Annual Review 2016/17

The James Hutton Institute

hutton.ac.uk

Vital Statistics

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

552 Employees

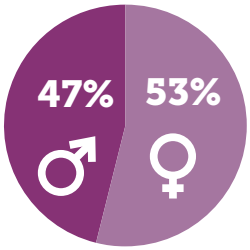
40 Staff with 30+ years scientific experience

389 Peer reviewed papers

165 PhD Students

401 Press articles

5 Sites



238 PhD qualified employees

178 TV/radio broadcast features

Employees from over **32** countries

27 Professors

4554 Years of scientific experience

1697 Online media articles

Timeline of our Year

2016 INTERNATIONAL YEAR OF PULSES

2016

April

Brazil-UK partnership launched to research nitrogen fixation

May

'Tundra IPA' 40% bean beer launched

June

Brexit vote brings major implications for Hutton staff and research funding

July

Paper on genetic adaptability of barley published in *Nature*

August

EAPR Potato Pathology conference in Dundee

September

Economic impact analysis shows £12.75 return for each £1 Hutton gets

October

'Grazing on the Edge' film launched; how crofting contributes to environmental management

November

'Magic Margins' wins RSPB Nature of Scotland Innovation award

2017

December

'Shrinking reindeer' climate change story goes global

January

Tay Cities Deal submissions for Barley Hub and Plant Growth Centre

February

Commonwealth Potato Collection seeds deposited in Global Seed Vault, Svalbard

March

Launch of SEFARI consortium of Scottish research institutes

Some Research Highlights

New data from Hutton's **barley genetics work** published in *Nature Genetics* shows that climatic variables associated with temperature and dryness are at least partly responsible for driving barley's adaptive response; important for understanding diversity and how it can be exploited to benefit barley's growing range.

The 'Hutton Criteria' - new risk criteria which aim to transform the performance of potato **late blight** alert systems - were launched. They are a significant advance on the current method for predicting blight pressure.

ICS researchers created a visualisation model to represent and understand large datasets of **peatland restoration** information, working with RSPB to increase the dataset size.

Host proteins that are required by **plant pathogens** for successful infection have been identified. Surprisingly, the activity of these plant 'susceptibility' proteins promotes pathogen infection. These findings have allowed a new hypothesis about plant disease pathways to be developed.

Our work on the **ecosystem approach** and embedding the value of the natural environment in decision-making has met with widespread interest from government, agencies, policymakers and stakeholders, especially on barriers to implementation and using ecosystem service concepts.

H2020 **rural sociology** projects PLAID and AgriLink were awarded, worth €460,000 and €550,000 to Hutton respectively. PLAID will compile an inventory of demonstration farms across Europe, identify best practice in on-farm demonstration and develop 'virtual' demonstration farming approaches.

The concept of **'nature-based solutions'** featured in a *Nature* editorial, citing a paper co-written by Hutton scientists as a key resource in developing the notion of NBS. This recently-introduced term in environmental research and management, with connections to other concepts for managing and understanding ecosystems, was analysed by an international effort that included Hutton researchers.

Hutton researchers and partner organisations are investigating the **impacts of pesticide withdrawal** in Scottish and English soft fruit production, and have shown that insecticides can be reduced by 30 percent using Integrated Pest Management tools without impacts on yield or quality.

We have identified and functionally **validated genes** underlying heat tolerance and tuber development in potato.

Hutton findings on the **obstacles to outdoor recreation** by older people were widely reported in the media and taken up by sector professionals. Coverage reached an estimated audience of 4 million and research leaders met with NHS Health Improvement Scotland about getting older people into the outdoors.

The Depsy project **measuring software impact** puts Hutton's 'Biopython' in the 100th percentile for impact research software written in Python, reportedly used in over 1700 projects and downloaded 272,000 times.

Institute scientists have widened research on by-products from alginate extraction in **seaweeds** to examine novel valuable commodities for the biomedical, food and pharma sectors.

Our Agroecology group won EU funding of €16m for three major projects. All develop the use of legumes as the foundation for **sustainable cropping systems** and supply-chains. TRUE and DIVERSify are coordinated by the Institute, and we lead work-packages on TomRes.

Hutton's SEGS group is coordinating the 4-year EU 'SIMRA' project, aiming to unlock the potential growth of **rural and marginalised areas** through enhanced governance and social innovation, specifically in relation to agriculture, forestry and rural development.

Using liquid chromatography–mass spectrometry techniques, researchers **discovered novel antimicrobial compounds** in certain Scottish honeys which make them comparable in effectiveness to established antimicrobial honeys in the fight against antibiotic-resistant bugs such as *Staphylococcus* and *E. coli* when applied topically under certain conditions.

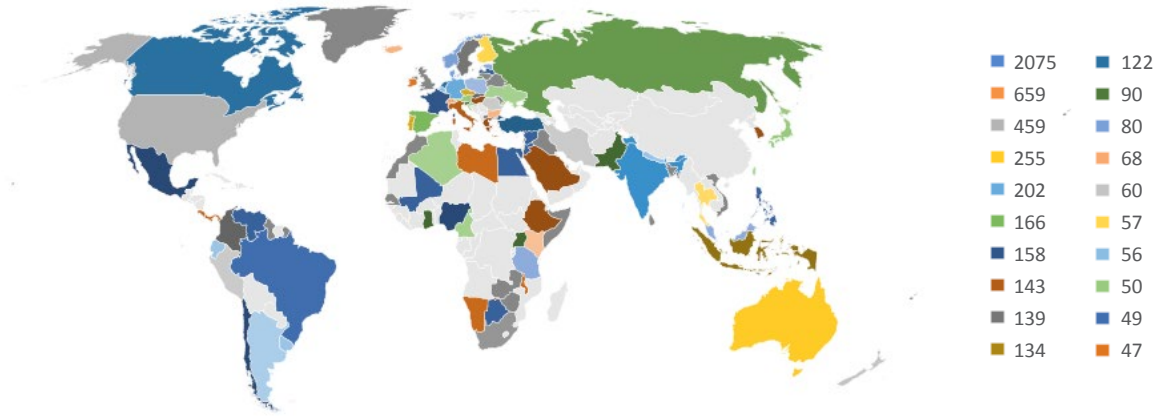
After 3 years of validation and UK wide sample-testing, a new suite of molecular diagnostics for **free-living nematodes** was launched commercially. This pest costs global agriculture ~£100bn annually in reduced yield, quality and crop management. The diagnostic has potential to allow us to identify influential molecular markers for future breeding of new potato varieties.

We have developed a **barley genotyping platform** representing 44,000 sequence variants that allows comprehensive fingerprinting of barley lines and is used by collaborators worldwide.

The HydroNation International initiative was set up, launching **clean drinking water and sanitation** improvement projects at local and national levels in India, Pakistan, and Malawi with Hutton leading the Initiative for the Scottish Government.

Articles published by country since 2011

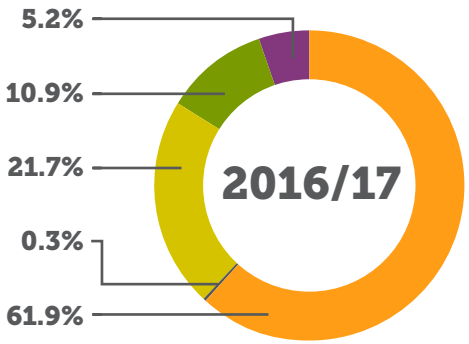
From Scotland to the world and back again



Accounts

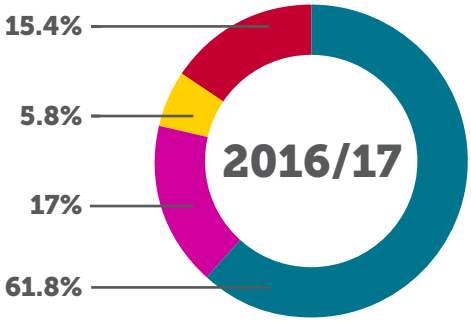
Group Annual Report Figures (£000)

Income	2016/17	2015/16
Scottish Government Strategic Research Programme	23,549	24,482
Capital	100	861
	23,649	25,343
Research grants & contracts	8,252	7,410
Trading income from subsidiaries	4,134	4,920
Other income	1,988	1,372
Total income	38,023	39,045



Expenditure	2016/17	2015/16
Staff costs	24,831	24,712
Scientific consumables	6,830	6,467
Depreciation	2,325	2,495
Support costs	6,184	5,959
Exceptional costs	0	0
Total expenditure	40,170	39,633

Surplus/(deficit) for the year	(2,147)	(588)



James Hutton Institute Board changes

Outgoing Board members:
Ray Perman (Chair)
George Thorley
Dr Laura Meagher
Prof Alan Werritty
Prof Brian Clark
Allan Stevenson

Incoming Board members:
Andrew Millar
Iain Reid
Archibald Gibson

James Hutton Limited Board changes

Outgoing Board member
Allan Stevenson (Chair)

For both companies, Beth Corcoran left as Company Secretary and Derek Leslie was appointed.

A Summary from the Chief Executive

The past year has seen unprecedented change in our external environment in what was already a changing world. Brexit, new governments and the formation of UKRI were all significant changes. It was also a year of change and renewal in the Institute, with our new 5-year strategy and recruitment to the Executive and Board. Challenges around declining research funding continue and - while we are able to cover operating costs - much needed capital investment is the biggest of these.

Big challenges need bigger thinking and a step change in approach. Our strategic objectives and operational changes this year reflect this. A new capital plan was implemented, including studies into how we use our estate to generate revenue and two bids (totalling £68m) for the International Barley Hub (IBH) and Advanced Plant Growth Centre (APGC) were submitted to the Tay Cities Deal. These have been well received. The IBH will create an industry-led innovation centre that brings scientific talent together with global business sectors that depend on barley. The APGC will establish a research facility that will service newly imagined ways of growing plants with enabling technologies. We are also looking at how we renew the spaces we have for collaborative work and public engagement and are developing new ideas on visualising big data. New ways of working have been introduced by a new Institute-wide Science Strategy Group to guide our future science. We are also developing a bigger Project Management Office and have established a single, updated set of staff terms and conditions reducing long term risk around pensions liabilities.

Despite difficult operating conditions, we continue to be successful in delivering the Scottish Government (SG) research programme, external grant successes, in publishing high quality articles and creating a growing range of novel and alternative research software, databases, videos and mobile apps. Innovation is evident across the Institute; not just in science, as exemplified by our farm staff being recognised with the RSPB Nature of Scotland Innovation Award for the Magic Margins concept.

The SG research programme is vital to our aim to conduct long term mission-orientated research, and there has been much progress in this. An independent economic impact study showed a return of £12.75 to the UK economy for every £1 invested in Hutton. This is an excellent ROI but it's essential to recognise there are many non-monetary benefits in supporting science: on contested issues, scientific method can sieve evidence to make meaningful conclusions that deliver us all from simple perceptions and falsehoods.

"£12.75 to the UK economy for every £1 invested in Hutton"

We also saw the launch of SEFARI (Scottish Environment, Food and Agricultural Research Institutes) that brings the different research institutes in Scotland together to work more collectively and add value to our delivery to the SG research programme. This important development will help us all have greater impact for stakeholders.

Valuable members of the Board left in the year, not least our founding Chair, Ray Perman, on 31 March. We thank them all. We have been joined by an intake of talented new Board members. Also this year with help from the MDT, MT and SSCR we started a project to establish the James Hutton Foundation. Appropriately - and generously - Ray Perman was the first to donate to the Foundation, to establish a system to recognise staff making the biggest contribution to the Institute. Ray has made an outstanding contribution to the Institute over the last 6 years and we owe him many thanks. So; a lot of ground work has been laid to provide solid foundations for further development and for the continuing delivery of knowledge and progress for the economy and for society as a whole.
As always, I am immensely grateful to our staff, students, associates and Board for their support, ideas, talent, effort and application.

Professor Colin Campbell
Chief Executive

The James Hutton Institute

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