understand how these trends are evolving in different places and what this means for rural and island communities across the globe.”

Lead researcher Jane Atterton, Manager and Policy Researcher at SRUC’s Rural Policy Centre, said: “There is increasing evidence from different countries that the Covid-19 pandemic has resulted in a new wave of urban migrants in search of rural, island or coastal living, motivated by access to open space and dispersed populations, and facilitated by a shift to hybrid working practices and improved digital connectivity.

“This project aims to build a strong, collaborative and sustainable international research network to understand these new migration patterns and their implications.”

Outputs from the project will be shared on SRUC’s Rural Exchange web portal which was set up last year to gather and host large-scale citizen science information.









# Scottish field trials show cost of shift to sustainable farming

“When you first move from a conventional intensive cropping system to a more sustainable, integrated system, there are potentially initial costs. You also disturb the system by changing management, for example, adding the compost and reducing tillage. But over time the system starts to stabilise and you get benefits to crop health and soil structure, as well as biodiversity.”

- Cathy Hawes, a research scientist at The James Hutton Institute

**Farmers who want to adopt more sustainable and environmentally friendly farming methods could face lower short-term margins, but the long-term benefits could outweigh the pain, according to the results of our innovative crop trials.**

The trial, at the Hutton's unique, long-term Centre for Sustainable Cropping (CSC) field platform on Scotland's fertile northeast coast, is testing the impacts of moving towards more regenerative methods of farming.

A cost benefit analysis of its first six-year crop rotation found that moving from conventional commercial crop management to a more low-input, mixed or integrated cropping system could dent earnings by up to £500, or 25%, per hectare per year.

However, while inputs such as fertilisers were reduced, how much was grown, or yield, was maintained. It's also expected that the margins would improve longer term, as initial costs, such as for compost, to help return to soil to health, are no longer needed – and in some cases farms could have their own supply, so avoid that cost altogether. In addition, farmers would be less susceptible to fertiliser price hikes, as soil health and wider biodiversity improve.

The studies were undertaken at the Hutton's 42-hectare CSC site at Balruddery Farm, near Dundee. It is one of very few sites that look at long-term trends in the whole system across multiple fields and crops.

Cathy Hawes, a research scientist at the institute, says, “When you first move from a conventional intensive cropping system to a more sustainable, integrated system, there are potentially initial costs. You also disturb the system by changing management, for example, adding the compost and reducing tillage. But over time the system starts to stabilise and you get benefits to crop health and soil structure, as well as biodiversity.”

“That means the system is more able to regulate itself, for example, in terms of pest and disease control, with fewer

inputs, therefore less cost in the longer term. So we would hope to see more of these benefits when we get the results from the second rotation.”

“With lower inputs, farmers could also improve resilience to economic shocks, such as the fertilizer price spikes we've seen recently, because the system is more stable,” says Michaela Roberts, an economist at the institute, who performed the analysis for the study.

Roberts says the study also only looked at the on-farm costs and benefits, so there are other uncoded benefits, such as CO<sub>2</sub> sequestration in the soil, from taking up no-till methods, reducing soil runoff impacts and wider biodiversity.

Rotation crops used were potatoes, winter wheat, winter barley, winter oilseed rape, spring sown faba beans and spring barley.

The CSC was set up in 2009 to study new cropping approaches in a real-world setting. After an initial two years' baseline setting, the first six-year crop rotation started in 2011. The second crop rotation completed in Autumn 2022, and it's hoped analysis of this second rotation could be completed by the end of 2023.

Despite skepticism about the trials back in 2009, there's growing interest from the farming community, says Hawes.

“Early on, we had groups visit and they wondered what on earth we were doing it for, because more environmentally friendly management didn't seem relevant to commercial situations,” she says. “But now we have people coming to us and asking how they can apply it themselves. Everyone is now more aware that that we need to be looking after the whole environment rather just producing food.”

The work, published in the Journal of Environmental Management in April, was funded via the Scottish Government's Rural and Environment Science and Analytical Services Division (RESAS).



# Join us at our summer events

## Arable Scotland 2023, 4 July, 9.00 am to 4.00 pm

Come and be inspired by arable innovation at Scotland's premier arable event. Arable Scotland is a free, day long event taking place on 4th July, 2023. This is a chance for key players in food production, from farmers and agronomists to machinery and AgriTech suppliers, and to processors and distillers, to demonstrate and discuss industry issues such as innovative and sustainable farming.

Arable Scotland has something for everyone, providing knowledge and inspiration for farmers to take steps towards a more sustainable future. We'll be featuring talks and trade stands focussing on knowledge and solutions for the arable industry.

Please visit the [Arable Scotland website](#) for more.



## Fruit for the Future 2023, 27 July, 3.00 pm to 6.30 pm

Join scientists at the James Hutton Institute in Dundee on Thursday 27th July for the 2023 edition of Fruit for the Future, the annual showcase of soft fruit research including scientific presentations, outdoor demonstrations, walks through experimental plots, followed by a cream tea and tasters. The event is proudly presented by the Institute and the Scottish Society for Crop Research.

Fruit for the Future is one of the James Hutton Institute's most successful and long-running industry events and is aimed at farmers, agronomists, representatives of the food and drink industries, scientists and others interested in soft fruit.

Tickets are [available here](#).



## Potatoes in Practice 2023, 10 August, 9.00 am to 3.30pm

Potatoes in Practice is the largest field-based potato event in the UK. The event brings together a variety demonstrations, research and trade exhibits in one place making it an essential date in the potato industry calendar.

In the field, you'll find commercial breeders showcasing the latest varieties, agronomists demonstrating what's new in crop protection and researchers discussing their most recent findings, all on hand to share their knowledge and give advice. And of course, no field event would be complete without machinery - both moving and static.

Find all the information you need to register your attendance on the Potatoes in Practice [event website](#).





## Diary dates

Date	Event	Location	Notes
13 – 14 June 2023	Cereals	Thoresby Estate	<a href="#">Registration open</a>
24 – 25 June 2023	Royal Highland Show	Royal Highland Centre, Ingliston	Stakeholder and general public event
28– 29 June 2023	Groundswell - The Regenerative Agriculture Festival	Lannock Manor Farm, Hertfordshire	Farmers, growers, or anyone interested in food production
1– 2 July 2023	Game Fair	Scone Palace	Use science to promote game and wildlife management as an essential part of nature conservation.
4 July 2023	Arable Scotland	James Hutton Institute, Balruddery Farm	Come and be inspired by arable innovation at Scotland's premier arable event. <a href="#">Registration open.</a>
27 July 2023	Fruits for the Future	James Hutton Institute, Invergowrie	The annual showcase of soft fruit research including scientific presentations, outdoor demonstrations, walks through experimental plots. <a href="#">Registration open.</a>
10 August 2023	Potatoes in Practice	James Hutton Institute, Balruddery Farm	The largest field-based potato event in the UK. <a href="#">Event is open for bookings.</a>
9 – 10 September 2023	Doors Open Day, Craigiebuckler	James Hutton Institute, Aberdeen	More information available soon
23 – 24 September 2023	Doors Open Day, Invergowrie	James Hutton Institute, Invergowrie	More information available soon
10 – 11 October 2023	Future Farming Expo	P&J Live, Aberdeen	Support Scotland and its farmers in order to make Scotland a global leader in innovative, profitable and sustainable agriculture.



*The International Barley Hub (IBH) is holding a seminar series with events running every fortnight through 2023. To find current information on the next seminar please see their [website](#).*



# Hutton Annual Research Symposium 2022



The Hutton Annual Research Symposium 2022 was held at the end of last year. The event brings colleagues from the Institute together into one room where they can share ideas and present the research they have been working on throughout the year.

A summary video of the day can be found here:



Funded by:



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