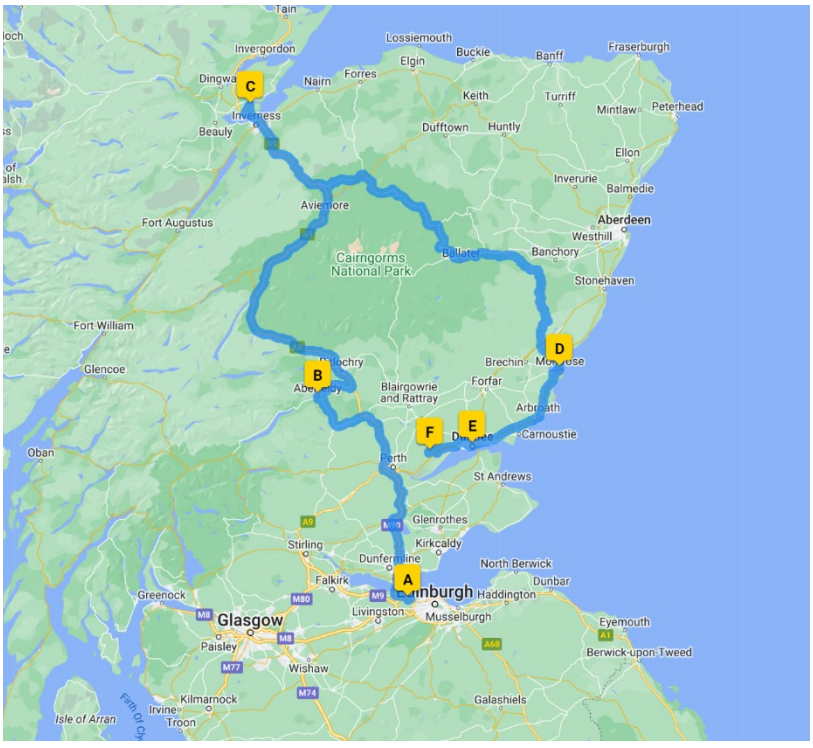
CUPGRA Study Tour : Scotland 19th – 21st June 2024

Aims: To recognise the importance of developing our understanding of the seed supply chain, particularly during challenging times with implications for us all. Our three main aims were:

1. Knowledge - Enabling a better understanding of the seed supply chain for members
2. Skills - Learning how science and research can provide solutions
3. Relationships - Recognising the importance of collaborative efforts in the future

Our key points of interest

A. SASA (Edinburgh). Scottish Seed Certification, Statutory PCN and Virus Testing.
B. Fimm Farms (Aberfeldy). Optical seed grading on farm.
C. PB Growers (Black Isles). Pre Basic seed production.
D. McCains (Montrose). Seed handling, grading and storage.
E. Gentech (Dundee). Mini-Tuber production.
F. James Hutton Institute (Dundee). Commonwealth Potato Collection and Pre-breeding, Virus Modelling, PCN, Crop Storage Facility, Blackleg update.



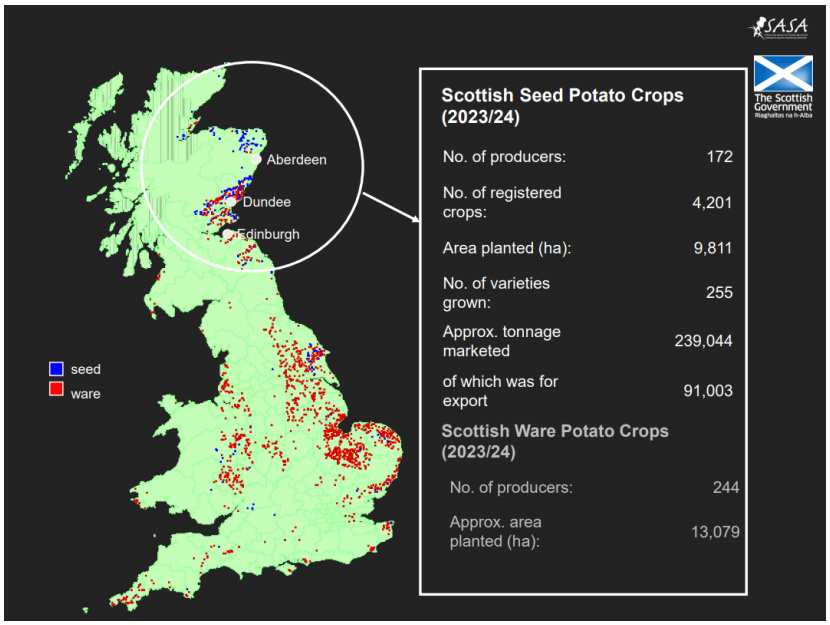
Study Tour Cohort:

No.	Company	Name
1	B & C Farming Ltd	Sophie Bambridge
2	Wm Morrison Supermarkets Ltd	Andy Swain
3	Kettle Growers Group Ltd	Craig Stephen
4	Omnivent UK Ltd	Ronnie Laing
5	Produce Solutions	Tom Eyles
6	Produce Solutions	Jake Caston
7	AG Wright & Son (Farms) Ltd	Edward Mayell
8	NIAB Potatoes	Peter Craven
9	R S Cockerill (York) Ltd	Wayne Vermeulen
10	R S Cockerill (York) Ltd	Sam Cockerill
11	Arundel Kerr Produce Ltd	Richard Arundel
12	Arundel Kerr Produce Ltd	Andrew Johnston
13	Greenseed International Ltd	Jenny Hookham
14	IPM Potato Group Ltd	Liam Cupit

DAY 1 – SASA, Edinburgh.

We began our tour at SASA with a talk by John Ellicott on Scottish Seed Potato Classification, Inspection and Health Status. Key points being:

- 1/3 of seed potato grown in Scotland is exported outside UK
- 240,000 marketed tonnes / year, (90,000 being exported with the top three being Egypt 57%, Morocco 12% and Saudi Arabia 5%)
- Scotland only produces Pre-basic and Basic seed, lower quality (blue labels) are not permitted for planting in Scotland for seed or ware production, with all stages of production closely monitored by government officials.

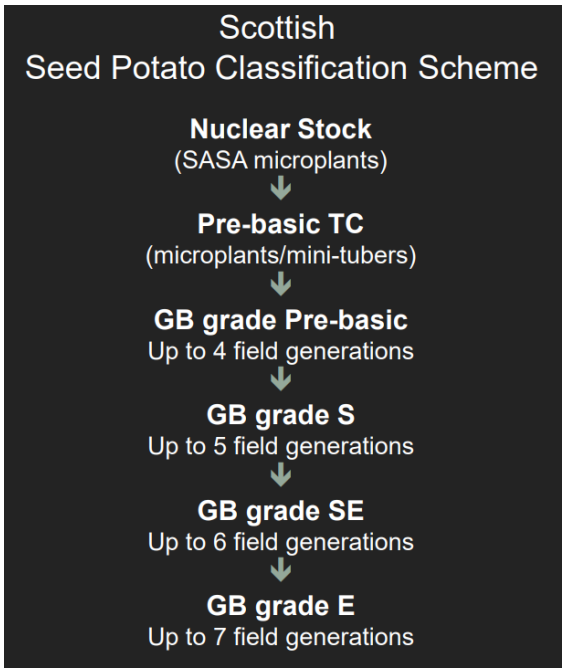


Interestingly of the top 3 varieties grown, both Cara and Hermes is grown for export markets, leaving Maris Piper as the most popular UK variety, posing the question that there is scope to potentially reduce exports and increase UK seed production, although this would likely demand a rise in seed cost to the grower.

	VARIETY	AREA 2023
1	CARA	1160.4
2	MARIS PIPER	1063.9
3	HERMES	974.5
4	DESIREE	438.1
5	ATLANTIC	351.4
6	INNOVATOR	335.9
7	ROYAL	312.0
8	LADY ROSETTA	242.2
9	MARKIES	233.0
10	BROOKE	222.5

Scottish Seed Classification can be seen in the diagram below with stocks of ALL varieties starting out as *in vitro* 'Nuclear Stock' within the labs at SASA. Almost all seed potato crops in Scotland are derived from pathogen tested microplants produced officially at SASA

Only officially approved laboratories multiply SASA micro-plant material, grown on peat or hydroponics/aeroponics to produce mini-tubers, in a protected, pest and disease free environment.



In Vitro Nuclear stock

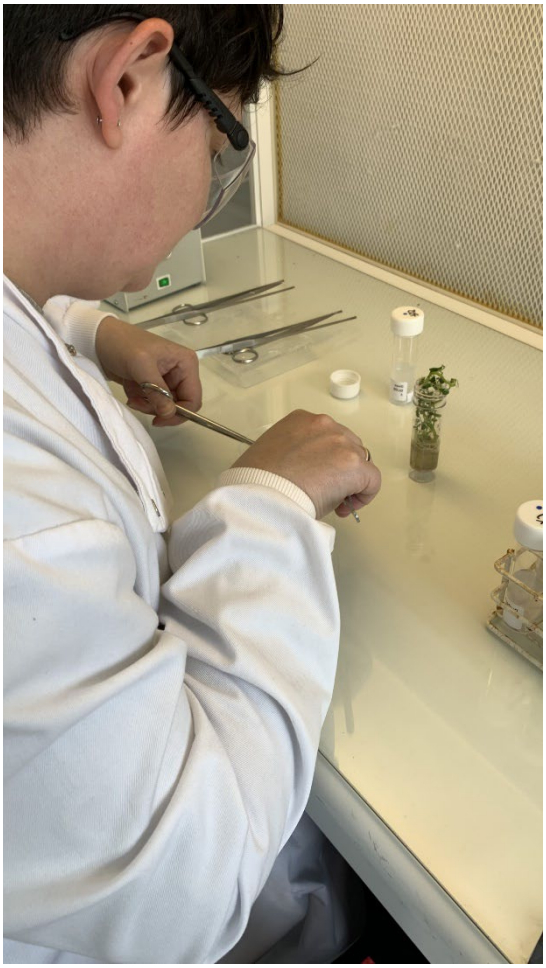
(In Vitro is Latin for 'within the glass')

Over 1000 varieties (lines) are held in the collection, with all lines being monitored for trueness to varietal type on a three year programme by a field grow out inspection. Each line is held within 4 test tubes.

Mind blowing fact.....

ALL the Maris Piper potatoes grown in the UK started life as a cutting from one of four test tubes at SASA, before going to mini-tuber production and field generation multiplication.

And check out the back of your seed plant passport label, you will notice the official SASA hologram, proving authenticity.



Our tour looked at the statutory testing process for PCN testing in Scotland, as seed potatoes cannot be grown on land with any PCN presence. We saw the current carousel system below which is capable of handling 1000 samples per week, however SASA have just commissioned a new PCN testing system capable of 1000 tests per day. Initial testing and calibration is due late summer 2024.

Current carousel (1000 PCN tests/week)

Latest innovation in PCN testing (1000 PCN tests/day)

We met with Christophe Lacomme senior virologist at SASA and responsible for Virus Testing within SASA. Christophe described the current challenges within managing virus in the seed potato crop and the rising incidence of Potato Leaf Roll Virus.

Our visit coincided with the Scottish Seed Inspectors course, where inspectors are trained up prior to harvest inspections. We were able to see virus in the field test plots and how it affected different varieties. This picture on the right shows the visible effects of Leaf Roll Virus.

Day 1 Fimm Potatoes – James McDiarmid, Perthshire.

Our next stop took us to see James at Fimm Farming, with a particular focus on optical grading, to achieve a much more consistent product. Their system is fully automated with a 30 tonne bunker and six 6 ton hoppers for chosen outputs, so that when staff stop for breaks the system can continue grading. The optical smart grader is set up to run for 2-3 hours at the end of the day so that when staff arrive in the morning they have a ready stock of sized product to begin with.

James likened his optical grading technology to the change in farming systems from 'horse and plough' to the tractor! The improvements in output and reduction in labour have soon paid for the system, especially as reliable seasonal labour becomes more difficult to find.

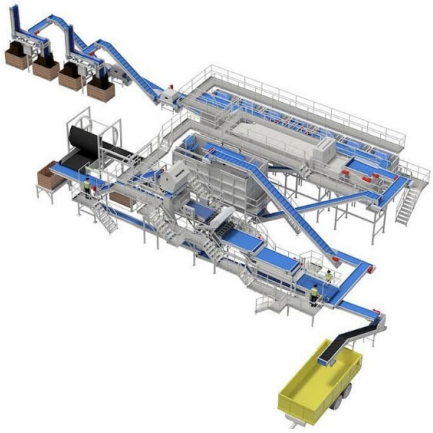
Day 2 : PB Seed Grower visit – Jonnie Martin, Calum McIver and Glen Allingham – Black Isle

After an overnight stay in Inverness we took a short drive north to an area known as the 'Black Isle'. On our drive up north from the flatter landscapes of Perthshire the landscape narrowed between mountains, before flattening out again into some incredibly fertile ground. We met with three key PB growers, of which there are only 26 in Scotland, in what can only be described as 'a little piece of heaven'. Their location created a special microclimate offering superb conditions for specialist seed production, and it felt as if we could have been stood in a French vineyard learning about the 'terroir'. Indeed, if there is a champagne region for potato growing, we had found it.

Jonnie Martin pictured in the centre.

Day 2 : McCain Seed Grading and Storage facility – Montrose

We met with Colin Ross and Kate Mclaughlin to see McCain's £2.5 million investment in optical sorting and grading, with a focus purely on seed potatoes. The site is responsible for supplying 30,000 tonnes of seed potatoes every year to McCains ware growers in England, who then supply the processing crop to the McCain food factories. The integrated supply chain ensures McCain have high quality raw material for their products and extensive traceability from seed to end user.



Day 3 : Gentech Mini-Tuber production, Dundee – Derek Scott

Gentech was built in 1986 and at the time was the first commercial mini-tuber unit in Europe, with a purpose-built greenhouse and laboratory unit. The facility maintains a potato pathogen free status due to physical and procedural barriers to entry including; aphid screens, chlorinated mains water, filtered and UV treated water and sterilised peat. Over the last 37 years Gentech has produced more than 20 million mini-tubers, with a current average of 900,000 per year, using micro plant clones grown annually at SASA.

The benefits of producing mini tubers in this way as opposed to conventional poly tunnel techniques results in seed that is of an older physiological and chronological age. This is linked to increases in stem and tuber numbers by 20-30%, with tubers that emerge faster and reach mature plant virus resistance quicker.

Day 3 : The James Hutton Institute, Dundee – Ian Toth.

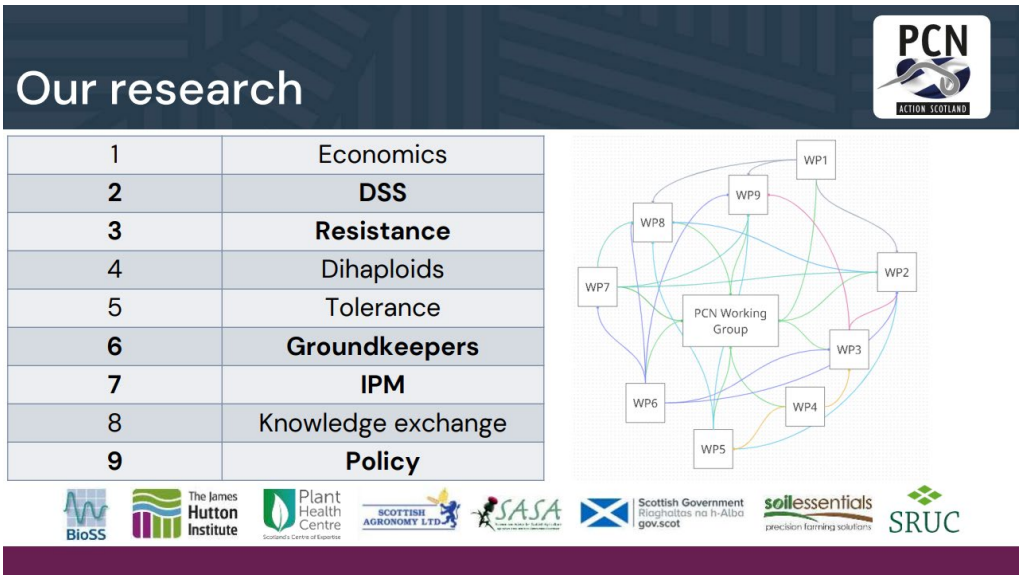
The James Hutton Institute was the final destination for our study tour, and you might say we saved the best until last!! Formed only in 2011, JHI is the result of a merger between the Macaulay Land Use Research Institute and the Scottish Crop Research Institute. James Hutton (1726-1797) often referred to as the 'Father of Modern Geology', was a Scottish geologist, agriculturalist, chemical manufacturer, naturalist and physician and the inspiration for those at JHI today to deliver global impact through excellent science, collaboration and innovation.

JHI is probably most well known for holding the Commonwealth Potato Collection (CPC). We met with Gaynor McKenzie who explained that the CPC is one of the world's largest genebanks, holding some 1800 accessions of 82 wild and primitive cultivated potato species, primarily from Latin American. JHI also have several other important germplasm resources such as diploid and tetraploid bi-parental crosses, populations and association panels.

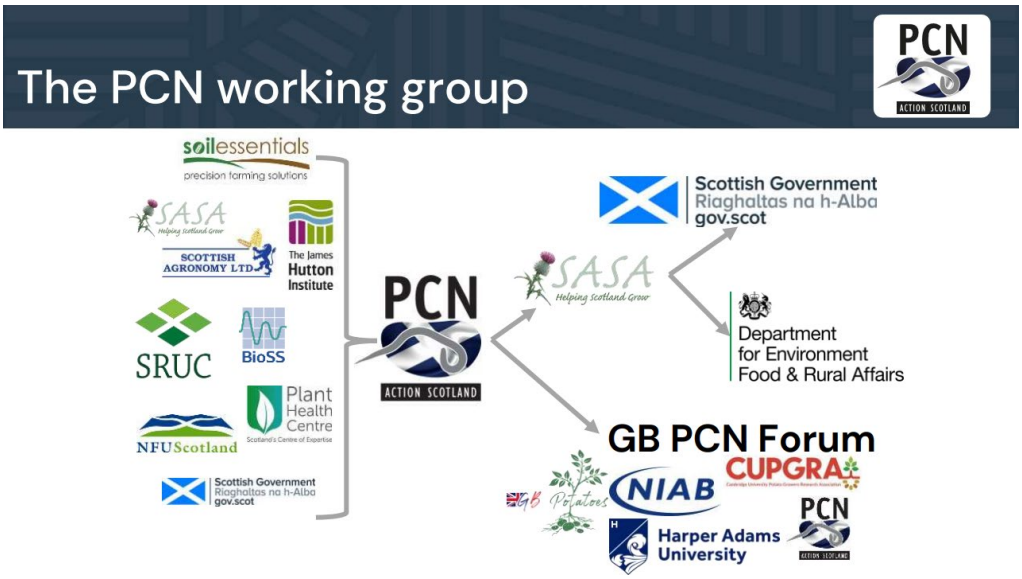
We heard from Ingo Hein, Head of Potato Research at JHI, whose focus is on the identification, mobilisation and cloning of durable resistances against major potato pathogens. Through genome sequencing they have been able to identify positive traits from wild species, within the commonwealth collection, and then breed these into new varieties, with a focus on late blight, PCN, viruses and potato wart disease.

James Price gave an update on PCN Action Scotland, a £2.6 million initiative supported by Scottish Government to help control PCN. All Scottish seed potatoes must be grown of land free from PCN, and with reductions in effective chemistry to control the pest, populations are expected to increase over the coming years to the point that we could see the end of Scottish seed production within the next 30 years (one generation). With potentially only 5 potato seed rotations left, this is a serious issue for Scottish growers, and the wider UK potato Industry to address.

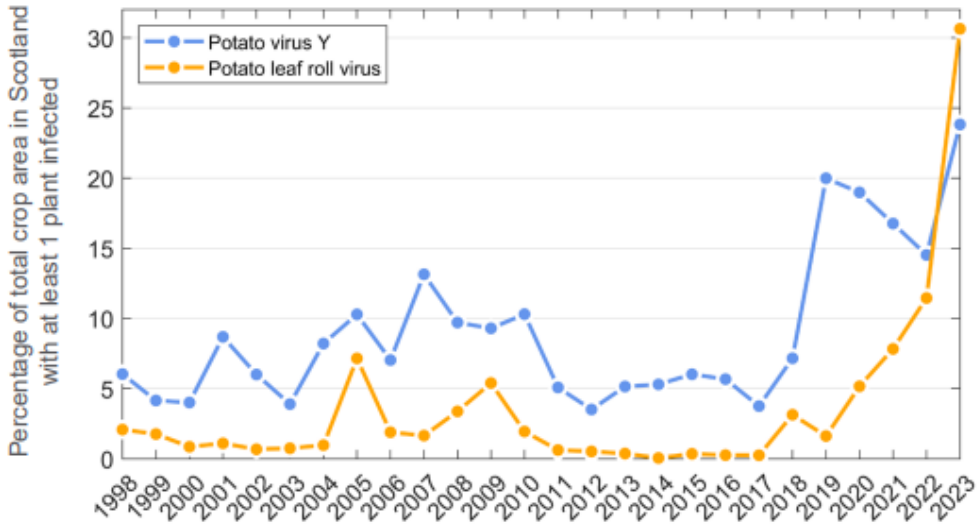
Nine work packages are currently underway to address this major issue with a key output being the creation of a Decision Support Tool to help growers:



Recognising this is a huge issue for growers in England and Wales, CUPGRA teamed up with GB Potatoes and PCN Action Scotland to create a National GB PCN Forum, looking to update and inform growers nationally, with a revision to the AHDB growers guide, delivering valuable information in the vacuum created post AHDB, and the decision to no longer support an industry levy.



Peter Skelsey discussed the importance of analysing and modelling potato virus data, especially as the incidence of potato viruses has been increasing over the last 5 years. With continued trends in warmer climatic conditions, industry has expressed the need for a national evidence based IPM strategy.



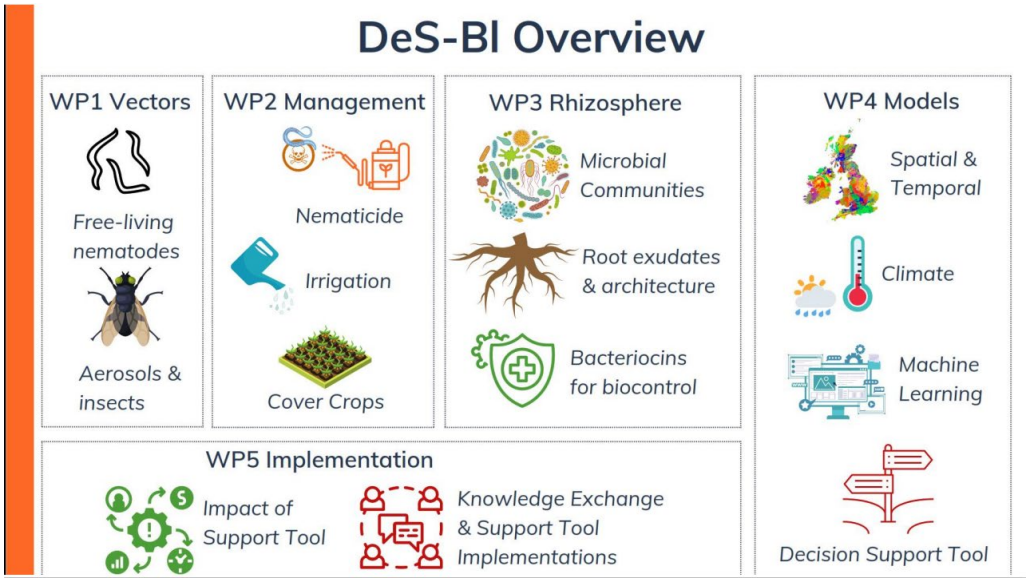
Being able to base actions on reliable forecasting data could well help in managing the trend in virus incidence that we have seen in the last few years. The example below shows an example of some of the effects and actions required.

DDDM: Data-driven decision making

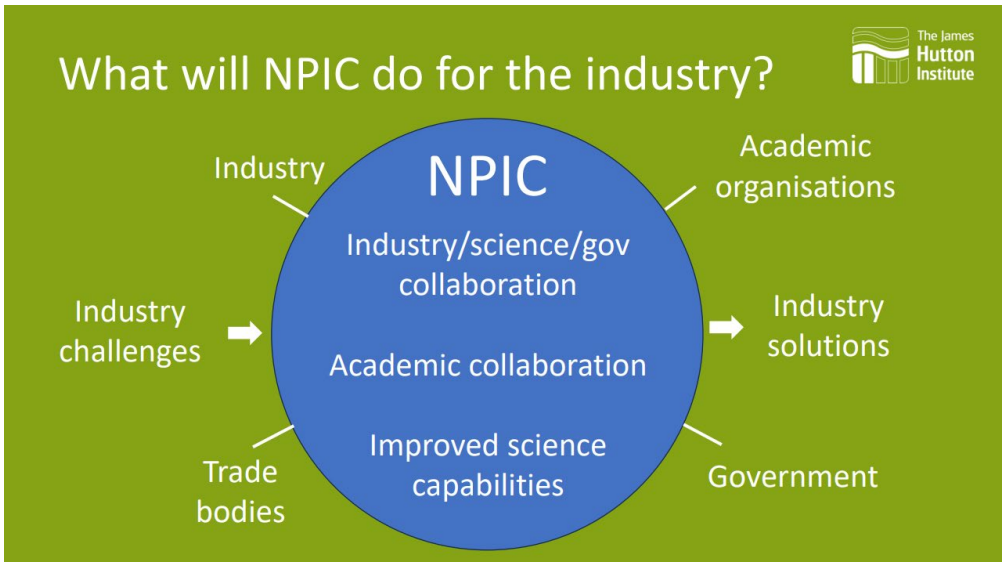
The James Hutton Institute

- A bad year is forecast for PVY in your area:
  - Improved planning and site selection
  - Extra vigilance in disease hot-spots
    - inspect crops / neighbouring crops more frequently
  - Test your farm-saved seed
  - Source some high-quality virus-free seed
  - Communicate with neighbouring growers
    - share yellow water-trap data for decisions on appropriate means of control
  - Varietal choice if possible
  - Additional control measures
    - mulches, mineral oils, barrier strips etc.
  - "The 6 Steps to Effective Virus Management in Certified or Home Saved Seed"

Ian Toth discussed the Decision Support Tool for Blackleg disease that he had helped work on as seen below:



Ian is Director for an exciting project they are hoping will receive the funding to establish at JHI. As well as the Internation Barley Hub, which is currently under construction, they are hoping to establish a National Potato Innovation Centre (NPIC), based in Dundee, but with a focus on collaborating with Industry and Academics within the UK to find solutions to the many industry challenges of the future. Ian held three workshop events to fully understand industry needs better.



We saw the new Storage Facility at JHI. CSPS – Crop Storage and Post-harvest Solutions, focussed on the future of crop storage. Funded by UK and Scottish governments this facility will explore the impact of temperature, gas composition and humidity on the quality, nutritional value and appearance of stored crops.

Raul Huertas highlighted the importance that crop storage plays in ensuring sustainable potato supply and minimising waste.

The crop storage facility is delivered in partnership with UK Agri-Tech Centre, and is part of a network of crop storage facilities involving ADAS and the Natural Resources Institute (NRI) at the University of Greenwich.

Thank you for all those that took part on the CUPGRA Study Tour 2024, especially all those hosts that gave so freely of their time to help us understand better. It was clear to see the benefits of improving our understanding of the potato seed industry in Scotland and CUPGRA would like to continue a regular pipeline of Study Tours, perhaps annual or bi-annual; if anyone has any suggestions for locations / topics / sponsorship, please get in touch.

On Behalf of CUPGRA.

CUPGRA Chair of Directors, Sophie Bambridge.