



“ It’s about creating a robust system which avoids virus infection in the first place. ”

Potato virus prevention

Potatoes

The 2022 spike in aphid numbers has resulted in a significant impact on the production cycle for seed potatoes, despite populations decreasing since. *CPM* investigates the steps industry experts are taking to combat the most prevalent potato viruses.

By Janine Adamson and Rob Jones

New genetic material with resistance to some of the most prevalent potato viruses may soon be rolling out into commercial breeding programmes, thanks to development work being undertaken by James Hutton Limited (JHL).

As shared at this year’s Potatoes in Practice, held at Balruddery Farm in Dundee, delegates learned of pipeline

developments from the commercial arm of the institute. Speaking ahead of the event in an exclusive preview interview for *CPM*, potato breeder Drummond Todd says the uplift in potato virus in recent years has meant breeding programmes have had to widen focus.

Secondary result

“In 2022 we experienced huge aphid pressure therefore many growers observed an increase in virus – most strikingly potato leafroll virus (PLRV) – in seed crops the following year. This is because the symptoms you see in the subsequent year are a ‘secondary’ result of the ‘primary’ infection.

“Although aphid numbers have been substantially lower in 2023 and 2024, due to the length of the production cycle for seed potatoes, that spike will have a significant impact for a number of years. Furthermore, virus pressure will continue to be high as a consequence of increased reservoirs of virus in crops and groundkeepers,” explains Drummond.

But, it’s not all doom and gloom, he adds. Research has been taking place to validate new genetic markers for resistance to potato viruses using molecular diagnostics, similar to the previous work

undertaken for late blight and potato cyst nematode resistance at the institute.

In fact, the team at JHL and JHI (James Hutton Institute) are validating markers for two different sources of PVY resistance and are working on potential candidates for PLRV resistance. According to Drummond, populations have been produced and material is already in the field ready for testing.

“If successful, the markers will then



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Knowledge transfer day

Rain might have tried to stop play at Hutchinsons' potato demonstration day, but knowledge transfer continued to flow on subjects such as wireworm, PCN management, crop safety and nutrition.

Presenting to delegates from one of the yards at Worth Farms in Holbeach, root crop technical manager, Darryl Shailes, highlighted work being undertaken to assess the impact of different strategies on wireworm populations within a crop of popular variety, Maris Piper.

These include a pyrethroid granule which is awaiting approval and a calcium-cyanamide based fertiliser. "At the moment we're focused on the theoretical effects of these products," said Darryl.

Equally, some cover crop species can help to reduce wireworm populations; Hutchinsons is measuring the effects of two different types of buckwheat, a high glucosinolate mustard, a lower glucosinolate standard mustard, and a multi-variety cover crop, he revealed.

Darryl also presented research which explores the potential benefits from growing DeCyst-Prickly (*Solanum sisymbriifolium*) and DeCyst Broadleaf (*Solanum scabrum*), which can be used as catch crops for PCN as well as cover crops.

"We'll be comparing the final populations with those initially present (pf/pi) so growers can make informed strategies on how to reduce PCN infestation," he said.

Simon Faulkner from SDF Agriculture pointed out the importance of developing strategies which aren't dependent on pesticide approvals. "Concerns highlight the importance of knowing which varieties can offer resistance and/or tolerance," he said. "Growers have to manage



Hutchinsons' Ed Brown drew attention to the possible reasons for why PCN may be proliferating, such as too short rotations and a lack of predators for those nematodes in the soil food web.



Hutchinsons' potato demonstration day included knowledge transfer on subjects such as wireworm, PCN management, crop safety and nutrition.

their land to ensure PCN levels are manageable without over-relying on pesticides."

PCN varietal resistance trials which started last year are continuing, he said, and are assessing a mix of older and newer varieties. "We're seeing some additional crisping, packing and chipping varieties which have both tolerance and resistance, which will be important traits going forward."

French marigold (*Tagetes patula*) and certain varieties of oil radish cover crops can be effective at reducing soil populations of root lesion nematode (RLN) *Pratylenchus* spp., explained PhD student Vongai Chekanai from Harper Adams University. Vongai first introduced delegates to her research at 2023's demo day.

As she shared then, the main crops susceptible to RLN include potatoes, onions, carrots, daffodils and other narcissi. In potatoes, *Pratylenchus* is associated with potato early dying disease and poor emergence. Vongai outlined that cover crops can be non-hosts, trap crops, or biofumigants to nematodes. Conversely, other species used as cover crops can be good hosts which support nematode multiplication.

"Our trials indicate that some varieties of oil radish and French marigolds are poor hosts and suppress RLN population numbers, however, Indian Mustard, which is popular as a biofumigant to suppress potato cyst nematodes (PCN), increases *Pratylenchus* spp," she explained.

Michael Rodger from Richard Austin Agriculture updated the event's attendees on the herbicide crop safety trials being held across 26 varieties, including some new coded varieties provided by breeders.

While last year's trials were focused on metribuzin, 'hotter' herbicide mixes have been used this season. Observations will be

made weekly for the next four weeks and the plots will be taken through to yield.

Another area which generated discussions between Hutchinsons staff and growers was agroecological strategies, their benefits and potential pitfalls when not correctly undertaken.

Ed Brown, head of agroecology services at Hutchinsons, emphasised that healthy soils are key to healthy crops and such strategies can deliver benefits for potato crops when delivered appropriately.

He encouraged visitors to explore the principles and keep an open mind with strategies including minimising soil disturbance, maintaining living roots in the soil throughout the year, maximising diversity, and, where possible, integrating livestock into the rotation.

"These activities will help to develop truly healthy soil, thereby growing truly healthy plants which will rely on less intervention but provide better yields and better quality," said Ed.

He drew attention to the possible reasons for why PCN may be proliferating, such as too short rotations and a lack of predators for those nematodes in the soil food web. "We have to ensure the soil food web is balanced so individual species never have a chance to take hold."

Ian Robertson, head of soil services at Hutchinsons, emphasised that nutrient soil indexes don't imply functionality or availability to the plant. He explained some of the interactions of the soil food web – which spans from photosynthesisers at the top level, through decomposers, pathogens and root feeders, and predators at different levels.

"Connectivity between the different levels of organisms is key and as soon as you move soil you lose this, which allows some pests to proliferate above others," he concluded.

► be applied in commercial breeding programmes which is ultimately what JHL is about – commercialising the outputs from science. However, it's important to stress that this work is about progression.

"We have to produce viable varieties so are seeking parental material with solid agronomic and sensory performance together with old and new resistance markers, rather than combat potato virus in isolation. By building and stacking in this way, we can maintain and increase the marketable yield of new varieties," he says.

Drummond hopes JHL's breeding work will help to increase confidence in the future of Scottish seed crops, after a challenging year of downgrades. "There's a full awareness of the size of the problem among growers, we're likely to be looking at continued restriction in seed potato availability in the coming season."

Adding a practical, agronomic perspective to the presentations at Potatoes in Practice, Graham Tomalin from VCS Potatoes says when it comes to ware crops and potato virus, there doesn't seem to be a clear pattern. In another exclusive preview interview with CPM, he explains the impact of potato virus varies depending on the specific variety, type/virus combinations, and time of infection.

"Virus and combinations of viruses can cause splitting and tuber deformities in some varieties. The same virus or virus combination can infect other varieties and exhibit no tuber symptoms. It's very nuanced, meaning in-depth knowledge of the variety is very important."

Graham says he's noticed an increase in PLRV in UK crops this season, whereas PVY levels remain similar to last year. "Although awareness is there, growers tend to revert to their agronomist where virus occurs. However, it's about creating a robust system which avoids virus infection in the first place which all starts with seed sourcing. The yield impacts of virus infection in some varieties can't be overlooked."

Breeding targets

With the promising developments coming through from Drummond and JHL, Graham hopes potato virus will eventually be managed through genetics and targeted breeding. Although he warns that such progress has to result in varieties that match or exceed current yields, plus deliver marketable traits such as skin finish and processing attributes.

In the meantime, he highlights the importance of purchasing input stock

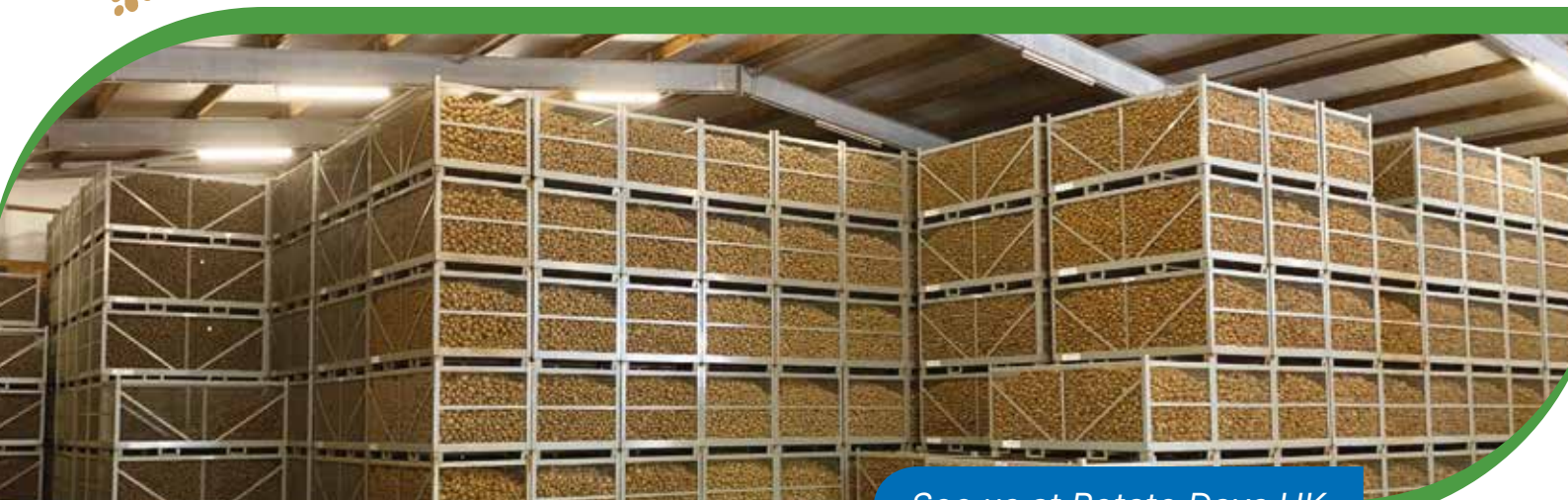


VCS' Graham Tomalin says he's noticed an increase in PLRV in UK crops this season whereas PVY levels remain similar to last year.

of the highest possible quality. "With shortages across the board this hasn't been the easiest of late, but buying seed of the lowest generation and highest certification grade is the most effective way of minimising the risk of potato



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► virus. A good long-term relationship with seed suppliers is important.

“Where I advise in East Anglia, aphid populations in most years are particularly high as is the prevalence of virus in volunteers. This makes quality seed sourcing imperative,” he stresses.

For seed growers he adds how location can add further complications, whether that be proximity to ware potato fields or the presence of volunteers in other crops being a virus source. “You also can’t risk growing near to allotments or residential veg patches. This means you’re often utilising land without irrigation which creates additional production challenges in a relatively dry area of the country,” explains Graham.

Weather constraints

But again, even when deploying tried and tested cultural control mechanisms, it’s not always simple, he adds. “Earlier planting would be a way to reduce virus impact because plants gain a level of resistance to some viruses as they develop. But of course, we’re finding this is becoming more challenging to achieve with recent weather patterns and earlier aphid flights.

“In addition to all of the above, you also have to reduce the risk of virus spreading in seed crops by using chemical control options – whether that be oils or insecticides.”

Earlier this year an emergency approval was granted for paraffin oil product Olie-H in seed potato crops, for application from tuber initiation onwards. The product works by coating the crop’s leaves with a thin film which disrupts the acquisition and transmission of virus by the aphid’s stylet.

Used alongside translaminar insecticides such as Teppeki (flonicamid) and InSyst (acetamiprid), Olie-H forms part of an integrated approach but offers a completely different mode of action, says Graham. He adds that it should be noted the use of



A potato tuber infected with a necrotic strain of potato virus Y (PVY).

Restrain PET update



Restrain has unveiled a delivery mechanism for its Precision Ethylene Treatment (PET) technology.

Manufacturer Restrain has announced the official launch of its new Precision Ethylene Treatment (PET) technology for potato stores.

As explored in the June issue of *CPM*, the company has been working to harness the power of ethylene to revolutionise potato storage and sprout prevention. Now, Restrain has unveiled a delivery mechanism for PET which introduces and maintains optimal ethylene levels in potato stores to prevent sprouting, preserve sugar levels with protection of fry colours, and minimise weight loss.

The system is based on three steps: a sensor, a dose pulse and a control management system.

1 The sensor – excludes interference from other molecules to ensure precise and continuous ethylene sensing in potato storage. It also measures carbon dioxide, temperature and relative humidity for comprehensive monitoring.

2 The pulse – this innovative low dosing

pulse system delivers controlled ethylene at parts per billion, below sensor detection levels. This prepares potatoes for higher ethylene levels while suppressing sprouting and minimising respiration to protect fry colour and reduce weight loss.

3 The control – a state-of-the-art ethylene control management system which employs sophisticated algorithms to establish and maintain precise ethylene levels in commercial storage facilities.

In layman’s terms, the system uses a ramping up system to introduce initial low doses of ethylene into the store before achieving the concentration required for sprout suppression. This ‘helps’ the potato to acclimatise to the ethylene, reducing the impact on respiration rates and therefore reducing sugar production within the tuber.

According to Restrain, the PET system represents a ‘quantum leap in potato storage solutions’.

Teppeki is restricted in many ware markets.

Graham also believes more work can be done to maximise the cultural control methods which are becoming popular in other areas, such as companion cropping. Most famed for use in oilseed rape to combat cabbage stem flea beetle, he says trial work is taking place which looks at planting a spring cereal alongside seed potato crops.

“By shielding the young potato crop, it makes it more difficult for the winged

aphid to locate the plants because they’re unable to differentiate the potato plant from the background cereal crop. This is similar to research that’s taken place in sugar beet and carrots.

“Work has also been undertaken, with promising results, looking at a similar concept with straw mulches. But I can’t see this taking off in East Anglia in the same way due to the volume of rented land and implications of resistant blackgrass seed spread.” ■