Field Trials and Demonstrations

Plot tour starting points are signposted and are located just outside the main marquee.

The James Hutton Institute

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The James Hutton Institute (JHI) brought together the Macaulay Land Use Research Institute and SCRI on 1 April 2011

The new organisation combines existing strengths in crops, soils and land use and environmental research, and will make major, new contributions to the understanding of key global issues, such as food, energy and environmental security, and developing and promoting effective technological and management solutions to these. We aim to develop new ways of managing interdisciplinary science groups and research themes.

The James Hutton Institute is an internationally networked organisation and operates from multiple sites, including two main ones in Scotland at Aberdeen and Dundee. It employs more than 600 scientists and support staff, making it one of the biggest research centres in the UK and the first of its type in Europe. The institute is one of the Scottish Government's main research providers in environmental, crop and food science and will have a major role in the Scottish knowledge economy.

James Hutton (1726 – 1797) was a leading figure of the Scottish Enlightenment, an eighteenth century golden age of intellectual and scientific achievements centred on Edinburgh. He is internationally regarded as the founder of modern geology and one of the first scientists to describe the Earth as a living system. His thinking on natural selection influenced Charles Darwin in developing his theory of evolution.

We have a tremendous amount to contribute both in the UK and globally, working to produce more and better food from less land, with reduced environmental impacts and fewer chemical, carbon and water inputs. We aim to make Scotland proud of us!

Impact of aerenchyma on ephemeral waterlogging tolerance in potato

Plot: 29

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Plant roots suffer from anoxia when soils become waterlogged. Thus, waterlogging negatively affects the growth and survival of most plants in agricultural systems. Plants that grow in waterlogged soils can tolerate oxygen deficiency by shifting metabolic pathways. Many plants develop aerenchyma, which are internal gas spaces that connect along organs to enable oxygen movement from shoots to roots and further on into the rhizosphere. Beyond this, the constitutive expression of aerenchyma in root tissue may allow plants to rapidly respond to ephemeral waterlogging as it happens.

Ephemeral waterlogging in Scottish agricultural fields is likely to become more prevalent under climate change scenarios which predict greater occurrence of extreme precipitation events. Previous research by us has demonstrated that *Solanum tuberosum* var *phureja (Phureja)* lines of potato have constitutive expression of aerenchyma and thus have root systems with many more permanent air filled pores, than *Solanum tubersosum* varieties which have few if any. In a glasshouse experiment we have further demonstrated that *Phureja* types were able to cope with waterlogging much more effectively than *S. tuberosum* types e.g. 62% un-stressed yield compared to 32% unstressed yield, respectively. This experiment demonstrates how effective aerenchyma are under ephemeral waterlogging in the field.

Selection in a Potato Breeding Programme

Plot: 17

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The commercial success of new cultivars is dependent on meeting quality demands of processors and supermarkets. Potato breeding research at The James Hutton Institute (JHI) continues to develop scientific breeding methods. Extensive parental stocks and unique potato germplasm within the Commonwealth Potato Collection coupled to research into selection procedures and new improved progeny testing methods has had a dramatic effect on both the quality and the effectiveness of the potato breeding programmes at JHI. The continued progress in potato breeding is dependent on the correct choice of parents and progenies and also on rapid and efficient selection procedures. The utilisation of marker assisted selection is important within potato breeding research programmes at JHI. Locating genes underlying quantitative traits such as late blight resistance and *G. pallida* resistance through their close linkage to molecular markers will have a significant impact on determining breeding strategies. New cultivars with improved disease resistance, quality attributes and yield are now released through a number of commercial companies – e.g. Greenvale AP plc. In addition, Mylnefield Research Services Ltd. (MRS) undertakes targeted breeding programmes for other companies within the UK and abroad.

The selection of material early in breeding programmes will be discussed and illustrated using unselected material and visitors will have the opportunity to assess material and apply selection within families.

Field Trials and Demonstrations

Diversity potato populations – what use are they?

Plot: 18

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Andean cultivated potatoes possess a large store of variation that has been only lightly exploited in modern European potato cultivars. The high yielding types of potato that rose to prominence in the 1800s in Europe have a parentage primarily from Chilean potatoes which were adapted since before recorded time to the particularly damp conditions of coastal southern Chile. Potatoes in their ancestral home in the central Andes face a quite different and very varied set of environmental challenges.

These challenges include drought, heat and cold and so cultivated potato from these regions may be expected to provide excellent breeding material to improve European cultivars for these traits. This display will present examples of two types of diversity populations, diploid and tetraploid, derived from Andean cultivated potato in the Commonwealth Potato Collection. Both sets were derived from CPC accessions through mass selection for early tubering in long days, and so had lost the requirement for short days before setting tubers. The populations are now being explored for useful traits, including rooting traits and the ability to perform well with less applied water. We intend to demonstrate some of the techniques available and show some of the variation in these populations.

Breeding potatoes for different uses and markets

Plot: 16

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Genetics and breeding of potatoes at The James Hutton Institute uses methods of gene discovery to identify genes required to improve the potato; and then uses efficient breeding methods to transfer these genes into potatoes to be used as parents to breed new cultivars. Desirable genes are sought in the wide range of germplasm, including accessions of the wild and cultivated potatoes of Latin America in the Commonwealth Potato Collection (CPC), and long-day-adapted *Phureja* potatoes.

The breeding of cultivars is commercially funded. The potato breeding strategy at JHI avoids the ineffective practice of intense early-generation visual selection between seedlings in a glasshouse and spaced single plants at a seed site with emphasis on progeny tests used to discard progenies before starting conventional within-progeny selection, placing selection pressure within the superior families.

Potato breeding is now entering a promising new phase. Molecular markers have been developed for selection of several important disease resistance and quality traits in potato. We are now deploying such markers within breeding programmes.

The diversity of modern potatoes and markets will be discussed and efforts to develop new varieties to meet new demands and challenges illustrated through recently produced varieties.

The effect of *Spongospora subterranea* soil inoculum levels on powdery scab

Plot: 19

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The link between soil inoculum level and powdery scab development has not been fully established. The aim of the experiments described here was to investigate the link between initial inoculum levels (spore balls) in the soil and the development of powdery scab. This study was comprised of field trials, repeated over three years, in which a range of soil inoculum levels were created. Two cultivars were compared, one susceptible to powdery scab (Agria) and one more resistant (Nicola). *In situ* monitoring of soil temperature and soil moisture were carried out to enable the interaction between inoculum and environment to be investigated.

SAC

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Syngenta herbicide trial

Plot: 26

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This 15 treatment trial has a number of objectives with treatments applied at three timings. An early post planting timing compares residual herbicides with an application at emergence. This attempts to answer the classic dilemma of do you apply the herbicide early when weather, workload and perhaps soil conditions are not ideal or wait until the last minute to get maximum persistence from the residual component and risk scorching the crop with the contact. The trial also asks the question on whether the addition of Retro improves crop safety of a residual applied at crop emergence. Retro is compared with competitive products.

Makhteshim Agan (UK) Ltd. herbicide trial

Plot: 28

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This trial aims to demonstrate the new formulation of pendimethalin (Cinder) as a mixer product with metribuzin and linuron. Cinder is a Capsulated Suspension, CS, which is a more operator and sprayer friendly formulation than the old suspension or emulsifiable concentrate formulations of pendimethalin. Pendimethalin is relatively insoluble and thus should provide an ideal partner to low rate metribuzin or linuron.

Field Trials and Demonstrations

Control of potato volunteers

Plot: 27

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Volunteer potatoes are an inevitable problem if potatoes are in the rotation and are worse in some years following a wet harvest when more potatoes go over the back of the harvester. They can be expensive to control in crops following potatoes and often survive from one potato crop to the next in the rotation. If they contaminate potato seed crops they can be expensive and time consuming to rogue out. This trial aims to demonstrate various herbicide control measures in different crops, peas, carrots, spring barley and in a fallow situation. The demonstration is carried out with Potato Council funding.

Implications of cultivar blight resistance rating changes

Plot: 24

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The changes in cultivar resistance due to new genotypes of *P. infestans* and the reduction in cultivar resistance in terms of fungicide input will be discussed.

Other topics discussed will be:

- Changes in individual varieties
- Implications for blight control in GB crops
- Relationship between cultivar resistance and blight development
- How much did and does cultivar resistance contribute to control?
- The relative contribution of cultivar resistance and fungicide product to blight control in the field

Seed Treatment Efficacy

Plot: 25

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The results from PCL funded work (R413) between SAC and Sutton Bridge Crop Storage Research (SBSCR) on seed tuber treatment and practical measures to improve seed treatment efficacy will be discussed.

A number of methods of seed tuber treatment were investigated with the aim of improving the coverage and hence the efficacy of fungicide treatment. Surface coverage, more than residue level is important for disease control. Conventional hydraulic spray applicators on roller tables were more effective than a spinning disc applicator.

Four potential ways to improve tuber coverage and residues using conventional roller table spray applied equipment will be discussed. These include:

- swapping to a more effective nozzle
- avoiding using a downward fan
- improving the configuration of spray nozzles over a roller table
- using an adjuvant in the spray solution to improve wetting and spreading.

A range of alternative methods of applying seed tuber treatments will be discussed. Cold and hot fogging gave inconsistent coverage on different surfaces of tubers. Dipping of tubers was very effective at achieving good surface coverage and an optimum dilution for the dipping solution was identified. However, there are potential drawbacks for dipping and these will be discussed.

Masstock Arable (UK) Ltd.

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Herbicide Plot

Plot: 22

This season we are continuing to looking at improving our herbicide mixes with the increased rate of Retro and the addition of a new adjuvant to see if it improves the efficacy of the chemicals.

Desiccation Plot

Plot: 23

This trial is looking at eight plots of differing methods and approaches to desiccation of the potato crop from flailing to straight Diquat applications.

Variety Specific Foliar Nutrition

Plot: 20

This season we have decided to build on what we learnt from last season when we tailored a programme to one variety. This year we are looking at four typical varieties with different characteristics we have Maris Piper, Estima, Cultra and Charlotte the results should be very interesting as we try to see how different foliar nutrition programmes can manipulate the yield and quality on different varieties.

Under the Ground Treatments

Plot: 21

This season we are continuing our work on Bield and have widened it to look at other *Bacillus* along with some novel treatments that have shown promising results elsewhere in the country. Also included in this plot is both Syngenta and Bayer's new seed treatments that are coming in the near future.

Agrico UK Ltd.

Plot: 9

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Agrico UK Ltd., in conjunction with Agrico Global, specialise in bringing forward new seed varieties, bred for table and processing markets. Agrico UK Ltd. has a proven reputation for supplying quality Scottish, English and Dutch seed and are committed to working with established and new growers to optimise consistency and quality for home and export trade.

This year we have the following varieties on display and look forward to discussing their characteristics and merits with delegates: **Ambassador, Premiere, Arsenal, Mustang, Agria, Fontane, Markies, Athlete, Elisabeth, Novella, Almera, Arizona, Madeleine, Amorosa, Manitou** and **Rudolph**. Agrico remain committed to working with our customers on a technical and marketing level to introduce and explain our existing and new varieties. We look forward to welcoming you to our demo stand which will be located in the field trial plots.

Agrinos AS

Plot: 4

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Introducing HYT (High Yield Technology) from Agrinos
In order to meet the global challenge of increasing food security and safeguarding environmental integrity, farmers need to produce much more yield from much lower inputs. Agrinos High Yield Technology provides the agronomic breakthrough needed to achieve this vital task.

HYT Efficiency - liquid concentrate of naturally occurring soil-based microbes, designed to create a complete and highly productive microbial ecosystem in the soil, restoring and enhancing the fertility of modern agricultural soils.

HYT Nutrition - organic, biologically extracted liquid amino acid solution that acts as a nutrient source for beneficial microbes and as a bio-stimulant for the plant, resulting in better uptake of nutrients, improved plant development and greater tolerance to environmental stress.

HYT Bioguard - organic, biologically extracted, micronised Chitin. This high-grade natural polymer is used by the plant to strengthen root formation and cell structure, resulting in significantly increased levels of preventative, natural, non-toxic suppression of soil-based pathogens and nematodes.

Based on over 20 years of applied research, and with a proven track record in crops grown worldwide, Agrinos High Yield Technology is delivering on its promise.

For more information, or to review UK trials, contact Neil on +44(0) 7887 743 035.

Field Trials and Demonstrations

Agrovista UK Ltd.

Plot: 1

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Agrovista are demonstrating their latest developments in several key areas of potato production.

Plot A is dedicated to crop desiccation showing various combinations of desiccant products, timings, rates and novel approaches.

Plot B is split into sections to demonstrate foliar feeds, liquid seed treatments applied at planting and also the effects of oils applied to crops through the growing season.

Branston Ltd.

Plot: 12

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This year we are pleased to launch the baker variety Safari which is seen as a replacement for Marfona and Estima in a range of situations. Noted for its moderate number of round to oval tubers and its shallow eyes, Safari also has excellent drought resistance and low nitrogen requirement. Alongside will be Lanorma, another maincrop baking variety with flatter tubers but exceptionally high common scab resistance. Lanorma is being assessed at two planting densities.

Other varieties on demonstration are the late maincrop Tabitha, together with Blue Belle and the processors Sassy and Daisy. Salad or baby varieties include Inca Bella, our own *Phureja* type, Piccolo Star, and Novella.

Plots of our baking variety Saphire are on display with or without Fence treatment. This biological plant stimulant, based on specific strains of *Bacillus subtilis* can often raise tuber number and may be of use to both seed and salad potato producers.

Among biofumigant treatments we will also be demonstrating the product Spudguard which is a mustard formulation currently being evaluated for its efficacy against potato cyst nematode.

Staff from our seed and agronomy teams will be available to assist with any enquiries.

Caithness Potatoes Ltd.

Plot: 7

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Divaa (CA 99-1) - 2nd Early: good fry colour, medium to high DM, bright skin white flesh and good flavour, suitable for pre-pack and chipping markets. Seed availability - limited.

Sunrise - 2nd Early/Early Maincrop: part-coloured, large baker content and good flavour, cream flesh, medium to high DM, good drought resistance. Seed availability - good.

166 HVN - 2nd Early: high yields of attractive round oval tubers, aimed at the Estima Melody section of the Pre-Pack market. Seed availability - very limited.

Harmony - 2nd Early/Early Maincrop: high yields, high baker content, easy to grow with good storage qualities. Seed availability - good.

Valor - Maincrop: high yields of attractive tubers for the fresh market especially well-suited to hot climates and organic markets. Seed availability - good.

Kestrel - 2nd Early: part-coloured, very attractive tubers - established favourite with flavour conscious supermarkets, consumers and horticulture exhibitors. Good storage qualities. Seed availability - limited.

Apache - Early Maincrop: *Phureja* cross. Warm red skin dotted with cream coloured patches ideal for 'peeled and cut' roast potatoes having an almost sweet, buttery, chestnut flavour. Good resistance to Blackleg and bruising. Seed availability – marketed in the UK by Albert Bartlett.

Golden Nugget - 2nd Early/Early Maincrop: ideal for salad and punnet markets, producing high tuber numbers with golden skin. Good storage and cooking quality. Good resistance to Common and Powdery Scab. Seed availability – marketed in the UK by E Park and Sons.

Field Trials and Demonstrations

Cygnet PB Ltd.

Plot: 11

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Cygnet PB Ltd., Milnathort, Scotland currently operates the UK's largest British controlled breeding programme with exclusive rights to many popular UK varieties.

Plots demonstrate our new table, export and processing varieties designed to meet current and future market requirements. Varieties on display are:

Bonnie - a new white with attractive red splash of colour, setting new standards as a 2nd early baker with excellent black dot resistance and storage quality. Low Nitrogen requirement.

Bounty - a high yielding early maincrop baker. It has good black dot resistance and long term skin finish with excellent heat and drought tolerance, performing very well around the Mediterranean region.

Casablanca - a first early variety suitable for loose new, French fry and early processing. Casablanca has excellent Blackleg resistance and sets new standards for earliness and taste.

Rubesse - an attractive red variety producing bold deep red tubers for UK and Export markets.

Excalibur - a new maincrop pre-pack white with good blight, PCN and powdery scab resistance.

Chicago - a maincrop crisping variety, with excellent long term sugar stability, low defects, uniform shape and shallow eyes. Can be processed nine months after harvest, with low Asparagine levels.

Flex Fertilizer System ApS

Plot: 3

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The Flex Fertilizer System has been proven over many years to provide complete nutrient management strategies for a wide range of specialist and broad acre crops, delivering everything from placement and starter fertiliser to a full range of foliar feeds, specifically designed to meet the nutritional needs of growing crops. The formulations produced by the Flex System are based on innovative complex chemistry, resulting in higher crop performance per unit of plant food applied. Trials in the UK over the last five years show significant improvements in potato yield and quality, compared to traditional fertiliser.

Building on the success of last year's event, field plots demonstrate core components of the Flex system, including:

Placement fertiliser - optimising tuber numbers, root development and water/nutrient uptake

Calcium nutrition - affecting tuber development, seed vigour, fry colour and storage

Foliar nutrition - maintaining canopy development, bulking rates and tolerance to stress

Graded yield - targeting nutrition to improve uniformity, colour and skin finish

Common scab - integrating nutritional and microbial materials to enhance plant health

Varieties include ***M.Piper, M.Peer, Cara, Challenger, Charlotte, Epicure, Marfona, Markies, Rooster*** and ***Desiree***.

For more information on the complete Flex System, or to arrange to visit Flex farm trials sites, contact Neil on +44(0) 7887 743 035.

Field Trials and Demonstrations

The Glenside Group

Plot: 6

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Bioscence® in Action - Profitable potatoes from better informed soil and fertiliser management.

Bioscence® combines biology, science and soil sense to increase the profitability of potato growing. Glenside use their Albrecht® Soil Survey to identify the factors in each field which are limiting yields and affecting marketable quality. Detailed field by field recommendations are provided matched to variety and market requirements. Inputs are carefully targeted to optimise margins whilst lowering carbon footprint.

The benefits of working with Bioscence® can clearly be seen on Glenside's demonstration plots:

Higher percentage of marketable quality

Improved skin finish and storability

Reduced hidden costs

Lower carbon Footprint

Glenside's plots are managed by The James Hutton Institute, Dundee and the results are monitored and reported on by Aberdeen University.

Glenside's clients are located throughout the UK, Ireland, Southern Europe and the Middle East. As the UK's leading proponent of Bioscence® to achieve sustainable soil and crop management, Glenside welcomes enquiries from Growers and their Advisors in the UK and from overseas.

Greenvale AP Ltd.

Plot: 10

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Vales Sovereign - pre-pack variety regularly topping retailers' consumer taste panels. Has very low nitrogen requirements and is drought tolerant with highest resistance to Black Dot of any pre-pack variety available.

Vales Emerald - early bulking variety, attractive appearance and flavour, bred primarily for the punnet potato market; has shown yield increases of up to 25% compared to standard punnet varieties.

Sofia - bred by Agrico for the fresh market, early maturing, has high tuber numbers producing good yields and good resistance to black dot, blight and virus Y.

Sylvana - high yielding variety, bred by HZPC, it has a high proportion in the 65mm plus size band and a high resistance to common and powdery scab.

Asterix - high yielding variety suitable for the French fry market, high dry matters, requires moderate levels of Nitrogen and has high resistance to PCN RO1.

Rembrandt - bred by HZPC is a high yielding variety suitable for both French fry and pre-pack market, long dormancy and well suited for use out of the store.

Pioneer - high yielding early salad/punnet variety with excellent eating qualities and packed by The Co-operative.

Mayan Gold - grown for the premium/speciality market, it has an unrivalled nutty flavour.

Higgins Agriculture Ltd.

Plot: 13

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Since acquiring the G.I. business in 2001, the Higgins group have been very successful in the selection and breeding of new varieties, as well as marketing material from other seed houses.

Today we are pleased to exhibit eight varieties.

Six varieties are young numbers still being evaluated:

Hig 03 22.3 and **Hig 03 22.8** are both Morene x Spey, and are performing well in processing trials across the Mediterranean.

Hig 04 23.9 and **Hig 04 29.5** are Valor crosses, producing high yields for the table / ware market.

Hig 05 3 A17 and **Hig 05 9 A2** are Olympus crosses, aimed at long term storage for crisping.

Olympus (Atlantic x 12601ab(1)) is a main crop Crisping variety, which produces excellent fry colours after medium to long term storage.

Hermes is the control in this trial.

HZPC UK Ltd.

Plot: 8

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HZPC UK Ltd. continues to expand production in Scotland for the increasing demand for their varieties both nationally and internationally.

Pre basic and SE stocks now being grown from the Black Isle, down to the Borders and the variety selection reflects prominent developers.

This year, the two very promising French fry varieties Challenger and Sagitta; the red prepack variety Mozart; a world leader in Innovator; and the new crisping variety, Crisps 4 All are on display.

HZPC are committed to Scottish seed production through the minituber system primarily for their own breeding material as a feeder for seed and ware growers in England and Wales. They are pleased to be associated with some of the leading growers in Scotland. In addition, the company is building an exporting network for in-house and free varieties for sister companies and networks internationally.

IPM (Irish Potato Marketing) Ltd.

Plot: 14

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IPM, a subsidiary of Donegal Creameries PLC, exports around 60,000 tonnes to over 35 countries worldwide. From its roots in Dublin 60 years ago, IPM has become the leading seed potato company in Ireland and the largest exporter of protected varieties from the UK.

The company has built up a wide range of varieties from its breeding programme at the Oak Park Research Centre, Carlow near Dublin. Today it proudly presents 26 commercially produced varieties ranging from its stalwart Cara, widely popular Rooster and export favourites Burren, Slaney and Galactica, to its upcoming new varieties Nectar, Electra, Cristina, Banba, Infinity and Setanta.

Its never ending drive for expansion continues from its other bases in Scotland, England and Netherlands. If you would like to become part of our team of seed growers or if your interest is simply pre-packing, processing, crisping or organic you will be made very welcome at our IPM variety plot, showcasing 16 of our varieties.

Field Trials and Demonstrations

Nutrition First Ltd.

Plot: 2

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Celebrating 25 years of applied research and independent consultancy in the field of nutritional agronomy, the team at Nutrition First are once again pleased to invite you to review field plots demonstrating the potential of ***Prescription Nutrition™*** strategies designed to optimise yield, quality and health. Based on the very best soil analysis and a unique understanding of plant nutrient requirements, supported by data from our own comprehensive international trials programme, our independent approach to nutrient management is delivering significant advantages to potato growers around the world.

This year, as part of the **Crop Nutrition Innovations** programme, our field plots demonstrate the role of soil and nutrient management on plant health, focusing on the application, management and efficacy of biological controls for:

Common scab **Powdery scab** **Rhizoctonia** **Alternaria**

Showcasing the microbial products FZB24, *Serenade and Guardian™*, using disease management strategies developed by in-house trials in support of our own commercial grower and agronomy groups, on the varieties ***M.Piper, M.Peer, Cara, Challenger, Charlotte, Epicure, Markies, Marfona, Rooster*** and ***Desiree***.

For more information, to book a place on our Nutritional Agronomy training courses or to arrange a visit any of our independent trials sites, contact Neil on +44(0) 7887 743 035.

Omex Agriculture Ltd.

Plot: 5

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Omex are demonstrating how our unique portfolio of biostimulants, precision fertiliser applications and foliar nutrition products can be used in combination to promote crop growth and plant health, helping to boost yield and to meet challenging quality targets, both for seed and ware crops.

The plot area showcases carefully targeted input regimes aimed at producing optimum tuber size, numbers and quality for a seed crop, and yield, crop health and skin finish for a ware crop.

The demonstration includes precision base fertiliser placement, the use of Biomex biostimulants to promote root growth, the use of phosphites and foliar nutrition to promote plant health, CalMax for skin finish, and Sluggo, the new molluscicide which combines efficiency with safety to beneficial species and the wider environment.

Promoting plant health with biostimulants and targeted nutrition has been shown to make crops more tolerant to stress from pests, diseases, drought and other factors. This can enable reductions in other inputs and less dependence on pesticides, in tune with the current drive for integrated crop management and sustainable agriculture.

Strathmore Potatoes Ltd.

Plot: 15

Contact Details:
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Breeders, growers and merchants situated on a two acre site in Forfar.

We produce over 150,000 mini tubers each year in our purpose built poly tunnels. We have over 600 acres of seed in our control from mini tubers to Pre-Basic and SE grade. We market over 15,000 tonnes of seed and ware annually and supply all sectors of the Industry.

We are sole marketing agents for the successful salad variety **Harlequin** bred by The James Hutton Institute, Dundee.