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# Hutton Highlights

## February 2022

**Why COVID is poor  
stress test of food supply  
resilience**

**Loss of tree species has  
cumulative impact on  
biodiversity**

**Beavering away to  
restore Scotland's  
rivers**



The James  
**Hutton**  
Institute



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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

# Time to roll up our sleeves



Professor Colin Campbell, Chief Executive of The James Hutton Institute

Welcome to the first Hutton Highlights of 2022. This is also the first edition since COP26, where some historic decisions were taken but which also left us feeling there is so much more to do, and urgently.

The profile for climate action gained around the COP26 summit must not be allowed to dwindle just because it's slipped down the news agenda: it remains a clear and present threat to people everywhere and demands individual as well as political action. Biodiversity and the

crisis it faces will get its turn in the media spotlight and public consciousness this year as COP15 approaches. As we said in the BBC Resolutions programme at New Year, we need to re-think our relationship with Nature. The climate, the nature crisis and the pandemic are all symptoms of over consumption and this is the latest Inconvenient Truth we all have to grapple with. At the James Hutton Institute, our job is to provide scientific evidence of what the likely trajectory is, how we avoid the worst and take the best opportunities.

Our science has a purpose, and as ever, the stories in Highlights provide a snapshot of how we are providing insight and understanding to help create a more sustainable and enriching world for future generations. We thank all our partners and hope you not only enjoy this edition but share any feedback and ideas arising.

## SEFARI activity

SEFARI Gateway has been recommissioned and is set to become a Centre of Expertise.

As well as preparing for the transition, Gateway is also bringing various projects - many involving Hutton colleagues - to their conclusion.

Our colleagues Zisis Gagkas and Rupert Hough have completed highly successful Fellowships: Zisis with RESAS to [establish the potential of spatially referenced data to support the evolution of land-based policy in Scotland](#); Rupert with Environmental Standards Scotland (ESS) on approaches and requirements for monitoring environmental standards compliance in support of ESS' statutory role within Scotland.

A Responsive Opportunity project adding [climate research to the virtual tours platform](#) has been completed and is being used extensively to promote institutes' expertise and national capabilities. Gateway is building a legacy from the wide engagement at COP26 events, such as [SEFARI Innovation for Climate Research](#) as part of the COP26 UK Presidency Pavilion. Hutton's Mags Currie co-led a panel debate on [Rural Just Transitions](#) as part of the Scottish Government COP26 programme.

In addition, Gateway worked with Hutton people to chair or lead a series of workshops and panel discussions with Centres of Expertise including a panel debate on [the role of the Centres of Expertise in delivering climate action](#), a debate on [vector-borne animal and plant disease in the face of climate change](#), and a workshop on effective [working within the science-policy interface](#).

With a new Strategic Research Programme for the Scottish Government in the offing, 2022 looks to be full of interest and opportunity.

Comments?





# News Highlights

## Support for proposed Dundee life sciences innovation district

The James Hutton Institute has supported plans put forward to create a life sciences innovation district for the Dundee region.

Dundee City councillors will be asked to kick-start discussions that will explore and agree joint marketing, development and governance arrangements with the University of Dundee, Scottish Enterprise and private sector landowners to market land and property assets that would make up the proposed district.

“Life sciences is one of the most important high value growth sectors for the greater Dundee area and currently employs more than 1700 people.

“We have an internationally recognised reputation for excellence and attracting significant venture capital into new companies, which we want to build on by exploring with our partners how we could create an innovation hub.

“A facility like that could offer greater opportunities for collaboration and economies of scale to accelerate commercialisation of research, attract new private sector investment into life sciences and create jobs,” explained Mark Flynn, convener of Dundee City Council’s city development committee.

Innovation Districts are defined zones in cities where public, private and academic partners work together to attract entrepreneurs, start-ups, business incubators and others with the aim of assisting and transforming under-used areas and grow key industry sectors.

A life sciences innovation district in Dundee could be centred on the current Technopole, between Hawkhill and Blackness Road. Other potential assets that could be marketed include SE owned land at the Medipark, public and privately-owned land and property at the Technology Park and the new Tay Cities Region Deal funded facilities at the Hutton.

“Critical mass is a factor and an attractor for businesses and organisations. Co-location and interaction drives invention and impact, so joined up thinking to market and develop existing and additional hot spots of activity is vital across the breadth of the sector locally,” said Professor Colin Campbell, Chief Executive of the Hutton.

“The outstanding depth, breadth and quality of life sciences research in Dundee and the Tay Cities region is generating new companies in biotechnology, therapeutics, medical technology, informatics and artificial intelligence. This is happening at pace and bringing with it significant investment.

“The Life Sciences Innovation District concept is designed to support all our private and public sector stakeholders and to make our region one of the ‘go to’ places for life sciences innovation and commercialisation. The opportunities to improve the regional economy and to bring and sustain quality jobs for our citizens are very exciting. I believe our future is very bright,” added Professor Iain Gillespie, principal of the University of Dundee.

For more details about the plans, read the full press release on the [Dundee City Council website](#).

## Hutton experts give evidence to parliamentary session on challenges facing Scotland’s islands

Dr Ruth Wilson and Dr Jonathan Hopkins, social scientists within the James Hutton Institute’s Social, Economic and Geographical Sciences department, have contributed evidence to a session of the Rural Affairs, Islands and Natural Environment Committee of the Scottish Parliament on the challenges facing Scotland’s islands communities.

The committee was established in June 2021 and it focuses on areas including farming, food and drink supply, animal welfare, fisheries and aquaculture, crofting, and issues relevant to the Islands (Scotland) Act 2018. Dr Wilson and Dr Hopkins drew their evidence from the findings of the National Islands Plan Survey, whose results painted a mixed picture of life in Scottish islands.

“The findings underline just how diverse our islands are. Life in one island can be experienced very differently from life in another, even where these islands are close by. The findings also show that the challenges facing a young person can be quite different from those facing an older person living in the same island group.

“This is a big step forward in understanding the realities of life across Scotland’s islands and improving the islands’ evidence base,” said Dr Wilson.

Dr Hopkins’ evidence further illustrated examples of geographical differences in views and experiences between island groups, and across different age and household income groups, using summary graphs (available online) to highlight differences (including those related to jobs, housing and tourism) which could be prioritised for more detailed analysis.

The Hutton presentation can be viewed below.



## Peatland restoration project in the Forth catchment receives £1m funding boost

Over the next four years the James Hutton Institute, NatureScot, the UK Centre for Ecology & Hydrology (UKCEH) and the University of Stirling will work in partnership to restore habitats across the Forth catchment area.

The award is part of the £18m EU MERLIN project coordinated by the University of Duisberg-Essen, which seeks to restore the functions of freshwater and peatland ecosystems across Europe to help tackle the twin crises of nature loss and climate change, and ensure a green recovery from the Covid-19 pandemic.

The work in Scotland will include the restoration of several peat bogs and their vital carbon stores. It will also restore connections between the Allan Water and its floodplain, to contribute to natural flood management and the restoration of valuable wetland habitats. The funding will also include long-term evaluation and monitoring of the restoration work.

“Our task is to help navigate any challenges and find solutions through bringing together diverse industries and communities. MERLIN hopes that working with nature becomes business as usual for all concerned,” explains Dr. Kirsty Blackstock, who co-leads the transformation work package for the Institute.

“We know that nature and climate change are intrinsically linked – and that we need to tackle them both together, or we tackle neither. If we are to achieve net zero in Scotland by 2045, we have to focus on solutions based in nature.

“Through restoring and enhancing the natural habitats along the Forth, this exciting partnership project will play an important role in helping us mitigate and adapt to climate change, reduce carbon emissions and reverse nature loss. This project will also provide us with important lessons to rapidly upscale the most valuable solutions in time to meet our net zero and biodiversity targets,” said Dr Iain Sime from NatureScot.

“This project will invest in nature-based solutions to the climate and biodiversity crises by restoring peatlands and rivers throughout Europe. Through the use of innovative ‘digital twins’ such as the Forth-ERA platform, led through Scotland’s International Environment Centre at the University of Stirling, we will explore how we can develop more effective methods for measuring the benefits of such interventions,” added Dr Peter Hunter, University of Stirling lead.





# Awards, Accolades & Appointments

## Dee Catchment Partnership scoops Nature of Scotland climate action award

The Dee Catchment Partnership, a collective of organisations tasked with looking after the river Dee catchment in north east Scotland, has won the Nature and Climate Action award at the RSPB Nature of Scotland Awards recently. The highest accolade for nature conservation in the country, the awards recognise excellence, innovation and outstanding achievements in Scottish nature conservation.

The Partnership's winning entry, the Easter Beltie Restoration project, rehabilitated the river valley of an artificially straightened stretch of the burn near Torphins, bringing multiple benefits for biodiversity and climate resilience.

Partnership Manager Dr Susan Cooksley led the three-month restoration project with River Operations Manager for the Dee District Salmon Fishery Board, Edwin Third. "We are over the moon to have won this fantastic award, exactly one year after the restoration was completed. Our partnership exists to deliver collaborative projects that conserve the unique biodiversity and natural beauty of Deeside, and build climate resilience across the catchment. The Easter Beltie restoration has done exactly that - creating a new area of wild beauty and habitat for a rich diversity of wildlife, and slowing the flow of water which will help to ease flooding issues downstream."

The Nature and Climate Action Award recognises projects that tackle the twinned crises of biodiversity loss and climate change with nature-based solutions. The judges noted that all finalists were of an incredibly high standard, but that the Dee Catchment Partnership was the best example of a project that has taken clear, definitive steps to protect nature and adapt to climate change.

The Easter Beltie Restoration project was managed by the Dee Catchment Partnership working with the Dee District Salmon Fishery Board and the James Hutton Institute. Delivery partners were cbec eco-engineering UK Ltd, Edinburgh Napier University, McIntosh Plant Hire, NatureScot, the River Dee Trust, the River Restoration Centre, Scotland the Big Picture, and the Woodland Trust. The project was funded by Aberdeenshire Council, Cairngorms National Park Authority,

the NatureScot Biodiversity Challenge Fund, Scottish Environment Protection Agency, and Scottish Forestry.

The Institute-sponsored Food and Farming award went to Kinlune Organic Nature Farm. Kinlune is an 1100 acre sustainable organic mixed farm in Angus. They breed organic pure-bred Aberdeen Angus and Limousin cross cattle and maintain a small organic sheep herd. They also breed, produce and show native Highland ponies.

The Nature of Scotland awards celebrate the inspirational people, projects, groups and organisations working hard to protect Scotland's precious natural heritage. The [shortlist for the 2021 awards](#) provides a snapshot of the breadth of businesses, charities, the public sector and individuals working towards conserving the country's unique wildlife and natural environment.



## Young barley researcher receives new John Hillman Scholarship

The Mylnefield Trust has awarded the inaugural John Hillman Scholarship to Jessica Shadbolt, a PhD student at the James Hutton Institute, for research on barley breeding.

The new scholarship celebrates the life and achievements of Professor John R Hillman, an eminent plant scientist and former director of the Scottish Crop Research Institute, a forerunner of the James Hutton Institute.

Jessica will undertake barley breeding studies at the Institute under the supervision of barley geneticist Dr Kelly Houston, senior postdoctoral scientist Dr Joanne Russell, a Professor Robbie Waugh, Director of the International Barley Hub (IBH).

"I am honoured and grateful to receive the John Hillman scholarship. It's wonderful to be working on a barley breeding project with real-world impact and to be at the institute at such an exciting time in barley research, considering I'll be one of the first PhD students at the IBH. I am really looking forward to working with my supervisors and others at the Institute," said Jessica on receiving the award.

Dr Kelly Houston added: "It is fantastic for Jessica to be awarded this studentship in honour of such an eminent plant scientist at a pivotal moment for barley research at the James Hutton Institute due to the establishment of the IBH. Translational crop research has never been more important given the issues surrounding climate change."

On behalf of the trustees of the Mylnefield Trust, Jim Godfrey commented: "Professor John Hillman was an outstanding leader and indeed was the driver of the creation of Mylnefield Research Services Ltd, from which the Mylnefield Trust derived its assets and objectives. He was also visionary about what science could do for all our futures.

This Scholarship has been created in his memory, with the hope that his life and work inspire more students of plant sciences. He was internationally renowned and reached many people including starting, and guiding, the careers of many other eminent scientists.

Having his name and reputation associated with this Scholarship will ensure future students are recognised in his memory and his spirit of inventiveness, excellence and vision."



## Research on impact of COVID-19 on food practices

The James Hutton Institute and Robert Gordon University (RGU) are investigating how COVID-19 restrictions impacted behaviours around food related practices. The study will look at the nature and extent of these changes across different social groups in North East Scotland and especially those experiencing or anxious about food poverty.

The research is part of a PhD studentship awarded by the Macaulay Development Trust to Flora Douglas, a Professor of Public Health based at RGU's School of Nursing, Midwifery and Paramedic Practice and Dr Liz Dinnie, a qualitative social researcher and Hutton Science Group Leader for People and Places.

The academics will supervise PhD student Josephine Heger as she explores decision-making around obtaining food and feeding since the first lockdown in March 2020 and will look at people's lived experiences to see whether those changes were sustained in the longer term. A key focus will also be the social, cultural, economic, and political reasons underlying decision-making about food. It is expected that the emerging findings will provide lessons for creating socially just and environmentally sustainable food systems across Scotland post-pandemic.

"Looking at food behaviours and how people manage disruptions to their 'normal' ways of obtaining food can provide important lessons for policy measures. Not only relating to food but to tackling intractable problems in other policy areas such as health, wellbeing, economic insecurity, community connections, loneliness, and isolation. Food is a cross-cutting policy issue that provides a bridge to address further issues," explains Professor Douglas.

"There's enormous pressure to re-think food systems and how our food is produced, transported and consumed. This study will illuminate how and why people make decisions relating to food, and help us understand how policy and public communication can most effectively influence those decisions with regard to environmental sustainability and social justice in the future."

PhD student Josephine Heger's perspective is that "during the pandemic, too many people have struggled to feed themselves and their families well. Understanding those experiences and strategies to cope with disruption, particularly in the context of food insecurity, is vital."





## Loss of tree species has cumulative impact on biodiversity

New research by Institute scientists and partners in the UK and Portugal has found that diseases affecting various UK tree species have a multiplying effect on the loss of associated biodiversity. The study published in the *Journal of Ecology* reveals that the decline of ash and oak trees may affect more species than just those that use oak or only use ash as their sole habitat.

In the UK, the common ash hosts 45 species found only on ash trees, while sessile and pedunculate oaks host 326 species exclusive to oak trees. However, 141 other species use ash and oak as alternative habitats and depend on these two tree species only. If both ash and oak were to be lost, the number of species at risk would rise to 512.

Lead author of the study Dr Ruth Mitchell, an ecologist at Hutton explains the numbers: “When a plant pest or pathogen kills a plant, particularly when it results in widespread loss of one plant species, it also impacts on those species such as insects, mosses, lichens, mammals, birds and fungi that use that plant for feeding, for nesting or a, living space.”

The impact of plant pests and pathogens on associated biodiversity is, however, rarely considered when risk assessments for plant pests and pathogens new to the UK are carried out, she adds.

“This work shows that such impacts may be considerable, especially where multiple host plants that support the same biodiversity are lost, which is what we’re seeing with the number of different diseases currently impacting the UK’s trees.”

Many species use ash, oak in conjunction with other tree species which should mean they are resilient to the loss of ash and oak through their ability to fall back on other species.

However, when the researchers looked at 24 mixed ash and oak woodlands within the UK, they found that only 21% of the sites could continue to support species that use ash

and oak if ash and oak were lost. This was because the other tree species that would support this biodiversity were not present at the site, although the site conditions were often suitable for them to grow.

The authors therefore suggest that in risk assessments, the wider ecosystem should be considered. Higher impact scores should be given to new pests and pathogens whose hosts occupy the same ecosystem as other host plant species already impacted by such threats.

The work reinforces a major theme in recent guidance on sustainable forestry, which advocates increasing the species diversity in multipurpose and conservation woodlands to enhance their resilience.

Dr Mitchell sums up the risk of ignoring this finding: “Current pest and pathogen risk assessment approaches that ignore the cumulative, cascading effects shown in this study may allow an insidious, mostly overlooked, driver of biodiversity loss to continue.”

Defra Chief Plant Health Officer, Professor Nicola Spence is in no doubt of its importance. “This work reiterates the importance of protecting our native trees. It confirms that the value of our interconnected ecosystems is often more than may immediately meet the eye, and the importance of intelligent woodland management plans to support resilience. Such combinatorial analysis assists our understanding and further development of toolkits,” she says.

Paper: Mitchell, Ruth J; Bellamy, Paul E; Broome, Alice; Ellis, Chris J; Hewison, Richard L; Iason, Glen R; Littlewood, Nick A; Newey, Scott; Pozsgai, Gabor; Ray, Duncan; Stockan, Jenni A; Stokes, Victoria; Taylor, Andy FS. *Cumulative impact assessments of multiple host species loss from plant diseases show disproportionate reductions in associated biodiversity.* *Journal of Ecology*. DOI: [10.1111/1365-2745.13798](https://doi.org/10.1111/1365-2745.13798).

## Rethink our relationship with nature to avoid worst of climate change and pandemics

Society needs to re-think its relationship with the natural world if we are to avoid the worst consequences of climate change and pandemics, the James Hutton Institute has urged in the 2022 episode of BBC Scotland’s Resolutions programme.

In the broadcast, filmed at the Institute’s Glensaugh Research Farm and at IGS Ltd in Invergowrie, Hutton Chief Executive Prof Colin Campbell and Deputy, Prof Deb Roberts, look back at the past two years and the lessons we have learned.

Both climate change and COVID are symptoms of over-consumption and a world system that is broken, they argue, reflecting on the role of science in developing new vaccines and medicines to tackle the COVID pandemic.

“One of the good things about the last two years and the changes to the way we’ve been living brought about by COVID is a greater awareness of nature as we’ve walked, and run, and cycled in all seasons and in all weathers,” they maintain.

The programme also looked at Hutton research on the relationship between society, climate, nature and the land.

“At Glensaugh we can study how land management supports wildlife, provides clean water, prevents floods and stores carbon in our soils, our vegetation, our trees and peatland, as well as providing food.

“Farms can harvest energy from the wind and from water, and we have shown here that it is feasible to use renewable energy to create hydrogen fuel for our tractors and for the homes in the farm. It’s a virtuous cycle, from water back to water again,” notes Prof Campbell.

A key message arising from the programme is how new thinking and believing in our own ingenuity can get us through many crises.

“Science is now clear that we, too, need to re-think our relationship with the natural world, if we’re going to avoid the worst consequences of climate change and avoid pandemics.

“We also need new ways of growing food that puts no more pressure on the land and spares land for nature. At IGS Limited in Invergowrie, we have a very different farm, a vertical farm that uses less space and can grow different things in different ways in different places.

“These new ways provide us with the means of growing a more diverse range of foods locally, avoiding imports, and also providing a fresh and nutritious source of food all year round.

“We are lucky at the Hutton to be in a position to do research that makes a real difference”, Profs Campbell and Roberts conclude.

The programme is available to watch below and it can be also watched on [iPlayer](#).







## Beaver away to restore Scotland's rivers

Beavers could make a major contribution to improving the condition of Scotland's rivers, improving water quality and limiting the effects of drought, according to new research from the University of Aberdeen and the James Hutton Institute.

**The positive role these animals can play in water resource management, and in creating habitat, river restoration and sequestering carbon is highlighted in a report for NatureScot by Scotland's Centre of Expertise for Waters (CREW), which is based at the Institute.**

The report – funded by the Scottish Government – examines evidence from 120 studies of beaver populations worldwide, as part of a large-scale review of their effects on streams and rivers.

In Scotland, beavers have already taken up residence in a few areas, including Tayside and Knapdale. While their presence has sometimes been welcomed, in other situations there has been conflict, for example where their activity affected intensively managed landscapes.

Until now, there has been minimal evidence of beavers' role in helping manage river ecosystems in Scotland. But by identifying trends associated with the effects of beaver dam-building on water quantity and quality – factoring in the characteristics of Scottish rivers – the report's authors have provided detailed evidence to help policymakers consider the benefits and limitations of beaver expansion in Scotland, including where trade-offs are required.

In November 2021, the Scottish Government announced a revised beaver policy which included developing a new national strategy for beavers.

The University of Aberdeen's Dr Josie Geris led the study. "We found that, by modifying physical processes in streams and rivers, beaver dam-building could help address several important water management challenges in Scotland, including water supply and, by trapping sediment and contaminants, water quality," she explains.

"Locally, beaver activity may also limit the effect of extreme events such as drought, which is expected to increase with climate change and has an economic impact like during the dry summer of 2018 when numerous private water supplies to communities and businesses were affected.

"Achieving the potential of the positive effects of beaver activity may involve some challenges and the need to find solutions. And while most of the evidence points to positive contributions to river ecosystems, the report recommends that more investigation to understand how the effects of beavers across multiple sites accumulate to affect rivers on a larger scale."

Dr Rachel Helliwell, CREW manager, captures the main issue: "On one hand beavers are considered ecosystem engineers as their dams create wetlands that have a role in natural flood management by attenuating water flows during periods of high rainfall and slowing flows to enhance resilience in dry spells. But on the other, it's recognised that some specific habitats and species of high conservation importance can be adversely affected by beaver populations if they're not appropriately managed appropriately.

"This timely report provides an independent assessment to aid policy decisions that balances the needs of land managers against the ecosystem benefits that come from reintroducing beavers."

The report, titled *Establishing the potential influence of beaver activity on the functioning of rivers and streams and water resource management in Scotland*, is available on the [CREW website](#)

## Rare organic samples gifted to Scotland's National Soil Archive

**The National Soil Archive of Scotland, held at the Aberdeen campus of the James Hutton Institute, has added two large samples of Dopplerite to its collection by gift of the executors of Mr William Filshie. Dopplerite is a naturally occurring, but relatively rare, organic material associated with peat deposits. It is a jelly-like, brownish substance related to humic acids that is insoluble in water and, if dried, it initially becomes brittle and eventually becomes as hard as coal.**

The Dopplerite, named after the Austrian mathematician and physicist Christian Doppler, who also gave his name to the 'Doppler' effect, was originally found by Mr William Filshie, father of the Executors. Mr Filshie was co-owner and partner in the firm of J M Filshie & Sons, who owned and managed the Snabe sand and gravel quarry at Drumclog, near Strathaven, Lanarkshire.

The Dopplerite deposit was found within a glacio-fluvial sand deposit 13cm below a 3m layer of peat and measured 23cm wide by 30cm deep and extended for 7.5m. The sand would have been deposited at the end of the last Ice Age as the glaciers that covered Scotland melted. Radio-carbon dating of the Dopplerite deposit suggested that the deposit was around 2,850 years old in 1987.

In 1987, Mr Filshie sent a specimen sample to the Macaulay Land Use Research Institute, one of the predecessor institutes that formed the Hutton. The samples were then subjected to a range of physical and chemical analyses including ultra-

sound dispersal, infra-red spectroscopy, acid hydrolysis, gas chromatography and elemental analysis to determine the carbon content.

The Dopplerite sample was found to contain about 75% water with the remainder of the deposit comprising ash (18%) and organic material (7%). The humic acid component was found to be like that found in sphagnum, a peat-forming plant, and the ash (mineral component) was mainly calcium and iron.

Previous research has suggested that the Dopplerite was formed by the leaching of humic acids from the peat into a gap in the sand deposit and mixed with calcium and iron to form a gel. There was a 5cm thick iron pan in the sand at the base of the peat showing that iron was also being leached through the soil.

"Our father, the late William Filshie, retained the Dopplerite samples after they were analysed in 1987. He was delighted to be able to put a name to the strange substance that was uncovered as they dug the sand from Snabe quarry. In all his years as a quarrymaster, he had never seen such a substance. We are delighted these samples will now be archived for future generations" explained Mr Filshie's executors.

"We are pleased to receive this donation of Dopplerite and to be able to secure it for future research to aid our understanding of soil processes and carbon storage over long periods of time" added Dr Allan Lilly, curator of the National Soil Archive.

## Blue light inhibits potatoes' immune response to blight

**Daylight is made from a spectrum of wavelengths and plants possess receptors that can detect red and blue light. Blue light is important for plant growth and yet inhibits the immune response of potato plants to *Phytophthora infestans*, making them more susceptible to potato late blight.**

This finding by a research team featuring Hutton plant scientists is critical for food security as late still causes millions of pounds in annual losses to the potato industry.

The scientific team, led by Professor Paul Birch of the University of Dundee, identified a signalling pathway in potato plant cells that negatively regulates immunity to the late blight pathogen, when stimulated with blue light.

*P. infestans*, the pathogen responsible for late blight, delivers a number of proteins into the host plant to manipulate host systems and cause disease. The research team found that one of these proteins binds to an important control point between the plant's response to blue light and immunity to late blight.

"Blue light was found to suppress plants' usual immune response to a characteristic pathogen molecule and make the

host more susceptible to disease," explains the study's co-author Dr Eleanor Gilroy, a molecular plant pathologist at the James Hutton Institute.

"This advancement highlights that varying light treatments could have a direct impact on plant health and the ability to respond to pathogen attack."

Professor Derek Stewart, Director of the Institute's [Advanced Plant Growth Centre](#) noted that the research "is an example of the kind of game-changing agricultural technologies that are at the heart of the Advanced Plant Growth Centre. Identifying new, non-chemical routes to modulating pest and disease damage and losses, here possibly via a breeding to modulate the response to blue light, is part of our aim to develop sustainable, low carbon routes to sustainable food production."

**Paper:** Naqvi S, He Q, Trusch F, Qiu H, Pham J, Sun Q, Christie JM, Gilroy EM, Birch RJ (2021) Blue-light receptor phototropin 1 suppresses immunity to promote *Phytophthora infestans* infection. *New Phytologist*. doi: 10.1111/nph.17929. Online ahead of print.



## Outrage and optimism in the face of the climate crisis: watch the 43rd TB Macaulay Lecture

How do climate negotiations take place and why is progress so slow? How can governments, scientists and activists work together to tackle the climate emergency for everyone's benefit? These questions, and many others, were at the heart of the 43rd TB Macaulay Lecture, led by Christiana Figueres, former Executive Secretary of the United Nations Framework Convention on Climate Change (UNFCCC), in conversation with Scotland's First Minister, Nicola Sturgeon MSP, and youth climate activists Anuna De Wever, Lola Segers and Julieta Martinez.

Traditionally held in Edinburgh, this year the TB Macaulay Lecture took place in Glasgow to coincide with the 26th UN Climate Change Conference of the Parties (COP26) and was hosted by broadcast journalist Laura Goodwin. An audience of 321 delegates attended the lecture in person at Strathclyde University's Technology and Innovation Centre, and more than six hundred delegates from 30 countries watched the live stream.

Introducing the speakers, Fran van Dijk, chair of the Macaulay Development Trust, said: "The Macaulay Development Trust and the Lecture are here thanks to the gift of TB Macaulay many years ago. He cared deeply about the land, especially rural land, and the people who live there. His generosity means we can fund research into sustainable land use, food systems and communities, all of which lie at the very heart of the climate emergency."

During her interventions, youth activists Anuna De Wever, Lola Segers and Julieta Martinez spoke passionately about the need to call out injustice and inequality, and how the world needs to put pressure on world leaders if we are to successfully tackle the climate crisis.

Following up, and in a speech before Ms Figueres' lecture, First Minister Nicola Sturgeon said: "This summit could be our best, and possibly our last chance to come together and act upon the climate crisis for now, but more importantly, for future generations."

"Time is quickly running out, and we must act with the ambition and urgency necessary to deliver a just transition to net-zero and limit global warming to 1.5 degrees."

During the lecture, Ms Figueres described her dissatisfaction with the sometimes slow progress of climate negotiations, but she also highlighted where advances have been made and reasons to be optimistic. She also emphasized the role of science in driving the conversation about climate change and holding world leaders to account, and was later joined by the First Minister and youth climate activists for a Q&A session.

Closing the event, Professor Colin Campbell, Chief Executive of the James Hutton Institute, said: "This was an outstanding evening. You'll be privileged to have some insight about what actually happens during COP discussions. Thank you to the Macaulay Development Trust, our event organisers, our audience and particularly our speakers for their time, passion and eloquence."

Professor Campbell added that the James Hutton Institute will plant a tree for each of the speakers and for everyone in the audience, in person and online, at the Institute's Glensaugh research farm, near Laurencekirk. "This will create a new woodland and we'll study it scientifically, to decide the best options to managing our land better in the future."

Presented by the Macaulay Development Trust and the James Hutton Institute, the annual TB Macaulay Lecture is given to stimulate thinking and dialogue about contemporary environmental issues. You can watch the 43rd TB Macaulay Lecture on [its dedicated website](#) or below. The latest episode of Ms Figueres' podcast, Outrage and Optimism, also references the 43rd TB Macaulay Lecture.



# THE 43RD TB MACAULAY LECTURE

## New research illustrates impact of Covid-19 pandemic on women in agriculture

New research published by the James Hutton Institute has found that the shift to virtual meetings and events due to the Covid-19 pandemic improved accessibility to knowledge exchange, networking, and organisations for women working on farms and in agricultural careers across Scotland. The virtual shift also saved time on travel and prevented childcare difficulties.

The research, which was undertaken through online focus groups of women and men during March 2021, found the pandemic also provided a 'legitimising' window of opportunity for greater female involvement in some farming and crofting activities. For example, in some cases women family members replaced staff who were prevented from travelling due to lockdowns.

However, female focus group participants explained that home-schooling children has impacted on their ability to do their jobs, maintain productivity and that it kept them from participating in some on-farm activities. Women also reported safety issues related to caring for children while completing farm tasks, and the impact of the pandemic on children and young people was a concern.

Dr Lee-Ann Sutherland, a research leader in the James Hutton Institute's Social, Economic and Geographical Sciences group, and co-author of the report said: "The experience of Covid-19 movement restrictions has shown that there are quite achievable ways to ensure that women can participate in more agricultural industry activities. It's important to the vitality of the agricultural sector that these lessons are taken forward into the future."

The research also gathered views and experiences of gender equality and diversity more broadly in Scottish agriculture, building on baseline research undertaken by the University of Newcastle and the James Hutton Institute, commissioned by the Scottish Government, in 2016.

The aim of this latest project was to understand the impact of the recommendations of the Scottish Government's Women in Agriculture Taskforce, and the influence of other initiatives that support 'women in agriculture', on women's experiences working on farms and in the agricultural industry in Scotland. The project involved the individuals who participated in the 2016 study, including women and men farmers, crofters, and other representatives of the agricultural industry.

Dr Annie McKee, a social researcher in land management at the Hutton, and lead of the follow-up study, added: "The participants were positive about the recommendations of the Scottish Government's Women in Agriculture Taskforce, noting that they had resulted in tangible outputs, including successful training programmes and support for women's practical training in agriculture.

"However, barriers remain to the recruitment and participation of women to positions of leadership in Scottish agriculture. These barriers include cultural assumptions, attitudes, and arguably unconscious bias."

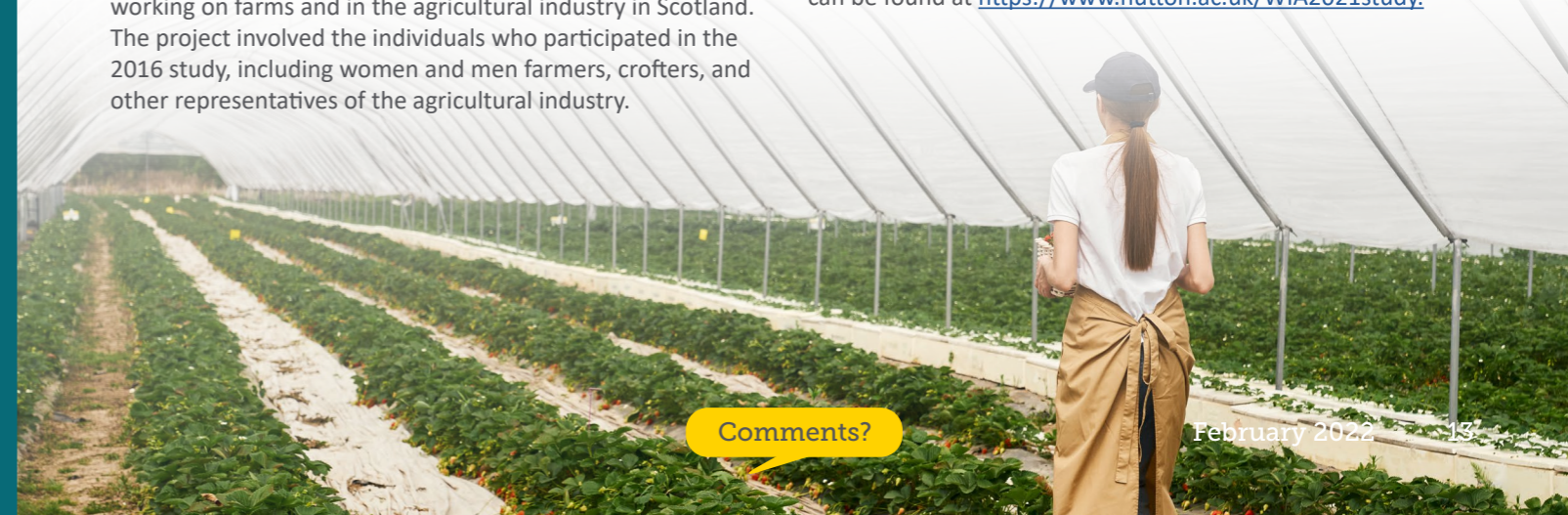
Cabinet Secretary for Rural Affairs and Islands Mairi Gougeon said: "I'm delighted that the focus and investment that this government has provided for this key area of work appears to be reaping rewards. The research findings show that participants believe the Women in Agriculture Taskforce recommendations have resulted in women increasingly participating in agriculture. We want to ensure that women living or working in Scottish agriculture are empowered to develop their skills and access equal opportunities.

"Delivering equality of opportunity will make Scottish agriculture a more resilient and economically sustainable industry and this will help women realise their potential and support business innovation."

Other topics discussed during the focus groups included the improved visibility of women in agriculture, the opportunities and challenges in accessing training, the provision of childcare in rural areas, mental health in agriculture, and the influence of generational change in driving greater gender equality.

The report highlights the ongoing importance of exploring opportunities to overcome barriers to gender equality and wider diversity in Scottish agriculture, and the value to the future of the industry, ensuring the participation of those from non-farming backgrounds, different ethnic and cultural backgrounds.

The full research report, 'The Changing Role of Women in Farming, Crofting, and the Agricultural Industry: 2016-2021', can be found at <https://www.hutton.ac.uk/WIA2021study>.





# Barley scientists of the future get £9m boost

The next generation of barley researchers have received a multi-million investment through the Barley Industrial Training Network (BARIToNE) programme, a Collaborative Training Partnership (CTP) led by the Scotch Whisky Research Institute, the International Barley Hub at the James Hutton Institute and the University of Dundee, and supported by BBSRC and industry partners.

The programme will fund a cohort of 30 postgraduate researchers to the tune of £9m in value. The four-year studentships will be delivered between 2022 and 2028 with £3M of funding from BBSRC, £600K in cash from industry and more than £5M in-kind co-investment from academic and commercial partners across the barley value chain.

“The barley supply chain has come together in partnership under the International Barley Hub umbrella to achieve government and industry targets for net-zero carbon emissions and to underpin the future climate resilience of barley as a major global crop. The BARIToNE CTP will create a new generation of scientifically diverse barley experts to become sustainability leaders in industry and academia over the coming decades,” according to Professor James Brosnan, BARIToNE leader and chair of the International Barley Hub.

“Under the CTP scheme they will have the opportunity to develop high-level technical and translational skills and forge strong professional networks as the foundation for their future careers. The 18 industry partners in BARIToNE all believe that this CTP will be a major lever for delivering barley sustainability through training talented people.”

International Barley Hub Director Professor Robbie Waugh adds that “a sustainable barley supply supports both UK agriculture and the significant economic benefit that arises when it is processed into whisky, beer and food.”

“Investing in barley science by bringing new researchers together within the BARIToNE CTP will not only yield a positive impact on the UK barley supply but as barley is also a major global crop and source of translational science to other crop species, the PhD projects are likely to have a far wider impact.”

Dr Julian South, Executive Director of the Maltsters Association of Great Britain, commented: “The BARIToNE programme will greatly enhance the opportunities for the future generation of scientists and engineers to join the malting industry. The coordinated programme of research is a real boost for the UK drinks sector and its supply chain.”

The BARIToNE studentships are part of a contingent of 225 studentships, in partnership with academia and industry, spanning 29 businesses and 12 academic research organisations. The CTP scheme run by BBSRC will address skills gaps in UK bioscience industry through doctoral training led by businesses. The collaborative partnerships will work across the council’s strategic priority areas such as Net Zero+, Tackling Infections, Transformative Technologies and more.

BBSRC executive chair, Professor Melanie Welham, said: “These awards underline BBSRC’s commitment to working with industry to support the next generation of bioscience researchers. Projects will span areas vital to our strategic priorities, such as meeting our net-zero goals.”

# Agri scientists of the future to be supported by £3.6m training partnership



An industry-wide consortium, led by producer organisation [G’s Growers](#) and supported by the James Hutton Institute, the University of Dundee and James Hutton Limited, has won a [UKRI-BBSRC collaborative training partnership award \(CTP\)](#) to provide a £3.6 million postgraduate training programme in sustainable agricultural innovation.

The programme has been co-developed by the Institute as part of its collaboration with the University of Cambridge, the Crop Science Centre, NIAB and leading UK universities.

The [CTP programme for Sustainable Agricultural Innovation \(CTP-SAI\)](#) will ensure young scientists are ‘business aware’, opening up opportunities for careers across industry. Running from 2022 to 2028, the CTP-SAI will create a pre-competitive network in which businesses can explore and co-design research and innovation programmes and will train 30 PhD students.

Ensuring the programme is inclusive and recruits a diverse range of candidates into agriculture is a priority. The CTP-SAI aims to lead the sector by example, training the next generation of new thinkers, ready to act in the public and private sector to effect positive global change in the food and farming system. The programme is supported by leading UK and international agri-food businesses, research organisations and charitable organisations representing the collective needs of farmers and practitioners.

“This BBSRC funded CTP embraces the challenges associated with developing more sustainable agriculture and brings together global industrial partners with UK research institutes and universities to train the next generation of research scientists. Responding to the needs of industry, research and innovation will be at the heart of 30 PhD student projects

that will develop system approaches towards more resilient crop production” explains Dr Ingo Hein, a senior research scientist at the Institute, the University of Dundee and Hutton coordinator of the CTP.

“Our CTP stretches across the food and farming crop supply chain, bringing together partners to address the joint challenges of reducing emissions, developing resilient farming systems and reversing biodiversity decline. Our vision is to train new thinkers for new times, providing outstanding training to address the challenges of creating and delivering sustainable agricultural systems” said Dr Richard Harrison, NIAB’s Director of Cambridge Crop Research and NIAB coordinator of the CTP.

The CTP programme places science-led innovation at its heart to ensure field-based agriculture is equipped with tools to enable resilient, sustainable and economic crop production whilst meeting consumer demands. The programme will address both short-term bioscience research challenges to facilitate the delivery of solutions within the next decade as well as thinking longer-term about the wider systems changes that will be underpinned by the research that this cohort of students will undertake.

“Businesses need access to postgraduates with skills in research and innovation in order to adapt to the enormous challenges that climate change, land use change and biodiversity loss pose. We also need to ensure that the supply chain products and processes pass the test of responsible, sustainable innovation that is core to each businesses value set and corporate social responsibilities” added Emma Garfield, Head of Research Agronomy at G’s Growers Ltd.

For more information, visit the [CTP-SAI website](#) and follow [CTP-SAI on Twitter](#).

# ISRR Medal Lecture on Root Research shines light into the dark world of roots and soil

The 2021 ISRR Dundee Root Medal Lecture and Workshop on “Below Ground Interaction between Plants” took place in November 2021. The annual event is for scientists interested in root research and the plant/soil interface.

Hosted by the James Hutton Institute, the meeting was virtual, and this format allowed it to be opened up to a large, international, audience of over 300 interested registrants. The Dundee Medal is presented annually to a scientist who has made an outstanding contribution in the field of root research.

The 7th recipient of the Dundee Medal for Root Research was Professor Jianbo Shen of the China Agri-cultural University in Beijing, China. Over the last 30 years, Prof Shen has worked

on understanding the role of root-soil interactions and other nature-based solutions in solving the problems of inefficiencies in fertiliser use.

You can watch the Lecture in its entirety below.



Comments?

February 2022

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# Plants for the Future: sustainable and innovative agricultural systems

A report by a multi-stakeholder working group of the European Technology Platform 'Plants for the Future' (Plant ETP) featuring contributions from James Hutton Institute scientists, has identified three principles that will help transition towards more environmentally and socio-economically sustainable agricultural systems.

**Plant ETP was established to support the transition to more sustainable and innovative agricultural systems that remain within planetary boundaries.**

To actively contribute to this transition, Plant ETP established a multi-stakeholder working group on Sustainable Agriculture, consisting of experts from academia, the seed and breeding industry, agricultural service providers, and the farming community.

From a plant sector perspective, this working group considers the challenges and opportunities of agricultural value chains in a holistic way, and aims to develop a vision for future systems spanning food, feed, and biobased raw materials.

The working group identified three main and interdependent drivers that should be developed in parallel and which will enable the transition towards more environmentally and socio-economically sustainable agricultural systems:

Innovative agricultural produce will provide sustainable and healthy food, feed and biobased raw materials for the bioeconomy, meeting consumer needs and societal expectations.

Resilient production (eco)systems will provide sufficient qualitative, nutritious food, feed, and biobased raw materials for society, while promoting One Health.

Agricultural data will be harnessed to support agricultural systems by leveraging big data and artificial intelligence to balance innovative agricultural produce and resilient production (eco)systems, matching produce with demand and enabling sustainable agricultural production through tailored advice.

"The report outlines the recommendations for research and innovation to support the transition towards more sustainable agricultural systems to meet the goals of the EU Green Deal and envisions how agriculture will likely transition in the short, medium and long term," explains Dr Roy Neilson, senior soil scientist at the Hutton and co-vice-chair of the Plants for the Future working group.

"The research is clearly aligned with the Institute's vision and research, and there are several projects highlighted in the document that Hutton either lead or is a project partner. We look forward to engaging with stakeholders to deliver future agricultural sustainability."

The full report, titled *Plants for the future's perspective on sustainable agriculture* – R&I Recommendation Report, is available on the [Plant ETP website](#).



# Potential future plant diversity hidden in soil seed banks

Soil seed banks are a hidden stock for plant diversity and are critical for the recovery of disturbed ecosystems. A new study co-authored by Prof Robin Pakeman, a senior scientist within the James Hutton Institute's Ecological Sciences department, has brought together research on the density and diversity of seed banks in an effort to try and understand their global patterns.

The analysis highlighted a range of climatic and soil variables that were major determinants of seed bank diversity, with diversity peaking at intermediate values of soil pH and annual temperature range and increasing with annual precipitation.

For soil seed bank density, soil bulk density was the most important predictor; density increased below 750 g cm<sup>-3</sup>. Density peaked at intermediate values of temperature of the warmest month and of precipitation of the driest month.

Mapping soil seed bank values onto global maps revealed considerable geospatial variation. For diversity, western North America, central South America, central Africa, central Europe, southern and eastern Asia and eastern Oceania had high values.

In contrast, eastern and central North America, northern Africa and central Asia had low values. For density, northern North America, northern Europe and northern Asia had higher values than elsewhere.

Prof Pakeman said the global analysis of soil seed bank diversity and density strongly suggests that the biodiversity of sub-tropical and tropical forests is particularly vulnerable to large-scale climatic or land-use disturbances.

"In contrast, the higher-latitude plant diversity, while currently low compared to that in tropical rainforest, can rely on high soil seed bank densities for resilience to large-scale climate or land-use induced disturbances," Prof Pakeman added.

The study is published in the latest issue of *Nature Communications*.

**Paper:** Yang, X., Baskin, C.C., Baskin, J.M. et al. Global patterns of potential future plant diversity hidden in soil seed banks. *Nat Commun* 12, 7023 (2021). <https://doi.org/10.1038/s41467-021-27379-1>.

# Assessing durability of potato breeding lines against PCN threat

Researchers at the James Hutton Institute and James Hutton Limited are exploring ways to reduce the losses caused by potato cyst nematodes (PCN) in commercial potato production. PCN is an increasing challenge to the UK fresh and processing potato markets, and the target of **concerted efforts to protect Scotland's seed potato and bulb sectors, worth £112m and £7m, respectively, to the rural economy.**

At the recent *Improving Global and Local IPM* conference organised by the Association of Applied Biologists, Hutton researcher Dr James Price presented the results of a study to assess the virulence of *Globodera pallida*, one of two PCN species present in the UK, populations against specific potato breeding lines.

Several varieties with resistance against *G. pallida* have recently become available, but these are mainly processing varieties and most varieties grown are still susceptible to the species. The lack of resistant varieties against *G. pallida* has led to its spread throughout the UK and now infestations in Scottish seed land are threatening the future of potato seed production. Potato breeders are producing novel lines with resistance to *G. pallida*, some of which combine PCN resistances from more than one source.

The research team looked at how *G. pallida* populations with different levels of virulence compared against recently developed potato breeding lines from the James Hutton

Limited pre-breeding programme. This provided an indication of whether these new potato lines will offer broad-spectrum and durable resistance against *G. pallida* in the future. Promising lines were identified which were highly resistant to all the *G. pallida* populations tested.

"Producing resistant varieties that are attractive to growers and processors is incredibly important if we're to protect the future of potato production across the UK. However, resistance is only half the battle, and we need to be considering tolerance too. Resistance will reduce PCN multiplication, whilst tolerance will protect yields.

"Growing only tolerant and not resistant varieties, while attractive to growers, will make the PCN problem much worse. Growing only resistant varieties such as Innovator does not guarantee strong yields and so these aren't always favoured by growers," explained Dr Price.

"Ideally we want to grow tolerant varieties with stacked PCN resistances. This will protect yields for farmers and reduce PCN multiplication, ultimately reducing the need for nematicides, saving money and pesticide dependence."

The work presented at the AAB conference was submitted for publication in a special issue of *Annals of Applied Biology*, and if accepted, the publication should be available by the summer of 2022.





## Why COVID is not a good stress test of food supply chains' resilience

Brexit. Labour shortages. COVID-19 disruption. It's perhaps surprising our supply chains coped, says Mike Rivington.

When we set out to study the impact of COVID-19 on the UK's food security, we assumed the food system would struggle to adapt to changes in production and demand and that the pandemic could lead to extensive shortages and rising prices. Yet, while COVID-19 has caused havoc in some supply chains (remember the fight for the last toilet roll?) and contributed to significant suffering in sections of society, ultimately food production was less affected than we thought it would be. The just-in-time, efficiency-focused model of supply held up in the face of a demand shock. Supermarkets were never busier, and the food system coped.

Policymakers, consumers and businesses may be tempted to interpret this as a sign of long-term food security and resilience. That would be a mistake. As a stress test, COVID-19 is likely to prove deceptive and could be dangerously misleading for the UK's preparedness and ability to withstand future production shocks from the growing and multiple threats posed by climate change and environmental degradation.

This is because COVID-19 produced a demand-side, as opposed to a supply-side, shock. Locked down consumers changed their behaviour in response to a wildly altered economic and social context, but the fundamentals of food supply didn't alter radically. With its focus on short-term production and efficiency, the UK's food system was well placed to respond and disruption was minimal.

However, as the impacts of climate change and environment damage begin to multiply, the UK and global food systems

will experience stresses for which it is vastly underprepared. Degrading soil health, depleted water reserves and more extreme weather will disrupt long-established crop growth patterns and yields, increasingly impacting supply. As nearly half of the UK's food is imported, our ability to meet growing demand, whilst also trying to mitigate the food system's sizable contribution to total carbon emissions, will be severely strained.

While it's good that the pandemic didn't cause more disruption to the availability of food, we may have been better served by a wakeup call that revealed the need for fundamental reform. Instead it has further entrenched a 'business as usual' attitude from policymakers and the major players in the food system, who continue to prioritise profit and ever-greater efficiency over the need to increase resilience and reduce the negative impacts of food production on human and environment health.

We need to learn lessons. Warnings about the prospect of a pandemic went unheeded for decades. Similarly, the starkest warnings about the worst impacts of climate change and environmental degradation were until recently dismissed as alarmist hyperbole. We risk making the same mistake again with food security.

The good news is that we can produce enough food whilst improving diet and protecting the environment. But to do so requires a few incontrovertible truths. We must diversify crops and land use – growing more fruit, vegetables, roughage and plant-based proteins

– and consume fewer sugars and fats. We will all have to eat less meat, a shift that will disproportionately impact rural communities and agricultural businesses. Eating whatever we want, whenever we want will not always be possible.

Prices will also have to rise for foods that damage human and environmental health. And, for a period at least, large producers and shareholders will have to accept smaller dividends and shoulder some of the cost of transformation which will, in the longer-term, protect shareholder value, mitigate against the worst impacts of climate change and address the growing divide between rich and poor in terms of access to good quality, healthy food.

The solutions to the coming food crises are as interdependent as the causes. All parts of the food system must work together to transform the system, and rebalance technical efficiency and social and environmental resilience. It is in all of our interests to accept and invest in a shift away from overconsumption and the production of ever more food at

the lowest possible price, towards reforms that protect the environment, prioritise health and mitigate the inevitable future shocks to supply. As a starting point, the food sector should develop its own plan to reduce carbon emissions, as countries are required to do as part of the UN Climate Change Conference process.

If it ain't broke, don't fix it, they say. In spite of the mask of resilience it wears, our food system is broken and highly vulnerable. Policymakers must recognise this. Only then can they set about fixing it.

*Dr Mike Rivington is a senior scientist at the Institute and led the UK Food and Nutrition Security During and After the COVID-19 Pandemic research project, funded by the Economic and Social Research Council through UK Research and Innovation. This article was originally published in [The Grocer](#), 17th December 2021. The project's final report is available on [the Hutton website](#).*

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## Five new climate and disease resilient potato varieties approved in Malawi

Five climate and disease resilient potato varieties developed by the James Hutton Institute-led Quikgro research project have been approved for release in Malawi by the Agriculture Technology Release Committee of the Malawian Ministry of Agriculture, Irrigation and Water Development. It's hoped that the new varieties will contribute to economic growth and prosperity along the whole potato supply chain in the region.

The new varieties, Chikoka, Chitute, Khutula, Phindu and Tinyadile, are high yielding with a short cooking time, which is important to consumers as well as their being the right size, shape, texture and flavour. Some are suitable for crisp making, others for boiling or chips. All are heat and disease resilient, making them suited to production in non-traditional potato growing areas, thus increasing the area under production.

The cultivars are early maturing and provide much-needed food before the maize harvest, and are tolerant to late blight, virus and bacterial wilt, meaning agri-chemicals are not needed to maintain tuber quality.

Hutton Director of Science Professor Lesley Torrance explained that in Malawi, potato is typically grown in highland regions because tubers do not form in the warmer temperatures found in other areas, leading to deforestation and high prices due to increasing consumer demand.

"The research team investigated genotypes previously identified as having different combinations of desirable traits, such as early maturing, short dormancy and disease resistance

or tolerance. The objective was to identify genotypes that combined traits and could be grown in non-traditional potato growing areas thanks to their resilience to heat and disease pressures. Maturing in 70 to 80 days, these genotypes can be grown in rotations, which will help control soil-borne disease, and low dormancy means farmers can get three to four crops per year."

The genotypes were grown in the field in different environments over a number of growing seasons, evaluated against currently-grown varieties and a dossier of data was prepared and submitted to the Agriculture Technology Release Committee of Malawi's Ministry of Agriculture, Irrigation and Water Development, which approved them for release.

"We hope these new varieties contribute to economic prosperity and increased food security in Malawi and beyond, and are very grateful to our project partners and funders for their continued support. The next steps are to reach out to farmers and other stakeholders around Malawi to let them know the new varieties are available and what their benefits are, to widen their impact and uptake," Prof Torrance concludes.

The Quikgro project partners in Malawi are the Department of Agriculture and Research Services of the Malawian government, the International Potato Centre, the University of St Andrews and the James Hutton Institute. Quikgro was funded by a Foundation Award and a Global Research Translation Award from UKRI's Global Challenges Research Fund.



# Plans afoot for UK's first purpose-built greenhouse gas observatory in Scotland

On the back of COP26, planning proposals are being put forward to build the UK's first purpose-built tower for directly measuring greenhouse gases from land at the James Hutton Institute's Balruddery Farm, in Angus near Dundee.

**The state-of-the-art facility is designed as a £1m, 100-metre-tall tower. It will enable the UK to monitor and so mitigate climate change by allowing scientists to measure the composition of greenhouse gases directly and then to model changes mathematically over the coming years and decades.**

The design allows air samples to be collected from the top of the tower at 100m, where air arrives from right across Scotland on prevailing winds. Instruments and sensors at ground level would then measure concentrations of the gases responsible for climate change, and scientists across the UK will interpret changes in the levels of these gases to calculate greenhouse gas emissions from the land.

Tracking whether emissions are deviating from expected declines will provide an early indicator of whether actions and policies are having the required effect or not and allow governments to adjust their plans.

"At COP26 in Glasgow, nations agreed that climate change is the biggest problem facing humanity and that decarbonisation of the global economy needs to begin immediately. The Scottish Government has also set an ambitious target for Scotland to become 'net-zero' in greenhouse gas emissions by 2045," says Dr Jagadeesh Yeluripati, a research leader at the James Hutton Institute and co-lead of the project to build the observatory.

"Science was at the heart of COP26, providing evidence of how much damage was being done due to climate warming from greenhouse gases but there are still contested issues about exactly how much GHG are being produced from land and a need to know if planned mitigations will work."

Project lead Dr Tim Arnold, an atmospheric scientist at the University of Edinburgh, adds: "Objective scientific evidence is needed to verify progress towards the net-zero emissions target. Our state-of-the-art new monitoring system will aid in this verification by allowing the effect of Scotland's climate actions to be monitored closely by continuous measurement of greenhouse gases in the atmosphere. This monitoring will help local and national policymakers to decide the best course of action to reach our climate goals. Currently there is no atmospheric greenhouse gas sampling in Scotland that can support this national action.

"Balruddery's location in eastern Scotland and dominant westerly winds means that measuring gases in the atmosphere here allows emissions from right across Scotland to be tracked, including emissions from agriculture."

The proposed development has been designed with considerations in place to minimise local disturbance. A 'free-standing' tower structure has been chosen over a guy-wired version to reduce ground disturbance, visual impact and ecological disruption and to increase security and safety.

The project is a collaboration between the University of Edinburgh and the James Hutton Institute, with policy support from the Scottish Government and additional backing from the Met Office, the National Physical Laboratory and the universities of Bristol and Strathclyde. It is completely financed through UK Research and Innovation's Natural Environment Research Council to support climate science in the UK.

More information can be found at <https://blogs.ed.ac.uk/soar/>.

# Intercropping: exploitation of biodiversity benefits in arable fields

**Diversification of crop systems provides great opportunities to make food production more sustainable and resilient but also faces challenges along the whole value chain. A session at the World Biodiversity Forum (26th June to 1st July 2022) co-organised by a James Hutton Institute scientist will summarise current knowledge about the benefits of intercropping and draw attention to ongoing challenges, including the need to provide advice to farmers, access to adapted machinery, and the development of end products from intercropped systems.**

Taking place as a hybrid event co-organised by ETH Zurich (Christian Schöb) and the Institute (Alison Karley), the session aims to give a voice to scientists and stakeholders from different disciplines and regions to obtain feedback on research findings and practical applications, and guide future developments in intercropping research.

Dr Alison Karley, an agroecologist within the Institute's Ecological Sciences group and co-organiser of the session, said: "Our trials with farmers across the UK - and beyond - have highlighted that intercropping is often hindered by practical issues beyond the farm gate. But when solutions are found, they create exciting opportunities for stakeholders across the value chain."

**Confirmed speakers at the session include:**

- Ivette Perfecto, University of Michigan, USA
- Marta Vasconcelos, University of Porto, Portugal
- Austin Phiri, Ministry of Agriculture, Irrigation and Water Development, Malawi
- Johan Six, ETH Zurich, Switzerland
- Lana Shaw, Southeast Research Farm, Canada
- Samuel Wuest, Agroscope, Switzerland
- Annelies Uebersax, Agrofutura, Switzerland
- Sebastian Kussmann, GZPK, Switzerland

For more information and registration please visit the [conference website](#).



# CPNB 2022: spotlight on agriculture, environment, combinable crops and potatoes

The Crop Production in Northern Britain Conference, the foremost summit discussing environmental management and crop production in northern environments, is back this year as an online event on 1-2 March.

CPNB 2022 brings together agronomists, scientists, policy makers and representatives of agritech, breeder and agrochemical companies and all those concerned with recent advances in crop production and protection, to discuss crop production and protection problems prevalent in northern environments.

“The CPNB conference is unique in being dedicated to the very practical issues attached to managing and growing crops successfully and sustainably in the north of Britain. The conference aims to present the very best in terms of technical information, tailored to the challenges and opportunities of farming the north” said Prof Fiona Burnett, chair of the Association for Crop Protection in Northern Britain.

This year, CPNB offers a programme full of the latest scientific advances in three key topics: agriculture and the environment; combinable crops; and potatoes, featuring talks from industry representatives, policymakers, invited speakers and Scottish experts from the James Hutton Institute, Scotland’s Rural College (SRUC), Scottish Environment Protection Agency (SEPA), Biomathematics and Statistics Scotland (BioSS) and Science and Advice for Scottish Agriculture (SASA).

The conference will be opened by Prof Fiona Burnett, followed by Prof Mathew Williams, the Scottish Government’s Chief Scientific Adviser for Environment, Natural Resources and Agriculture, and Lorna Slater MSP, Minister for Green Skills, Circular Economy and Biodiversity.

“CPNB 2022 will be an online event this year, and we hope this allows people who would not normally travel and attend a two-day conference to join the event and are particularly keen to promote the opportunity to more farmers, agronomists and students. We’d like to encourage agricultural students at all levels to attend” added Prof Burnett.

Registration for CPNB 2022 is now open, with concessionary rates available for students. Visit [www.cpnb.org](http://www.cpnb.org) to book your place and to see the full conference programme.

CPNB 2022 is organised by the Association for Crop Protection in Northern Britain, with the support of the Scottish Society for Crop Research and AHDB Cereals & Oilseeds.

Previous CPNB conferences have discussed cropping systems and environmental interactions; soils and water protection; soil health; sustainability and the application of new technology, integrated crop and pest management.

## Some dates for your diary

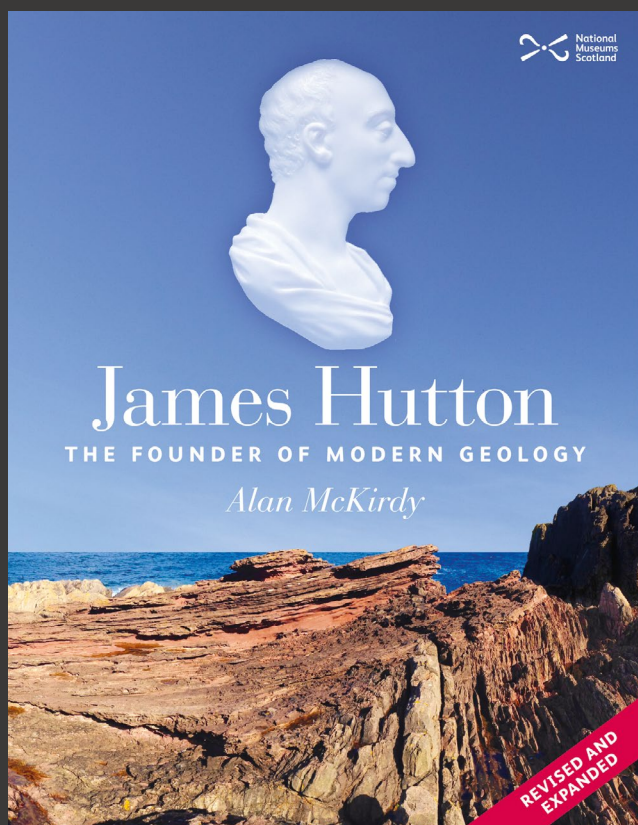
Date	Event	Location	Notes
1 and 2 March 2022	Crop Production in Northern Britain (CPNB)	Online event	Registration open <a href="https://www.cpnb.org/">https://www.cpnb.org/</a>
9 March 2022	SSCR Potato Winter Meeting	Will be held virtually from 10:00am to 12.15pm. The draft programme can be <a href="#">found here</a> .	Please register your intention to attend by emailing: <a href="mailto:Jennie.Brierley@hutton.ac.uk">Jennie.Brierley@hutton.ac.uk</a> by 7 March
22 March 2022	World Water Day	Invitation only	Stakeholder event
25 April – 8 May 2022	COP15 Biodiversity	Hybrid with mixture of both online and in person events (TBC)	Stakeholder event
27-29 April 2022	ENFSI APST Annual Meeting		The Animal, Plant, and Soil Traces expert working group (APST) supports the aims and objectives of the European Network of Forensic Science Institutes (ENFSI). This event is only open to ENFSI and associate members.
8 - 9 June 2022	Cereals	James Hutton Limited	Stakeholder event
23– 26 June 2022	Royal Highland Show	Royal Highland Centre, Ingliston	Stakeholder and general public event
5 July 2022	Arable Scotland	James Hutton Institute, Balruddery Farm	Theme is net zero. Event is open for bookings: <a href="https://www.arablescotland.org.uk/">https://www.arablescotland.org.uk/</a>
21 July 2022	Fruit for the Future	James Hutton Institute, Invergowrie	More information available soon
31 July – 5 August 2022	World Soil Congress	Scottish Event Campus (SEC), Glasgow	Stakeholder event
11 August 2022	Potatoes in Practice	James Hutton Institute, Balruddery Farm	Event is open for bookings: <a href="https://pip.hutton.ac.uk/">https://pip.hutton.ac.uk/</a>



The International Barley Hub (IBH) is holding a seminar series with events running every fortnight through 2022. To find current information on the next seminar please see their [website](#).



# New James Hutton biography hits the shelves



James Hutton (1726-1797) was a man ahead of his time. He saw the natural world around him as a work in progress, shaped by the processes of erosion, denudation and the 'continuity of Nature's operations'.

He developed a grand theory of the Earth in which he tried to make sense of a lifetime of observation and deduction about the way in which our planet functions.

A leading figure in the eighteenth-century Scottish Enlightenment, he was also an innovative farmer, successful entrepreneur and a man with endless intellectual curiosity.

The year 2026 will be the tercentenary of his birth and various special events are in prospect.

The first of these is this rewritten and considerably expanded new edition of the best-selling Hutton biography first published in 1997 and revised in 2012, which now has over a hundred illustrations.

*[Pre-order](#) now for delivery from the end of March 2022*



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## Contact

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