



Cereals in Practice

Thursday 2 July 2015

2.45pm – 7.30pm

Event Guide

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Welcome to Cereals in Practice 2015

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.

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.

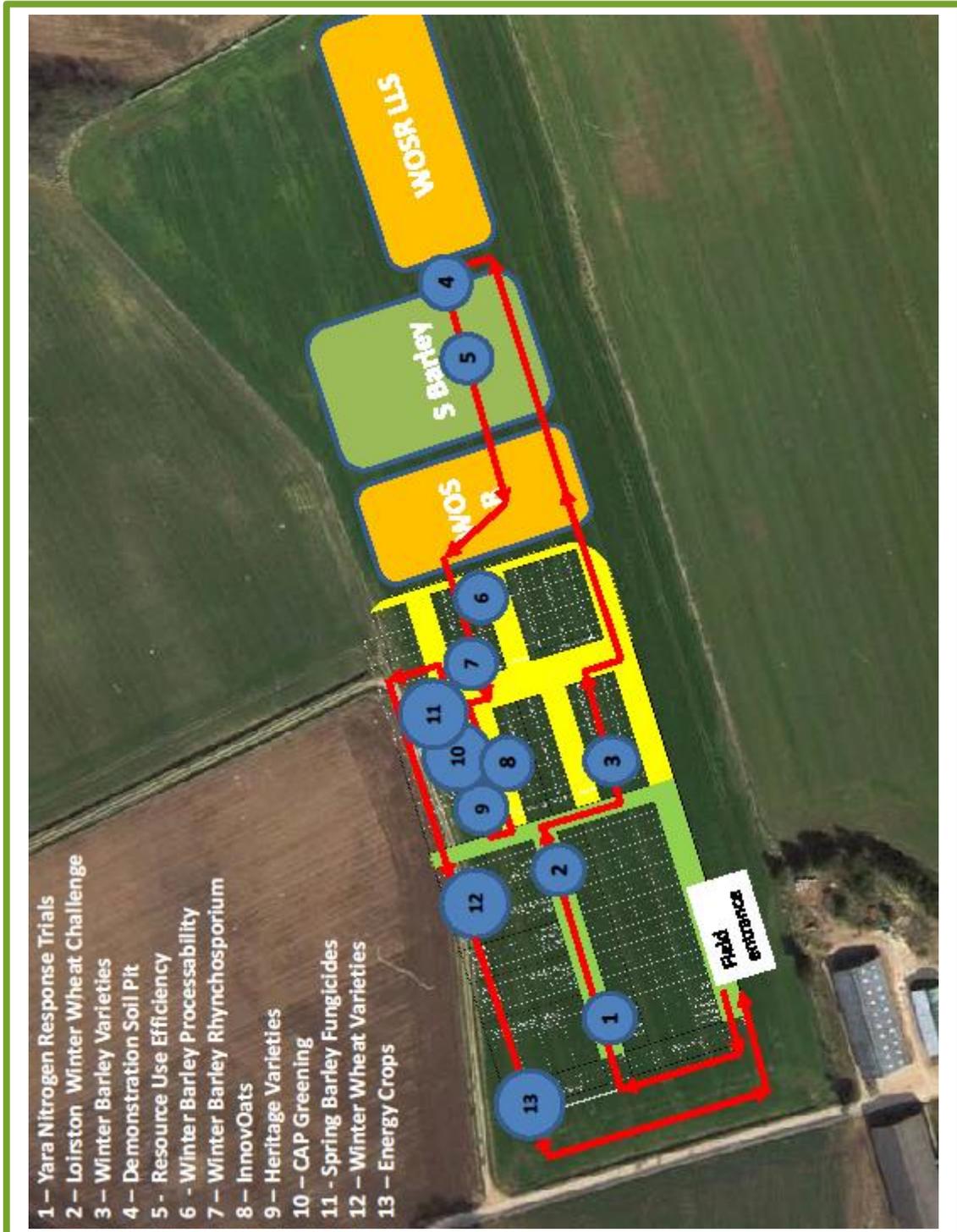
Please note that many of the demonstrations and plots on show today are research in progress.

Programme

- 2.45pm **First briefing and introductory talk**
Gavin Dick of HGCA and Scott Campbell of I & N Campbell
- 3.00pm **First complete guided field tour (tours take 60-90 minutes)**
This is a whistle stop tour of 13 plots and attendees are encouraged to join a tour then visit the plots later for a more in-depth chat if required
- 4.45pm **Second briefing and introductory talk**
Gavin Dick and Scott Campbell
- 5.00pm **Second complete guided field tour (tours take 60-90 minutes)**
This is a whistle stop tour of 13 plots and attendees are encouraged to join a tour then visit the plots later for a more in-depth chat if required
- 7.30pm **SSCR Whisky prize draw for pre-registrations and completed feedback forms**
Event closes

Catering will be available free of charge throughout the event and attendees are welcome to visit the indoor exhibits etc. in between field tours.

Site Plan



The James Hutton Institute

Contact Details:

Communications

The James Hutton Institute, Dundee DD2 5DA

Email: **events@hutton.ac.uk**

Tel: +44(0) 844 928 5428

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 approximately 550 and almost 150 PhD students, operating over two main campuses, Aberdeen and Dundee, and four research farms; Glensaugh, Balruddery, Mylnfield and Hartwood. We work collaboratively and in partnership with a number of Scottish and overseas universities.

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 a commercial subsidiary, James Hutton Limited, which commercialises the scientific expertise, intellectual property, facilities and resources of the James Hutton Institute. JHL offers commercial customers a comprehensive range of analytical, research and development, breeding, and consultancy services. JHL was formed through a merger of Mylnfield Research Services Ltd and Macaulay Scientific Consulting Ltd.

By operating in partnership with people, organisations and governments, our work enhances sustainable environmental, social and economic development, delivers practical solutions, and influences the agenda for land-use and development.

Scotland's Rural College (SRUC)

Contact Details:

Tel: +44 (0) 131 535 4000

Web: www.sruc.ac.uk

Scotland's Rural College (SRUC) 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. We work collaboratively and in partnership with several research and higher education institutes in the UK and in 2014, agricultural and veterinary research at SRUC and the University of Edinburgh was ranked as most powerful in the UK in the Research Excellence Framework (REF) results.

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 Crop & Soil Systems research group carries out research to underpin the development of resilient and sustainable systems of crop production that are economically viable, but also environmentally and socially acceptable. Soils are the fundamental base of all future production, hence our interest in rotations, organic matter and nutrient cycling. Our work in crop genetics and breeding considers not only increasing yields of some of our key crops, but also assesses new ways to protect the health of our plants. Managing pests and diseases makes farming more efficient and sustainable, so that more food can be produced on smaller areas of land.

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. Within six months of completing their course, 95% of our graduates are in work or are continuing in full-time education.

SAC Consulting offers a wealth of local knowledge and expertise covering 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.

Scottish Society for Crop Research (SSCR)

Contact Details:

Dr Bill Macfarlane Smith, Committee Secretary

Email: Bill.MacfarlaneSmith@hutton.ac.uk

Tel: +44 (0) 844 928 5428

Web: sscr.hutton.ac.uk

As the Society moves closer to its 100th birthday, one of its principal roles, that 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 Trials and Demonstrations

Yara Nitrogen Response Trial

Plot 1

Contact details:

Elaine Nicol; Jez Wardman

Email: elaine.nicol@yara.com; jez.wardman@yara.com

Yara are repeating nitrogen response work to confirm the optimum nitrogen rates on winter wheat under local conditions.

Many similar nitrogen response studies have been conducted over the years and tend to give varying results with optimum nitrogen rates varying from 150-290 kg N /ha in trials conducted 2013-2014. Understanding the underlying reasons for this variation often depends on soil conditions and the plants' ability to take up and utilise the available nitrogen efficiently which is difficult to both measure and predict based on soil measurements.

These trials will demonstrate that by monitoring the crop using tools such as the Yara N-Tester, it is possible to adjust the nitrogen application rate based on the crops requirement and so apply the optimum nitrogen rate for the conditions.

Mains of Loirston Winter Wheat Challenge

Plot 2

Contact details:

Alex Hilton, Lecturer in Crop Production

SRUC, Ferguson Building, Craibstone Estate, Aberdeen AB21 9YA

Email: alex.hilton@sruc.ac.uk; scott.murray@sruc.ac.uk

The Mains of Loirston Winter Wheat Challenge is a competition where the farmers and advisers of the future pit their wits against each other to achieve the crop with the highest gross margin. Teams from SRUC's campuses at Aberdeen, Edinburgh, Oatridge and Barony are represented. The field trials team at SRUC grow field plots under instruction from the teams. Decisions that have to be made include: variety, seed rate, fertiliser, and disease and weed control. Trials are replicated at three sites, including Fife, Edinburgh and here at Cereals in Practice.

At harvest, each plot is yielded and WN Lindsay then offer a price for the crop based on its quality.

Last year's winner, from Barony, successfully grew a crop of Cordiale and achieved a premium for obtaining milling quality. Who will win this year's challenge?

Help us by scoring the plots and see if you can identify this year's winner.

Winter Barley Varieties

Plot 3

Contact details:

Steve Hoad, Team Leader, Agronomy, Physiology & Genetics

SRUC, Crop & Soil Systems, Kings Building, West Mains Road, Edinburgh EH9 3JG

Email: steve.hoad@sruc.ac.uk

No soil, no cereals

Plot 4

Contact details:

Willie Towers; Blair McKenzie

James Hutton Institute, Aberdeen AB15 8QH; Dundee DD2 5DA

Email: willie.towers@hutton.ac.uk; blair.mckenzie@hutton.ac.uk

Soil is fundamental to the production of all agricultural crops and key features of the soil for plant growth are texture, carbon content, structure, stoniness, porosity and natural drainage. These vary with depth and although the surface horizon is most important, it is influenced by subsoil conditions. Other properties, such as pH and nutrient concentrations, can be manipulated but their efficiency is affected by these more intrinsic properties.

2015 is the International Year of Soils, designated by the UN through its Food and Agriculture Organisation arm, and Cereals in Practice is one of a number of events in which the value and uniqueness of Scottish Soils are being celebrated.

Nitrogen Use Efficiency

Plot 5

Contact details:

Ian Bingham, Senior Researcher in Crop Physiology

SRUC, Crop & Soil Systems Research, Kings Buildings, West Mains Road, Edinburgh EH9 3JG

Email: ian.bingham@sruc.ac.uk

A major goal for agriculture is to increase the nutrient use efficiency of arable crop production. One approach to this is to develop more efficient varieties. SRUC is carrying out Scottish Government funded research to identify those traits associated with high nitrogen use efficiency (NUE) of spring barley. Our research has shown that breeding over the last 75+ years has increased NUE. Modern varieties are able to produce higher grain yields for a given amount of N taken up. Under some conditions they are also more efficient in their capture of available N. More recently we have been investigating what controls N uptake after flowering. Results suggest that it is controlled by the availability of soil mineral N at flowering and not the demand of the grain. This is the case for both old and modern varieties, even though they differ in yield and grain N concentration. Our attention is now turning to the efficiency of N uptake before flowering as improvements here could lead to reductions in crop fertilizer requirement.

Improving Malt Processability

Plot 6

Contact Details:

Bill Thomas

The James Hutton Institute, Dundee DD2 5DA

Email: bill.thomas@hutton.ac.uk; luke.ramsay@hutton.ac.uk

2015 is the 50th anniversary of the first recommendation of Maris Otter as a winter malting barley. Whilst this variety was not well suited for growing in Scotland, it became the dominant malting variety in England and Wales and is still bought in significant amounts by maltsters (according to MAGB figures, it accounted for almost 3% of the total UK malting barley purchases from harvest 2014). It is well liked by craft brewers because it presents few processing problems

in the brewhouse whereas some newer varieties are associated with filtration problems. Results from a project funded by the BBSRC Crop Improvement are showing marked differences in the sensitivity of malting quality to increased grain nitrogen content with some still giving good levels of malt extract at higher nitrogen levels, suggesting that they might also be good processing varieties.

We are further testing this within the same project by sub-contracting Campden BRi to conduct a mash filtration test on the malt samples that have been generated to mimic the filtration of the wort in the brewhouse. Results so far suggest that this characteristic is independent of malt extract and is also sensitive to increasing nitrogen content with some varieties retaining good filtration characteristics at higher nitrogen contents. Further data is being gathered from the 2014 harvest with the aim of providing a reliable means to identify better processing varieties for use in malting, brewing and distilling.

Disease Resistance Breeding in Winter Barley Plot 7

Contact details:

Mark Looseley; Adrian Newton

The James Hutton Institute, Dundee DD2 5DA

Email: **Mark.Looseley@hutton.ac.uk; Adrian.Newton@hutton.ac.uk**

Using both elite germplasm and primitive sources we have identified, mapped and developed new markers for *Rhynchosporium* resistance in winter barley. Some control symptoms, another controls pathogen growth on barley. Using fluorescent marked pathogen isolates and microscopy we can characterise *Rhynchosporium* early infection in these resistance lines to ensure that they combine resistance with different modes of action and therefore likely to remain effective way, i.e. durable. These are now in advanced lines and later will be combined into new resistant breeding lines. 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, Agrii, KWS and University of Hertfordshire.

InnovOat:

Plot 8

Developing enhanced breeding methodologies for oats for human health and nutrition

Contact Details:

Athole Marshall (IBERS); Derek Stewart (Hutton); Sandy Cowan (IBERS); Irene Griffiths (IBERS)

The James Hutton Institute, Dundee DD2 5DA

Email: **thm@aber.ac.uk; derek.stewart@hutton.ac.uk; syc@aber.ac.uk; igg@aber.ac.uk**

InnovOat is a five year (September 2014 - September 2019) project funded through the BBSRC LINK scheme. It is led by Aberystwyth University with partners NIAB, Heriot Watt University, Senova and the BOBMA research group. The aims are to use modern breeding technologies to capture and enhance the proven health benefits of oats in new oat varieties.

The project will develop and apply state-of-the-art genomic and metabolomic tools for oat genetic improvement. Its primary focus is on the understanding and manipulation of key traits that will enhance the value of oats in human health improvement. It will develop new varieties which will enhance health benefits whilst capitalising on the value of oats as a low input cereal, and increase the environmental and economic sustainability of cereal based rotations.

It comprises six work packages (WP). The first three WP are developing the powerful enabling technologies dealing with genetics, genomics and their application to different breeding schemes. This also includes the development of specific populations to test these methods and provide accurate phenotypic data. WP4 includes the metabolite characterisation of various components of oat grains and their relevance to human health and nutrition. WP5 integrates the previous work packages into the breeding programmes and WP6 deals with dissemination of the results.

This multi-disciplinary programme which combines modern genetic and phenotypic methodologies with the expertise of 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.

For more information please visit the following website InnovOat: www.innov oat.uk

Here we are demonstrating some contemporary winter and spring oat varieties from the IBERS breeding programme.

Exploiting 'heritage barley' collections

Plot 9

Contact Details:

Joanne Russell; Luke Ramsay; Tim George

James Hutton Institute, Dundee DD2 5DA

Email: **joanne.russell@hutton.ac.uk; luke.ramsay@hutton.ac.uk;
tim.george@hutton.ac.uk**

With the yield of barley stagnating across Europe, researchers are returning to the importance of old cultivars and wild relatives as sources of beneficial variation to ensure the future efficiency of agriculture under a changing climate and limited resources. Large seed collections are available globally for barley and we have focussed on old cultivars that have been collected from the UK, grown for a hundred years or so, surviving both changes in climate and agricultural practice. The collection, known as 'heritage barleys', includes accessions from the 1800s from England, Ireland, Wales and Scotland, many of which are the cornerstones of modern UK cultivars. These 140 accessions have been scored for yield, earliness, quality and nutrient efficiency traits under field conditions over several years and compared to current elite lines to identify novel variation. To exploit this potentially useful variation, we are using a targeted introgression programme in collaboration with UK barley breeders at KWS. This strategy emphasises the importance of connecting old cultivar collections (maintained by genebanks) to state of the art gene discovery to phenotyping and, ultimately, targeted breeding approaches providing resources for our future needs.

CAP Greening

Plot 10

Contact Details:

Paul Chapman, Conservation Consultant

SRUC, Thainstone Agricultural Centre, Inverurie AB51 5WU

Email: **paul.chapman@sac.ac.uk**

Recent changes to the CAP (Common Agricultural Policy) have introduced a

number of Greening measures. Farmers are required to undertake these in order to receive their full BPS (Basic Payment Scheme) payment. The greening component of this payment will be made to businesses “for agricultural practices beneficial for the climate and environment”. Organic farmers, and farmers that have mainly grassland with little arable (>75% grass and <30ha arable), are exempt from greening requirements. For all other farmers, greening requirements are mandatory and relevant requirements must be met.

There are three main themes within the Greening measures that can be summarised as follows:

1. **Permanent Grassland Requirement** which requires retention of permanent grassland at National level, but not at farm level. Environmentally Sensitive Grassland Areas must not be converted at farm level.
2. **Crop Diversification Requirement** which, with some exceptions, dictates how many crops must be grown. If a farm business has between 10-30ha of arable land it must grow at least two crops (with the main crop area not exceeding 75% of the arable land), whereas if a farm business >30ha arable land, it must grow at least three crops (with the main crop not exceeding 75%, and the two main crops not exceeding 95%, of arable land). For the purposes of greening, winter and spring crops (i.e. winter barley and spring barley), temporary grass, and fallow land all count as different crop types.
3. **Ecological Focus Areas (EFA)** which is an area of at least 5% of the arable land, (as an equivalent – different EFA types have different weightings), must be managed as an EFA. This may include: areas of fallow (no production); buffer strips along water courses; field margins with no agricultural production; catch crops; green cover; N fixing crops; or any combination of these.

The CiP demonstrations include a range of crops that fit in the catch crops, green cover crops, and N fixing crop categories.

Spring Barley WP Fungicide Trial (RESAS Funded) Plot 11

Contact Details:

Dr Neil Havis

SRUC, West Mains Road, Edinburgh EH9 3JG

Email: neil.havis@sruc.ac.uk

This trial looks at integrated pest management in spring barley. This involves a combination of varietal resistance, effective and appropriate doses of fungicide, and alternative treatments to conventional pesticides. Responding to risk warnings – such as the one we have developed for *Ramularia* - are part of an IPM approach, as is the careful stewardship of fungicides to guard against resistance.

The trial is divided between two spring barley varieties - Concerto and Prestige. Both are approved for malting but both are susceptible to *Rhynchosporium* and *Ramularia* – look for varieties with better resistance in the variety demonstration and use this to manage future risk. This trial compares different approaches, including the use of the multi-site fungicide chlorothalonil which fits well into an anti-resistance strategy.

Winter Wheat Varieties

Plot 12

Contact Details:

Steve Hoad, Team Leader, Agronomy, Physiology & Genetics

SRUC, Crop & Soil Systems, Kings Building, West Mains Road, Edinburgh EH9 3JG

Email: steve.hoad@sruc.ac.uk

Energy Crop Trials

Plot 13

Contact Details:

David Lawson, Grassland Agronomist, Crop & Soils

SRUC Research, 1st Floor Sandpiper House, Ruthvenfield Road, Inveralmond Industrial Estate, Perth PH1 3EE

Email: David.Lawson@sruc.ac.uk

Agricultural crops are being used increasingly as feedstocks for renewable energy

generation; primarily by anaerobic digestion. In England, whole crop maize is being used. However, in Scotland winter rye and fodder beet appear to be more suitable but more information is needed on the most suitable crops for Scottish conditions, and particularly on those crops that will produce adequate biomass on more marginal soils.

To this end, SRUC is carrying out Scottish Government-funded trials on cereals and herbage crops most suitable for a variety of Scottish conditions. Crops such as Triticale, winter rye and oats, along with lucerne and pasture grasses, have been established at six sites from Dumfries to Skye, and including Kirkton of Kinellar.

The crops will be harvested, and methane potential measured, so that an energy value for each crop at each location will be obtained.

Non-Demo Plots and Indoor Exhibits

Winter Wheat Herbicide Matrix

Contact Details:

Mark Ballingall, Senior Weed Consultant

SRUC, The Applied Practice Team, 1st Floor Sandpiper House, Ruthvenfield Road, Inveralmond Industrial Estate, Perth PH1 3EE

Email: **mark.ballingall@sruc.co.uk**

The weather windows for the application of pre- or peri-emergence weed control options in the autumn or early winter in the North East of Scotland are fewer than areas further south. Often wheat is being drilled at the same time as harvest. Weather windows do present themselves but the soil conditions may not be ideal. Fortunately, some residual herbicides have cut-off recommendations into the new year, but the control of some weeds may be more difficult to control. The herbicide matrix looks at alternative weed control options in winter wheat at GS21, GS30 and GS 32 using existing and new herbicides.

Spring Barley Varieties

Contact Details:

Steve Hoad, Team Leader, Agronomy, Physiology & Genetics

SRUC, Crop & Soil Systems, Kings Building, West Mains Road, Edinburgh EH9 3JG

Email: **steve.hoad@sruc.ac.uk**

See handout for further information.

Barley Landraces for Marginal Land

Contact Details:

Tim George

James Hutton Institute, Dundee DD2 5DA

Email: **tim.george@hutton.ac.uk**

See handout for further information.

AHDB Cereals and Oilseeds

Contact Details:

Email: **Cereals.Admin@ahdb.org.uk**

Tel: +44 (0) 247 647 8730

Web: cereals.ahdb.org.uk

Join us at Cereals in Practice as we enter the latest chapter in the 50 year history of HGCA with a brand new name – **AHDB Cereals and Oilseeds**.

The event features a wide range of research that we support and fund, including work on soil management, fusarium head blight, fungicide performance and varietal improvement. On our stand, we will also have the latest AHDB Cereals and Oilseeds publications available to take away.

Members of the team, including our manager for Scotland, Gavin Dick, will also be on hand to discuss how our investment is bringing benefits to Scottish growers.

For further details on our messages, click on the links...

[T3 sprays and rainy days: Don't get blighted by fusarium](#)

[Going underground](#)

[Business of crop improvement](#)

Bread Matters

Contact Details:

Macbiehill Farmhouse, Lamancha, West Linton, Peeblesshire EH46 7AZ

Email: **andrew@breadmatters.com**

Tel: +44(0) 1968 660 449

Web: **www.breadmatters.com**

Andrew and Veronica from Bread Matters will be at Cereals in Practice to talk about the Scotland the Bread project. They will discuss their variety trials and new work they are looking to undertake to establish a nutritional 'base line' against which good grain, and good bread, may be assessed.

The project has already involved work with a number of academic interests in Scotland and beyond, including the James Hutton Institute, SRUC and the John Innes Centre.

Scotland the Bread

Imagine eating bread made by a local baker, from flour freshly milled near the bakery, from wheat grown by a farmer you know in fields near where you live.

Now imagine that bread is full of important nutrients and tastes great and that it doesn't bloat you or give you tummy ache or leave you feeling hungry.

What if everybody involved had been paid fairly for their work and nobody was slicing off an unfair share?

Sounds good enough to eat, doesn't it?

To help local communities bring better bread within everyone's reach, the project is supporting six groups to **grow** their own **healthy bread**, from the **soil** to the **slice**.

SoilEssentials

SASA

Acknowledgements

Principal Organisers

The James Hutton Institute

Pam Cassidy (Events Co-ordinator), Bill Thomas, Joanne Russell and Mark Looseley

SRUC / SAC Consulting

Robin Walker, Michael Coutts, Mark Ballingall, Fiona Burnett, Andy Evans and Lawrence Greig

Funders and Sponsors

The organisers would like to thank and acknowledge SSCR, RESAS and AHDB Cereals and Oilseeds for funding research and trials and SSCR for also sponsoring the event and providing the whisky for the prize draw.

A special thank you goes to Scott Campbell of I & N Campbell for providing the site for this year's event and to Country Flavours of Alford for providing the catering.



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Notes

Notes

