

LATEST PCN RESEARCH REVEALED AT OPEN DAY

PCN Action Scotland held an open day at Barnyards Farm in Angus (Scotland) on August 16 by kind permission of potato farmer Neill Smith, who grows ware for Albert Bartlett on 162ha. Dry weather and over 100 people turned out to see the Scottish Agronomy-run variety trials and hear from project members about some of the PCN-related work occurring in Scotland. **Heather Briggs** reports.

Neill welcomed everyone to the site and told the guests that his aim is to bring PCN levels on his farm to a sustainable level. The land has been used for potato production for over 50 years and Neill, a third-generation potato grower, believes the PCN population has been building up slowly over this time, perhaps due to shorter rotations used in the past.

He aims to bring the population under control on his own land through an integrated pest management (IPM) but notes that the situation is more

- No resistance and no tolerance: These varieties will allow PCN numbers to increase and will have lower yields
- Resistance and no tolerance: These varieties will stop PCN proliferation, but yield may be affected in the first rotation
- Tolerance and no resistance: These varieties will allow PCN numbers to increase but yield will be unaffected

difficult on rented land which is only rented for one year to grow potatoes.

Neill is growing some Amanda and Elland, two varieties which score highly (8 and 9) for resistance to *Globodera pallida*. While he understands resistant varieties are the best way to control

PCN, he is concerned that *G. pallida* resistant varieties are yet to be fully accepted by the market.

Tolerance and resistance to PCN

Dr James Price (James Hutton Institute) explained how tolerance worked in potato varieties. Resistant crops allow

the nematode to hatch and infect the plant but not complete the lifecycle, thereby reducing PCN population numbers. Tolerant crops allow the nematode to complete its lifecycle (increasing the PCN population), however, the crop will maintain a good yield.

James said: "It is important



Dr James Price.

that growers and agronomists understand the differences between tolerance and resistance to PCN. Growing tolerant varieties, which can produce good yields, without the necessary resistance results in significant increases in numbers of cysts in soil, making the situation worse for the next crop in the rotation."

James is working on understanding what it is that makes a variety tolerant and has

PCN tolerance and resistance variety demonstration trial

Eric Anderson (Scottish Agronomy) introduced the trial established in April 2021 at Tannadice, Forfar by Scottish Agronomy which has been exploring the response of twelve different varieties at the site. These were fully replicated, both untreated and with Nemathorin treatment. Initial PCN presence in the soil ranged between 27-68 eggs/g soil (*G. pallida*).

"Results show that where varieties were used with a resistance score of >6 against *G. pallida*, PCN populations were significantly reduced," said Eric, adding that the opposite was seen for susceptible varieties. "The presence of the nematicide protects the yield performance but tends to do little to reduce PCN populations. The comparison of nematicide treated and untreated plots therefore allows us to assess the tolerance of different varieties."

Phil said: "The Nemathorin treatment allows us to see the different performance of varieties being challenged by PCN when the feeding damage has been controlled by the Nematicide. We would expect an intolerant variety to respond to the Nemathorin treatment, however, a more tolerant variety will not necessarily show a benefit from the treatment."

Eric said: "At planting we sampled the soil in each of the individual plots. This gives us the Pi (initial infection level) and the results range from around 20 to 40 eggs per gram according to the results from SRUC. Everything we found on this site was *G. pallida*. These results represent a significant but highly realistic challenge to the varieties." He added that *G. pallida* is a problem for most of his clients.

Phil continued: "The objective was to show a range of the current crop of varieties which had some resistance to PCN. In Scotland the varieties currently grown for the packing sector generally have no resistance to *G. pallida* and are effectively making the situation worse year on year. Varietal resistance to *pallida* is a hugely effective tool in managing the problem. At this site we have a number of varieties with real potential to bring the epidemic under control.

"This is because a fully resistant variety, rated 8 or 9 for resistance, does what it says on the tin. These varieties can result in post-harvest populations less than the initial population at planting." He also pointed out that many breeders were actively looking to bring *G. pallida* resistant varieties to the market.

"This trial represents a selection of varieties which are currently available, and which may be suitable for production in Scotland. There will no doubt be more in the future. Indeed, the wider objectives of the PCN project were to develop robust resistance markers to bring into breeding programmes."

He added that getting acceptance from retailers for new varieties always represents a challenge and that one of the objectives of the PCN Action Scotland programme was to engage with the retailers to ensure they were aware of the challenges and sustainable solutions.

Eric pointed out that as well as resistance to PCN, it was important to remember the other attributes of varieties that make them of interest to growers. He noted in particular that resistance to spraing (TRV) is going to become more important if the availability of nematicides was reduced.



Eric Anderson, Scottish Agronomy.



Dr Phil Burgess.

Resistance and tolerance variety trials

Dr Phil Burgess of scottishpotatoes.org guided the visitors through the 12 resistant and partially resistant variety plots set up by potato specialist Eric Anderson of Scottish Agronomy. Phil also reminded everyone attending that the site was heavily contaminated with PCN. Anyone attending had the potential to

been studying the root structure of a range of varieties. "There is good evidence that tolerance to PCN and determinacy of the foliage growth in potato is correlated," he said. "However, it is certainly more complex than this and we hope to identify specific traits that can be utilised in new varieties to increase their tolerance."

transport these cysts to back their own farm. Facilities were available for washing and disinfecting footwear. However, the responsibility has to lie with all individuals attending to make sure the issue is not transported back to their own farm.

There was one distinct advantage for this site and open day. There was no doubt

The PCN Action Scotland programme is the knowledge exchange element of a £2.2M investment by Scottish Government into delivering a sustainable management of PCN and ensuring the future of the potato sector in Scotland. More information on www.pcnhub.ac.uk.

that everyone was at a contaminated site and everyone knew what they needed to do about it. In other situations, many of us visiting crops do not necessarily know the status of fields and attitudes to biosecurity can become relaxed.

Groundkeepers indicate ineffective rotations

Jim Wilson (SoilEssentials) updated growers on the work he was undertaking on groundkeepers, noting that when a groundkeeper is present it simply means that the rotation is ineffective. He reported some recent results from soil samples taken where groundkeepers were present and paired with soil samples just 1m away. Results have not

yet been analysed, but there are indications that there was three times as much PCN where there were groundkeepers.

Although approaches to the control of groundkeepers haven't changed much over the past 40 years or so, technology is now available to identify the precise location of individual groundkeepers and to treat them precisely. Jim added that he was working with onion growers in the Netherlands who needed to be able to spot spray individual plants in an onion crop.

Phil noted: "The advantages of such targeted and precise treatment are clear. Precision application of pesticides reducing the amount of product used to a fraction of an overall spray application." ♦

Graph Pf/Pi (below)

Data from a field trial carried out by Scottish Agronomy comparing initial (Pi) and final (Pf) PCN (*G. pallida*) population numbers after crops with various resistance scores; Maris Piper (2), Innovator (8), Elland (9), Camel (9), Panther (8), Buster (9), Bermuda (7), T6586/10 (8), Karelia (8), Amanda (8), La Perla (6). This trial clearly shows the strength of PCN resistance. However, it also highlights that when choosing a resistant crop, resistance scores >6 are needed to reduce the PCN population.

