



# Annual Review **2017/18**



The James  
**Hutton**  
Institute

[hutton.ac.uk](http://hutton.ac.uk)

# Vital Statistics



Our work is inspired by James Hutton: Scottish innovator and polymath



**5**  
Sites

Employees from over



**29**  
countries



**565**  
Employees



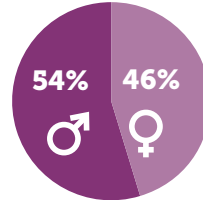
**28**  
Professors



**383**  
Peer reviewed papers



**153**  
PhD Students



**429**  
Press articles



**228**  
PhD qualified employees



**472**  
TV/radio broadcast features



**43%**  
Waste recycled



**54**  
Staff with 30+ years scientific experience



**667**  
Online media articles



**4754**  
Years of scientific experience

# Timeline of our Year

## 2017

<p><b>April</b></p> <p>Independent Research Organisation application</p>	<p><b>May</b></p> <p>Hutton Criteria potato blight controls rolled out to growers</p>	<p><b>June</b></p> <p>Plans for James Hutton Foundation announced</p>	<p><b>July</b></p> <p>Researchers challenge barriers to women farmers</p>
<p><b>August</b></p> <p>Rising Star Award for entrepreneurial Hutton scientist Dr Kirsty Black</p>	<p><b>September</b></p> <p>New £500k TIMS machine improves isotopic analysis capabilities</p>	<p><b>October</b></p> <p>Prof Lorna Dawson receives Pride of Britain award</p>	<p><b>November</b></p> <p>Space tech and Hutton expertise provide clean water in Pakistan</p>

## 2018

<p><b>December</b></p> <p>SEFARI CEOs appear at Holyrood Climate Change committee</p>	<p><b>January</b></p> <p>First Global Soil Organic Carbon Map published</p>	<p><b>February</b></p> <p>Centre of Expertise in Plant Health launched</p>	<p><b>March</b></p> <p>Natural Flood Management Network set up</p>
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# Some Research Highlights

Our research looking at the different ways in which four EU member states have tried to align their **river basin and flood risk management** plans has been used by the European Commission to assist with their review of the implementation of Water Framework Directive.

Hutton's report on **Women in Agriculture** has led to the appointment of researchers Annie McKee and Lee-Ann Sutherland to the Scottish Women in Agriculture Taskforce, which aims to increase women's representation and influence in the industry's representative and leadership bodies.

Novel plant expression platforms have been used to synthesise a range of Sheep Scab Mite proteins which will be used to make a **new prototype multicomponent vaccine** which is currently undergoing field trials.

We have published the first paper from the long-term cross disciplinary '**Centre for Sustainable Cropping platform**' experiment which has been running since 2009. The paper highlights the impact of a low-input, integrated management system on water soluble vitamin contents in five important Scottish crops.

The new national warning system for potato late blight in Great Britain – the Hutton Criteria – now has over 15,000 subscribers and has sent over 175,000 alerts allowing **more tailored and effective use of disease-protection measures** such as spraying.

Hutton staff were instrumental in preparing a landmark report that mapped the "**waste**" **bio-resource** available in Scotland at local authority level for upscaling and valorisation to benefit the Scottish bioeconomy.

Our analysis of **barley's genome** sequence, published in Nature, reveals that the large chromosomes are compartmentalised into distinct sections with some regions enriched in rapidly evolving genes while others are enriched in genes that control everyday cell functions.

Our projections of **demographic developments** in Scotland's sparsely populated areas have attracted interest from policymakers and gained significant national media coverage.

For the first time, a smoothed particle model has been used successfully to describe plant tissue growth, a methodological breakthrough that enables us to understand the **soil-microbe-plant system** in much more detail than previously. This has implications for optimising plant growth and nutrient uptake.

Our work on **food-borne pathogens in plants** has highlighted the potential hazard from microgreen or microherb plants in salads and sandwiches; not subject to any microbiological safety legislation. Experiments with *E. coli* O157:H7 showed massive levels of bacterial colonisation so there is a need to highlight the potential risks posed.

We have published the first **web-story of ecosystem indicators** for Scotland that will enhance the relevance of the UK National Ecosystem Assessment to decision and policy making at different spatial scales across the UK.

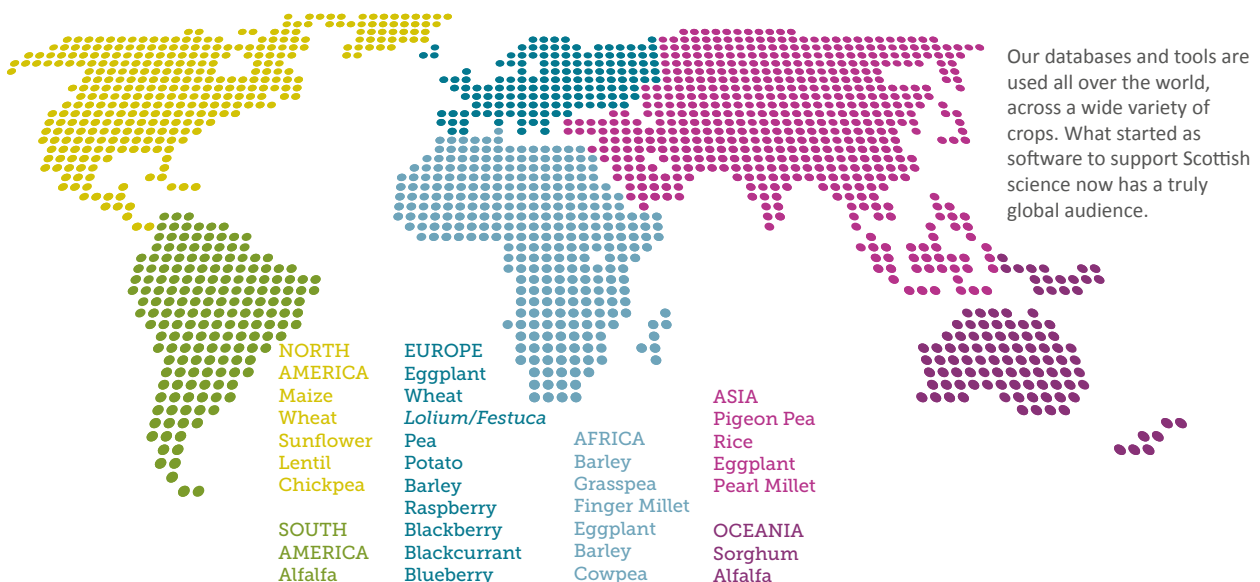
We have developed techniques to track and validate sequences of genes that control the major diseases of potato. This should **improve the speed and efficiency of breeding** for disease resistance by directing selection towards the most effective combinations of resistance genes.

We have shown that barley landraces selected over generations have adapted to soils with limited Mn availability. These landraces demonstrated outstanding photosynthetic efficiency and grain yields when grown in-field in alkaline sandy soil, while modern elite varieties failed due to their poor Mn efficiency. This has relevance for **future barley breeding**.

With SEPA and Scottish Water, we developed a suite of models to identify areas most at risk of **degrading water quality** and applied these to soil maps of cultivated areas in Scotland. The maps suggest where to deploy strategies to mitigate potential pollution and help understand taste and odour issues across drinking water catchments.

We have shown that **potato blackleg disease** can arise directly from contamination in the field and does not imply seed tubers were contaminated; a damaging association for Scottish seed potatoes' reputation. This has major implications for ware producers' growing practices and could see a significant reduction in disease in ware crops. The research has very strong industry involvement.

## Software Development for a Changing World

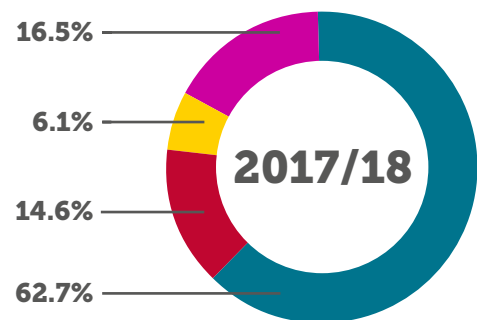
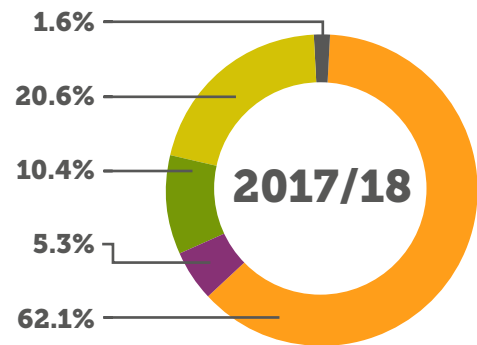


# Accounts

## Group Annual Report Figures (£000)

Income	2017/18	2016/17
Scottish Government Strategic Research Programme	22,930	23,549
Capital	599	100
	23,529	23,649
Research grants & contracts	7,593	8,252
Trading income from subsidiaries	3,835	4,134
Other income	1,952	1,988
<b>Total income</b>	<b>36,909</b>	<b>38,023</b>

Expenditure	2017/18	2016/17
Staff costs	23,574	24,831
Scientific consumables	6,216	6,830
Depreciation	2,304	2,325
Support costs	5,506	6,184
<b>Total expenditure</b>	<b>37,600</b>	<b>40,170</b>
<b>Surplus/(deficit) for the year</b>	<b>(691)</b>	<b>(2,147)</b>



### James Hutton Institute Board changes

#### Incoming Board members:

Prof James Curran (Chair)  
Susan Davies  
Prof Alyson Tobin  
George Lawrie  
Elizabeth Wade

### James Hutton Limited Board changes

#### Outgoing Board members

Graham Neale  
Jennifer Crow

#### Incoming Board members:

Anne McColl  
Robin Walker

# A Summary from the Chief Executive

**The past year saw two significant positive developments for the Institute.** Firstly – by joint effort of the Board, staff and senior management - we applied for Independent Research Organisation status through the BBSRC. We have since heard that our application was successful, opening all seven UKRI Research Councils' funding to us.

This change in Hutton's eligibility is a huge new opportunity as our abilities and expertise in inter-disciplinary science are closely aligned to the aspirations of UKRI and we have a tremendous track record of success in applying for competitive funding. Eligibility will also help us attract and retain the best scientific talent and ensure we can continue delivering cutting-edge science that drives real-world impacts.

Secondly, two years into our current 5-year plan, great progress has been made on our science, organisational development and financial sustainability. Despite the external environment remaining challenging, our financial performance improved, seeing significant successes with Innovate UK and the EU Horizon 2020 programme. This better than budget out-turn was helped by some much-needed capital investment and capitalising on our new UKRI funding eligibility to generate further revenue can build on this.

Our science continues to have impact both in the world's scientific community but also for businesses and communities in Scotland and, increasingly, internationally. This global reach is exemplified by the growing number of users and applications of our bioinformatics software; now applied to a wide range of different crops of global importance and in use on every continent. It shows how issues we work on in a Scottish context are relevant around the world. Developing climate-resilient crops, identifying and tackling issues around demographic change, rural development and environmental change have delivered meaningful impact in Scotland but also in India, Africa and China, where we have a growing number of research projects and strategic partnerships.

A big thank you to our staff, Board, stakeholders, customers and funders who are all helping Hutton build a long-term future founded on great science, innovation and our ethos of challenging conventional wisdom.



Professor Colin Campbell  
Chief Executive





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