Thursday 26 June 2014
4pm – 8pm

Programme
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We would like to welcome you to the sixth Cereals in Practice event. We are convinced you will find much to enlighten and inform you and this will lead to improved performance in your business.

Cereals in Practice is a unique event, bringing variety trials and research together in one place. It combines the James Hutton Institute’s former cereals event, Cereal Solutions, with the SRUC Angus/Perthshire Agronomy Centre wheat and barley variety and management trials, to create a must-attend event for anyone interested in cereal farming and associated industries.

Cereals in Practice attracts a wide range of visitors including farmers, agronomists, cereals industry representatives and scientists working with cereals.

With arable farmers coming under pressures from both home and abroad it is important the industry takes advantage of all the new technologies to remain competitive. Cereals in Practice aims to be the premier knowledge transfer event in the North of the UK combining scientific innovation with practical take home messages.

Please note that many of the demonstrations and plots on show today are research in progress.
Programme

4pm Welcome and Introductory talk

Tea and coffee available on arrival

4.20pm - 7.30pm Guided Tours of the plots – tour duration approximately 60-90 minutes

5.00pm - 8pm A light menu will be served in the exhibitor area, free of charge

7.30pm: Whisky prize draws

Pre-registration form draw sponsored by SSCR

Feedback form draw sponsored by Neogen Europe Ltd.

8.00pm Close of event
1. Soil – Where the Other Half Lives
2. Disease Resistance Breeding in Winter Barley
3. Winter Wheat Nitrogen Response – Yara Vita Trial
4. Fungicide Efficacy Trials
5. Breeding Progress in Winter Wheat
6. Winter Wheat Varieties
7. QuOats
8. Spring Barley Varieties
9. Super Sixes – Improving Six Row Barley
10. Spring Barley WP Fungicide Trial
11. Improving Malt Processability
12. Wild Bird and Conservation Mixes
13. Novel Approaches to Weed Control in Spring Barley
The James Hutton Institute

Contact Details:

Events

The James Hutton Institute, Dundee DD2 5DA

Email: events@hutton.ac.uk
Tel: +44(0) 844 928 5428
Fax: +44(0) 1382 560 002
Web: www.hutton.ac.uk

The James Hutton Institute is a world-leading scientific organisation encompassing a distinctive range of integrated strengths in land, crop, waters, environmental and socio-economic science. It undertakes research for customers including the Scottish and UK Governments, the EU and other organisations worldwide. The institute has a staff of nearly 600 and 120 PhD students.

The Institute organises its research through six principal themes: Safeguarding Natural Capital, Enhancing Crop Productivity and Utilisation, Delivering Sustainable Production Systems, Controlling Weeds, Pests and Diseases, Managing Catchments and Coasts, and Nurturing Vibrant and Low Carbon Communities.

The James Hutton Institute operates commercial subsidiaries. Macaulay Scientific Consulting (MSC) Ltd. is a leading environmental consultancy centre offering unparalleled experience in soil and water consultancy, and land evaluation. Mylnefield Research Services (MRS) Ltd. undertakes contract research, especially plant breeding, licenses plant varieties internationally and delivers analytical services.

By operating in partnership with people, organisations and governments, our work enhances sustainable environmental, social and economic development, delivering practical solutions for our shared future and influencing the agenda for land use and development for the 21st Century.
Scotland’s Rural College (SRUC)

Contact Details:

Mark Ballingall, Senior Weed Consultant, The Applied Practice Team  
SRUC, Sandpiper House, Ruthvenfield Road, Inveralmond Industrial Estate, Perth PH1 3EE  
Email: mark.ballingall@sruc.co.uk

Scotland’s Rural College (SRUC): Leading the way in Agriculture and Rural Research, Education and Consultancy.

Scotland’s Rural College supports innovation and sustainable development in agriculture and the rural sector in Britain and internationally. We are one of the UK’s leading agriculturally-focused higher education institutions, offering a unique blend of research, education and consultancy.

SRUC’s research and education activities operate from six campuses and eight farms and research centres across Scotland. Our consultancy arm, SAC Consulting, supports more than 12,000 farms and rural businesses across the UK from 25 consultancy offices and eight veterinary disease surveillance centres.

Our research focuses on rural, environmental and land-based activity and underpins our education and consultancy. Our work addresses health and productivity in animals, animal welfare and crops, promotes low carbon farming and increases farm output through efficiency and innovation.

As a Further and Higher Education institution we offer land-based courses at all levels – from access courses and vocational studies, through undergraduate programmes covering HNC, HND and undergraduate degree courses, to taught postgraduate programmes and PhDs. We support students in progressing to a level that suits them – and the industries in need of their skills. Within six months of completing their course, 95% of our graduates are in work or are continuing in full-time education.

With consultants, vets and specialists stationed across the length and breadth of Scotland, as well as the North of England, SAC Consulting offers a wealth of local knowledge and expertise. Our services cover all aspects of rural enterprise; from agronomy, livestock and dairy services to disease surveillance, farm animal diagnostics and environmental consultancy. Our own dedicated UKAS-accredited analytical facilities provide a seamless service from field to lab.

SRUC was established in 2012 through the merger of Barony, Elmwood, Oatridge Colleges and the Scottish Agricultural College (SAC).
As the Society moves closer to its 100th birthday, one of its principal roles of knowledge transfer from research to practical farming, processing and consumption, has never been more important. This was a major obligation placed on the Society at the time of its establishment to run the Scottish Plant Breeding Station early in the 20th century and has certainly not been diminished over the intervening years.

However, more and more, those investigating fundamental problems in agriculture, horticulture and arboriculture are required to demonstrate value for the investment. One of the most effective ways of showing this is through events such as Cereals in Practice, Potatoes in Practice and Fruit for the Future, in which both the Society and the James Hutton Institute, with which it is closely linked, play a major role in organising. The success of such events can best be measured by the steady increase in the numbers attending, especially over the past five years.

The involvement of other organisations, including SRUC and commercial companies, and the opportunity to also demonstrate practical products such as machinery, chemicals and composts, has added greatly to the value of these events. This has also been matched by an increase in the Society’s membership which is higher than it has ever been. There are few other events, even today, where those attending can see such a range of science, from very fundamental studies on genotypes, through to the best methods for growing crops to achieve maximum output and quality.

If one adds to this the Society’s support for new areas of research, and assistance to young scientists seeking to build their career, the overall package of the Society’s activities is one in which the Society’s forebears at the time of its foundation back in 1921, would have taken great satisfaction.
Field Demonstrations

Plot 1

Soil - Where the other half lives

Contact details:
Willie Towers, Blair Mackenzie
The James Hutton Institute, Aberdeen AB15 8QH, Dundee DD2 5DA
Email: willie.towers@hutton.ac.uk, blair.mackenzie@hutton.ac.uk

Half the cereal plant (i.e. the roots) remain hidden in the soil. It is this “hidden half” that supplies the water and nutrients essential for productive crops. Hence we need to understand the soil environment that supports the root system and realise that, if not properly cared for, the soil may limit plant growth. A pit, exposing a full soil profile, will be used to explain features of the soil relevant to root growth and crop production. Features of soil structure; including aggregate size and shape and pore types such as biopores and other macropores will be featured. A full profile pit also exposes features, such as impeded drainage, that are missed if only the surface plough layer is exposed.

Plot 2

Disease resistance breeding in Winter Barley

Contact details:
Adrian Newton, Mark Loosely
The James Hutton Institute, Dundee DD2 5DA
Email: adrian.newton@hutton.ac.uk, mark.looseley@hutton.ac.uk

We have identified, mapped and developed new markers for Rhynchosporium resistance in both elite germplasm and primitive sources. Some control symptoms, another controls pathogen growth on barley. By characterising Rhynchosporium early infection in these resistance lines microscopically using fluorescent marked pathogen isolates, we know that they have different modes of action and therefore likely to combine in a robust, effective way. These are now in advanced lines and later will be combined into new resistant breeding lines more likely to prove durable than current single resistance genes. We are also trying to determine how important it is to control infection by pathogens where no symptoms are expressed by determining the efficacy of T0 sprays with different varieties. This work is all part of our TSB project ‘SIBLINGS’ with DuPont, KWS-UK and University of Hertfordshire.
**Plot 3**

**Winter Wheat Nitrogen Response – Yara Vita Trial**

SRUC, West Mains Road, Edinburgh EH9 3JG

**Plot 4**

**Fungicide Efficacy Trials**

Contact Details:

Fiona Burnett  
Crop and Soils Systems Group, SRUC, West Mains Road, Edinburgh EH9 3JG  
Email: fiona.burnett@sruc.ac.uk

Disease pressure in 2014 has been extremely high, following a mild winter. Wet and splashy weather over key growth stages this spring has further increased disease spread and some fungicide programmes have struggled to contain this which reflects the situation in commercial crops. Barley trials at the site examine the strategies that will best manage the key diseases. Come to see if early T0 fungicides and the use of higher rates and more complex mixes have helped to manage Rhynchosporium, Mildew and Ramularia. Can we manage the difficult trick of protecting against Ramularia and also protecting the ear from Fusariums and sooty moulds? Fungicide resistance threatens the efficacy of several active ingredients – what are the alternatives and how can we best steward products? The trials at the site examine this and other key questions. Compare the efficacy of fungicides to the control seen in more resistant varieties and where we have used alternatives such as elicitor products.

In the wheat trials Septoria levels are very high and we will be demonstrating a trial that looks at products and doses at T1 and T2. Perhaps you couldn’t get hold of your first choice of fungicide this year and applied alternatives; see how the newer fungicides have performed and compare this to the activity of the azole fungicides. Crop potential this year is good with forward well-developed wheat crops but varietal resistance to Septoria in current varieties is only moderate. Our reliance on fungicides this season to deliver this good crop potential is very evident at the site.
Wheat is the dominant cereal worldwide but selection has generally been for bread-making quality and hence higher protein levels. Distillers use well over 0.5 million tonnes of wheat per annum in grain whisky production where they want maximum alcohol yield and minimum processing problems. We have been conducting a series of trials over harvest 2012 and 2013 to examine the partitioning of nitrogen in the winter wheat crop and its relationship to biomass production and overall grain yield. We have studied these parameters on a panel of over 150 different wheat varieties representing different European production areas. Here we are demonstrating the breeding progress from older landrace varieties such as Rouge de Bordeaux through varieties such as Capelle Desprez, Maris Huntsman, Riband and Consort to Viscount and KWS Santiago. There has been a clear increase in yield over this time period and this can be seen across three different nitrogen levels although the response is greatest at the highest level of available N.

There has been no observable change in total biomass production over time amongst the wheat cultivars that we have studied but there has been an increase in harvest index, i.e. more of the total biomass produced in the crop is converted into grain. This is again most pronounced at the highest fertiliser level. Considering the differences in nitrogen uptake and partitioning within the plant, we cannot detect any significant trends with time but this may reflect the different markets amongst the panel of wheat lines that we studied.
Plot 6

**Winter Wheat varieties: HGCA Recommended List (Summary)**

**Contact Details:**

**Dr Steve Hoad**  
SRUC, West Mains Road, Edinburgh EH9 3JG  
Email: steve.hoad@sruc.ac.uk

HGCA added 10 new wheat varieties to its 2013/14 Recommended Lists.

The most promising varieties for Scottish growers are the high yielding soft Group 4’s. Leeds and Myriad, are both are recommended for distilling in 2014. For sowing this autumn, the market leaders for soft distilling wheats remain Viscount, Horatio and Beluga. The new high yielding variety Twister is worth a look in 2014 as a potential distiller. Soft biscuit varieties, with distilling quality, are Invicta and Tuxedo, (now outclassed), and the new varieties Icon and Zulu are worth a look in this market.

At present the variety Skyfall is the only new milling variety that has done well in HGCA RL trials in the North in 2014. There are no new hard feed varieties with SRUC recommendation for Scottish growers in 2014, although promising varieties Evolution and KWS Kielder and Santiago are under test at Cereals in Practice.

Plot 7

**QuOats**

**Contact Details:**

**Derek Stewart, Sandy Cowan (IBERS), Irene Griffiths (IBERS)**  
The James Hutton Institute, Dundee DD2 5DA  
Email: derek.stewart@hutton.ac.uk; syc@aber.ac.uk; igg@aber.ac.uk

This five year (14 September 2009 - 13 September 2014) LINK research project (LK09124) will develop and apply state-of-the-art genomic and metabolomic tools for oat genetic improvement. Its focus is on the understanding and manipulation of key traits that will enhance the value of oats in human health improvement, capitalise on the value of oats as a low input cereal, increase the environmental and economic sustainability of cereal based rotations, realise the potential of oats as a high value animal feed and develop new opportunities for using oats through advanced fractionation.

It comprises four work packages, with the first of these developing the powerful enabling technologies for the identification of specific genes and markers to drive the development of
breeder-friendly tools accelerating the production of improved oat varieties that will be marketed by industrial partners. This underpins three further work packages focussing on: developing oats for human consumption and utilising high throughput chemical techniques to quantify grain composition; the development of oats for ruminant feed and how these can be developed to provide sustainable high quality feedstuff with low environmental footprint; oat agronomy including identification of traits associated with nitrogen use efficiency of oats enabling breeding of oat varieties better able to use nitrogen and further minimise their environmental footprint.

This multi-disciplinary programme which combines modern high throughput phenotyping methodologies with the expertise of genomics researchers, oat breeders and end-users, will also address long term breeding goals by developing experimental populations which are polymorphic for agronomically important traits but more amenable to mapping and forward genetic approaches than conventional agronomic lines.

Here we are demonstrating some contemporary winter and spring oat varieties from the IBERS breeding programme. For more information see www.quoats.org

Plot 8

Spring Barley Varieties

Contact Details:

Dr Steve Hoad
SRUC, West Mains Road, Edinburgh EH9 3JG
Email: steve.hoad@sruc.ac.uk

Concerto is the clear market leader for malt distilling in Scotland, supported by Optic, Belgravia and Propino. The Institute of Brewing and Distilling (IBD) has promoted Moonshine and Odyssey to full Approval for malt distilling use, whilst Overture and Glassel have Provisional Approval. Sanette is a brewing variety that may also interest feed growers with its very high yield. Waggon and Westminster, (now outclassed) continue to be the preferred feed options, with some interest also in the new variety Shada. Shada is relatively short with good Mildew resistance and average for Rhyncosporium.

Twelve candidates are being evaluated for malting potential, though at this this stage very few appear to have clear improvements over the current market leaders.
**Plot 9**

**Super Sixes - Improving Six Row Barley**

**Contact Details:**

Hazel Bull, Bill Thomas  
The James Hutton Institute, Dundee DD2 5DA  
Email: hazel.bull@hutton.ac.uk; bill.thomas@hutton.ac.uk

Six row barley is not widely grown in Scotland and the UK and is regarded solely as a feed crop. Results from a series of trials at different nitrogen management regimes show that the six rows generally yield better under lower nitrogen inputs but that the two rows perform better with high nitrogen management to promote the development of a crop with a large number of fertile ears/m². Six row types are also preferred under harsher environments where tillering and hence yield in two row types is restricted. The six row ear type found in current commercial cultivars is controlled by two different six row genes. Each can confer a six row head but the development of the lateral grain is restricted when just the one gene is present. The addition of the second gene improves lateral floret fertility and grain development therein. There remains a problem over the uniformity of six row grain even with both genes present and this is one of the main reasons why the crop has not been adopted by maltsters for use in brewing and distilling for many markets. We are investigating the effect of adding a third gene controlling six row head type to current six rows to determine if we can make further improvements in lateral grain development and hence produce a more uniform sample. Here we are demonstrating the effect of adding different alleles at the third locus to a typical North American two row feed barley – Bowman – and comparing them to a Scottish six row landrace – Scots Bere.

**Plot 10**

**Spring Barley WP Fungicide Trial (RESAS Funded)**

**Contact Details:**

Dr Neil Havis  
SRUC, West Mains Road, Edinburgh EH9 3JG  
Email: neil.havis@sruc.ac.uk

This work package trial is looking into various methods of protecting spring barley from serious disease problems. The trial is divided between two spring barley varieties Optic and Overture. Both are approved for malting.  
- Optic is susceptible to Mildew, Rhynchosporium and Ramularia  
- Overture is resistant to Mildew and moderately resistant to Rhynchosporium and Ramularia
The first aim of this trial is to examine the effect of resistance elicitors in a disease control programme on the crop. The elicitors induce the plants’ natural defences. In previous years, the elicitors have performed well in controlling disease when used early and in conjunction with reduced rate fungicides. Last year showed the devastating effects of Fusarium and Microdochium on barley crops. Sprays at GS 45-49 proved too early to give any ear protection and late season sprays (post flowering) also proved relatively ineffective. This trial is examining the performance of a compromise spray timing (GS 53-55) in controlling Ramularia Leaf Spot and protecting the ear.

**Plot 11**

**Improving Malt Processability**

**Contact Details:**

Stuart Swanston, Bill Thomas  
The James Hutton Institute, Dundee DD2 5DA  
Email: stuart.swanston@hutton.ac.uk; bill.thomas@hutton.ac.uk

Whilst many barley varieties produce good levels of hot water extract, few of these are taken up by the malting industry on a large scale. There are a number of factors behind this, amongst which is the ease with which a malting lot of a variety passes through malting, brewing and/or distilling, a factor termed processability. Processability problems are very often not detected until the later stages of testing when different larger scale lots are evaluated and sometimes can only become apparent once varieties are grown in more diverse environments. We have obtained funding from the BBSRC Crop Improvement Research Club to study malt processability by growing panels of winter and spring barley varieties under low and high nitrogen regimes and then micro-malting each sample but also adding in an analytical test developed by Camden BRi. Results so far highlight varieties that are more prone to accumulate nitrogen in the grain.

Early malting results are highlighting varieties that are in turn more sensitive to increasing grain nitrogen content in the amount of malt extract that they produce. Accepted good processing varieties such as Concerto are less sensitive to changes in grain nitrogen content and this is also reflected in the variation in the amount of beta-glucan (a cell wall component associated with viscosity issues) that it produces.
**Plot 12**

**Wild Bird and Conservation Mixtures**

**Contact Details:**

**Dr Paul Chapman**  
SRUC, Thainstone Centre, Inverurie AB51 5WU  
Email: paul.chapman@sac.co.uk

This year we have a variety of biodiversity plots containing conservation-friendly mixes. There is a wide range of conservation mixes to choose from nowadays, with some that benefit economically important insect pollinators, some that provide winter seed food and cover for declining farmland birds and some that have benefits as green manures. Some of the possible options will be demonstrated and expert advice will be on hand to explain the environmental and economic benefits of these mixes and their potential for ‘greening’ and SRDP payments.

**Plot 13**

**Novel Approaches to Weed Control in Spring Barley**

**Contact Details:**

**Mark Ballingall, Senior Weed Consultant, The Applied Practice Team**  
SRUC, Sandpiper House, Ruthvenfield Road, Inveralmond Industrial Estate, Perth PH1 3EE  
Email: mark.ballingall@sruc.co.uk

Many growers are seeing annual meadow grass as a key weed to control in spring barley especially for growers who have converted to minimal tillage. While not overly competitive annual meadow can present problems at harvest where it can hold moisture at the base of the crop increasing the time for the straw to dry out. This is more of a problem in a wet harvest. SRUC was instrumental in applying for the EAMU for the use of Defy (prosulfocarb) and Liberator, (diflufenican + flufenacet) for use in spring barley to control annual meadow grass and of course a range of other weeds too. Now there are a range of other products to control annual meadow grass in the crop, largely EAMUs. The problem is, can they be relied upon to control all the key weeds in spring barley, as well an annual meadow grass? Some products which control annual meadow grass have gaps in their weed spectrum. Find out which are most cost effective at Cereals in Practice. While annual meadow grass may not be the target weed on many farms the mix of annual broad leaved weeds can vary from farm to farm. At Cereals in Practice many different and novel herbicide options are demonstrated.
Winter barley varieties (SRUC Summary) (Not demonstrated)

Yield improvements the two-row feed varieties such as Retriever, KWS Cassia and KWS Glacier have been encouraging, though less progress has been made with new six rows. The best option for six row feed is the hybrid Volume, or non-hybrids KWS Meridian and Escadre. Two new entrants to the Scottish RL list include the two row varieties Cavalier and KWS Tower. Both have much agronomics although Tower has slightly better Rhynchosporium resistance.

Pearl, Cassata and SY Venture have IBD’s Full Approval for brewing.
Additional Exhibitors

HGCA

Contact Details:
General enquiries, HGCA, Agriculture and Horticulture Development Board, Stoneleigh Park, Kenilworth, Warwickshire CV8 2TL

Email: admin@hgca.ahdb.org.uk
Tel: 0247 647 8730

Neogen Europe Ltd.

Contact Details:
Michelle Goldie

Email: m.goldie@neogeneurope.com
Tel: +44(0) 1292 525 662
Fax: +44(0) 1292 525 603

Neogen Europe is a global leader in the development, manufacture and supply of diagnostic products to detect a wide range of important viral, bacterial and fungal plant pathogens, with specialist knowledge in cereal and potato pathogens. Our products are available in a range of formats to meet the needs of researchers, inspectors, farmers and growers; our lateral flow tests offer simple, rapid identification of a range of diseases and are developed in conjunction with growers and researchers worldwide. We now supply and support users of our products in over 90 countries with our complete range of solutions to detect more than 150 plant pathogens.

SASA (Science and Advice for Scottish Agriculture)

Contact Details:
SASA, Roddinglaw Road, Edinburgh EH12 9FJ

Email: info@sasa.gsi.gov.uk
Tel: +44(0) 131 244 8890
Fax: +44(0) 131 244 8940
Acknowledgements

Principal organisers

The James Hutton Institute

Sharon Neilson (Events Co-ordinator)
Bill Thomas (Research Scientist)
Adrian Newton (Research Scientist)
Stuart Swanston (Research Scientist)

SRUC

Mark Ballingall (Senior Weeds Consultant)
Neil Graham (Trials Officer)

The organisers would like to thank Neogen Europe Ltd. for providing the whisky for the registration prize draw and SSCR for providing the whisky for the feedback prize draw.

A special thank you goes to Mr Kerr Currie, Burnside Farm for providing the site for this year’s event.

DISCLAIMER

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