

PROJECT UPDATE

December 2017



Deck the halls with hops and barley



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Introduction

Welcome to our new format project update focussing on stories and events associated with the International Barley Hub (IBH) and the Advanced Plant Growth Centre (APGC). These fantastic projects are now gaining real traction with government and are already delivering impact. Please continue to engage with us as we shape the projects to meet the needs of our Farming, Food & Drink and Research partners and strive to make funding via the Tay Cities Deal a reality. Our very best wishes for a happy Christmas and a peaceful, collaborative and prosperous New Year.



Professor Colin Campbell, Chief Executive of The James Hutton Institute and SEFARI Chair.

Winter barley malting improvements in prospect

The distilling industry uses the majority of UK malting barley, preferring spring barley due to its higher spirit yield per tonne of malt used than winter barley. Unfortunately from a provenancing point of view, the Scottish barley crop no longer provides enough malting barley to meet distillers' requirements. Winter barley's higher (grain tonnage) yield would theoretically provide more spirit per hectare at current winter barley quality levels. However, breeding of winter malting barley has not advanced at the same rate as for the spring crop. With this in mind, BBSRC and AHDB's LINK project 'IMPROMALT' has identified key genetic characters that improve malting quality in spring barley that are not found in winter barley. Breeding companies in the project have transferred these spring genetic characters into two and six-row winter barley cultivars in an attempt to bridge the quality gap between the two crops. The most advanced lines were harvested in 2017 and their malting quality will be evaluated by MAGB member companies – likely in the first quarter of 2018 - to determine if any significant improvements in malting quality have been made. Preliminary results could be available around mid-year but the results from harvest 2018 will be more critical. If successful, such lines could substantially reduce the land area required to meet distillers' demand for malting barley. Watch this space!



IBH scientific mission to Ethiopia

Five University of Dundee and James Hutton researchers joined two colleagues from ICARDA (the International Centre for Agricultural Research in the Dry Areas) in Addis Ababa to initiate collaborative links with Ethiopian scientists to promote barley production in the Ethiopian Highlands.

Ethiopia is Africa's second largest barley producer: over 20M Ethiopians depend on barley as a staple. Ethiopia's population will double by 2040 so food insecurity will be an increasing problem. Barley yield is ~1.5-2 t/Ha - around one third of what should be achievable - hence a chronic threat to food sufficiency but also a clear opportunity for IBH to make an impact. Ethiopia's annual imports of barley (malt) have increased dramatically from US\$0.9M in 2003, to US\$28M in 2012 and US\$42 in 2014. Increasing barley yields and developing a robust value chain would boost food security and reduce barley imports, helping pull smallholder farmers out of poverty, creating new export opportunities and stimulating further economic growth and structural transformations.

Meeting farmers, policy-makers, researchers, agricultural extension agencies, breeders and industrialists led to the development of a €20M Global Challenge Research Fund (GCRF) bid. If funded the development would plug gaps that exist in the current barley supply chain, and work to provide smallholder farmers with better seeds, soils, inputs, knowledge, agricultural practices and markets.

Since the visit, the Royal Society has funded the group's GCRF Challenge Grant 'Understanding barley straw traits to improve sustainability and crop yields in Ethiopia' with £91,189 for 12 months from Dec 2017. This was turned down previously but was successfully redrafted with an Ethiopian focus and collaborators. We are now awaiting the response to the €20M bid and will keep you posted.

Focus on food opportunities

An IBH working group is considering the benefits of barley in foods and new targets for science to enhance food. This will inform breeding and genomics efforts to tailor future barley to these uses.

There has been little improvement in barley processing for food use in the last few decades. However, the discovery of barley's β -glucan, its efficacy in reducing cholesterol-related cardiovascular disease and the reported beneficial impacts of glycaemic index reduction has renewed interest globally.

With current barley varieties, incorporation of barley above fairly low proportions in food products made from wheat, rice or oats leads to loss of processing, performance or sensory properties so has limited appeal. Thus, to see a shift to impactful barley use in the food sector a more disruptive approach needs to be undertaken. A couple of promising options have been identified. Firstly, the generation of barley with a significantly greater β -glucan level (>12%) could effectively create a new cereal that could either be used directly in food to deliver health benefits, or as a crop generated specifically for β -glucan production as a health-beneficial food ingredient. The latter route is being followed for oats but via bio-refining rather than through genetic enhancement. Secondly, a protein in barley has some sequence homology with egg albumin and has the potential to act similarly to egg albumin (binder, foam construction and durability) suggesting two routes to exploitation: crop compositional enhancement (possibly via speed breeding) or industrial biotechnology using yeast as a production host.

Spare a thought for mutants 25-27 June 2018

The International Barley Mutant Workshop, iBMW2018, is a 2½ day event hosted in Dundee which will provide a platform for scientists who routinely exploit barley mutant resources to explore fundamental aspects of cereal crop genetics. It is a widely requested follow up to a similar and highly successful workshop held in IPK-Gatersleben, Germany, in 2014. Over the past 10 years by using historical mutant stocks, enormous strides have been made in understanding a wide range of fundamental biological processes in cereal biology. iBMW will focus on providing an opportunity for the next generation of early career scientists to present their research to the wider scientific community, share their experiences and establish new collaborative partnerships with leading groups in the field. Early feedback indicates interest in attending from research groups in the USA, Germany, Italy, Japan, Australia, Sweden, Denmark, Poland and the UK. Please let us know if you want to come or indeed if you want to discuss sponsorship opportunities. (<https://ics.hutton.ac.uk/ibmw2018/>)



The APGC project team have been busy since our last update:

- **Industry Engagement Days** – hosted by Hutton in Dundee and the West Sussex Growers Association in Chichester. We met lots of potential stakeholders, shared the APGC vision and learned a lot about key industry issues. We also visited fantastic facilities at Madstein UK and Tangmere Airfield Nurseries.
- **Hutton Science Engagement Day** – a full day seminar at the Institute explored how all our scientists will have the opportunity to work with APGC and its technologies, how different disciplines here can help address industry issues and whom we could collaborate with.
- **Collaborations** – we visited existing facilities and research projects at the University of Aberystwyth and Stockbridge Technology Centre. The latter is already collaborating with us and we hope to work more closely with the National Plant Phenomic Centre at Aberystwyth.
- **Events** – APGC Lead Scientist Dr Rob Hancock hosted a workshop on APGC at the Food Matters Live trade-show in London, where the project generated a lot of interest. The project was featured at the Hutton Royal Highland Show marquee, Edinburgh, and the Tayside Engineering Network visited the Institute to learn more about APGC and related work.



Tay Cities Deal update

The Tay Cities Deal continues to progress well with the deal as a whole receiving good political support and being mentioned in the Chancellor's budget speech. Both APGC and IBH bids are regarded as well-developed and continue to progress through the Government Gateway approval process with IBH having now recently passed stage 2 and APGC stage 1. This external review process provides evidence that the business cases for these projects are robust, well developed and will deliver real impact.

The leaders of Angus, Perth & Kinross and Dundee Councils recently attended the Institute for a briefing on APGC with a visit to the Intelligent Growth Solutions vertical growth facility which is fast approaching completion. They left the Institute inspired by the potential for APGC to develop real opportunities for the local Food & Drink sector. When we meet politicians and Government ministers now they are usually well briefed on IBH and this is testament to the hard work that has been put in by our team and key stakeholders to promote the projects. There is still no date set for confirmation of funding but we hope to have an in principle decision by Easter 2018.

Scottish farming in the spotlight in AHDB's latest report

AHDB's latest Horizon report 'Exploring the implications of Brexit for agriculture and horticulture in Scotland' highlights the risks and opportunities Brexit presents for Scottish farm businesses and the food and drink supply chain. It explores Scotland's domestic and international trading relationships, the reliance on EU migrant labour in its horticultural and wider food manufacturing sectors and the critical importance of agricultural support to its farm businesses.

The report's analysis using Farm Business Survey data to model the impact of AHDB's recently-published Brexit scenarios for specific sectors in Scotland shows an overall picture for Scottish agriculture broadly similar to England for cereals, general cropping, potatoes and horticulture. Based on the impacts, the report identifies five critical business planning questions farmers need to ask themselves to get fit for the future.

Co-author and AHDB Head of Strategic Insight, David Swales, said: "While the implications of this analysis need to be considered by policy makers in both Westminster and Edinburgh, the overriding message is that businesses need to focus on the aspects in their control. Businesses that have thought about the possible range of outcomes, have considered the options they can take to deal with them and have a plan for any eventuality are most likely to succeed."



The report can be downloaded at www.ahdb.org.uk/brexit

2018 Diary Dates

Date	Event	Venue
15 Feb	SSCR Soft Fruit Winter Meeting	Inchture Hotel
27-28 Feb	Crop Protection in Northern Britain 2018: Environmental Management & Crop Production	Dundee
28 Feb	Waitrose Science Day (APGC)	Warwick University
w/c 12 Mar	SSCR Combinable and Energy Crops Winter Meeting	The James Hutton Institute, Invergowrie
22 Mar	SSCR Potato Winter Meeting	The James Hutton Institute, Invergowrie
28 Mar	IBH Industry Advisory Group	New Seminar Room, Hutton Invergowrie
Apr	Tay Cities Deal announcement expected	
23 May	SSCR AGM and Lecture	TBC
13-14 Jun	CEREALS 2018	Duxford, Cambs
21-24 Jun	Royal Highland Show	Ingliston, Edinburgh
25-27 Jun	2nd International Barley Mutants Workshop	University of Dundee
3 or 5 Jul (TBC)	Cereals in Practice	Saphock Farm, Oldmeldrum
19 Jul	Fruit for the Future	The James Hutton Institute, Invergowrie
9 Aug	Potatoes in Practice	Balruddery Farm

Barley scientists discover path to improved grain quality [\[link\]](#)



Introducing our new quarterly e-magazine: Hutton Highlights magazine [\[link\]](#)

