Winning the war on volunteers

Potato agronomy

The potato industry and those that rent out land to grow the crop have to take a robust, joined up approach to reduce numbers of volunteers, which cause a long list of agronomic problems across crop rotations. *CPM* investigates.

By Rob Jones

Volunteers are a threat to the sustainability of potato production and agronomists are advocating an integrated approach to hit the problem hard and ease the rotation-round war of attrition.

Large numbers of tubers can be left in a potato field after harvest – one UK study suggests a figure of 370,500 per hectare – and up to 10% remain viable after a mild winter. In the case of last autumn's difficult potato harvest, the wet, mild winter that followed will have exacerbated the problem for many growers.

Potato volunteers pose a significant threat to potato crop health, principally because they can be a source of inoculum for disease including late blight, rhizoctonia, black dot, powdery scab, and silver scurf, as well as aphid-transmitted and spraing viruses and pests such as potato cyst nematode (PCN).

They're almost certainly behind the perpetuation of certain late blight strains, says Frontier crop production specialist Reuben Morris.

> *"Ultimately, the landowner is – or should be – responsible for controlling potato volunteers."*

While the potato sector is braced for the arrival of new blight strains EU_43_A1 (EU43) and related strain EU_46_A1 (EU46) in GB crops this season, established strains continue to pose a hidden threat of tuber blight infections, often not seen until crops are in store.

Reuben highlights strains such as EU_37, which is resistant to fluazinam, and 6_A1 (Pink 6), both of which appear able to cause tuber blight infections in the absence of foliar blight symptoms. The presence of groundkeepers on land used in potato production will allow these blight strains to persist, he says.

Disease pressure

Furthermore, volunteer potatoes can also exacerbate the threat from fungal disease silver scurf (Helminthosporium solani). "Silver scurf can be a real problem for growers who are trying to grow pre-pack crops. It's not an easy disease to control and keeping volunteers out will be of significant benefit."

Scottish Agronomy senior agronomist, Eric Anderson, is acutely aware of the threat potato volunteers pose to sustainable potato production, not only in terms of disease carryover, but also their ability to multiply virus and PCN.

"We have integration of seed and ware across Scotland and the legacy effect of volunteer potatoes and the virus levels they carry is an important issue for growers. Volunteers also amplify PCN in a rotation unless they're controlled," says Eric.

Control of potato volunteers requires a broad, integrated crop management approach, taking in rotation, appropriate harvester settings, cultivations and ag-chem solutions.

Eric notes that treatment with maleic hydrazide will render between 70 and 90% of treated tubers unviable. "There's no doubt that with the challenges of late blight, virus and PCN, maleic hydrazide supports an integrated crop management approach within the rotation," he says.

Where it can be used – in second earlies and maincrop, and depending on customer protocols – liquid formulation maleic hydrazide (as in Crown MH), has also become the cornerstone of sprout suppression in stored potatoes.

Growers can dramatically reduce volunteer survival with a well-timed application of the product, says Certis Belchim global crop manager for potatoes and beets, Ed Bingham.

Much has been learned in the Netherlands about the product's potential to pitch the battle against volunteers in the potato crop itself rather than being dragged into a rotation-round war of attrition he says.

Recent trials at Certis Belchim's Londerzeel site in Belgium with varieties Milva (relatively indeterminate), Innovator (very determinate) and Fontane (intermediate) tested the efficacy of Crown MH in reducing potato volunteers in the following season.

"We found that in the Milva, we achieved 100% control of volunteers, about 95% control in Fontane and even in the senescing Innovator, we were still seeing 85% control, even in a challenging season for Crown MH application," says Ed.

Herbicide options for potato volunteer control within the rotation are dwindling but still include fluroxypyr, sulphonylurea group actives and clopyralid, depending on crop, but achieving good control can be difficult.

"In sugar beet, Conviso One burns off volunteers quite nicely but you'd also require some clopyralid to stop any regrowth," says ▶

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Ed Bingham says growers can dramatically reduce volunteer survival with a well-timed application of maleic hydrazide.

Reuben. "There's a difference between burning off the haulm of volunteers and getting herbicides down into the daughter tuber to stop them coming up."

An application of Debut (triflusulfuron-methyl) tank mixed with Efekt (ethofumesate) will knock back potato volunteer haulm but again won't control tubers without the addition of clopyralid, he adds.

According to Eric, glyphosate pre-harvest in a cereal crop where appropriate, or on stubbles, can also provide useful control of volunteer potatoes, but care with rates is required and, in seed-producing regions, extreme care where there are seed potatoes in the area.

"A whiff of glyphosate will have a devastating effect on a potato seed crop. You can, however, apply three or four litres of glyphosate to potato volunteers in stubble or pre-harvest and you're only going to get control of a proportion of those volunteers."

Non-chemical approaches to control should also be part of any integrated approach, he maintains. "Many potato harvesters will have picking tables and the pickers on the back of the harvester will be discarding tubers which are viable.

"Very few harvesters are equipped with chat crushers, which is a mechanical intervention that could be done and should be done, but isn't because there is a cost implication. It's an additional piece of equipment that could be factory-fitted- or retro-fitted, but it's just not being adopted."

Shallow cultivations can also contribute to groundkeeper control, particularly if there's a helping hand from cold weather, although climate change means there are fewer frosts penetrating the ground to kill off potato volunteers.

"If you plough you're burying the tubers 10-12 inches below the soil where they're protected from frosts with a blanket of soil, but if you're min-till you're keeping tubers close to the soil surface and they're more likely to get frosted," says Eric.

While there are undoubted benefits across the rotation from control of potato volunteers, the question of who should have responsibility for doing it is a contentious one. "Ultimately, the landowner is – or should be – responsible for controlling potato volunteers," suggests Eric.

"In Holland, there's a limit to the number of volunteers that are permitted in a field in a rotational context and growers will be fined if numbers exceed that level. But in the UK, there's no control of that whatsoever.

"The challenge is that 80% of fields growing potatoes are rented. Therefore, landowner engagement on this issue is really important, as is their appreciation

According to Eric Anderson, there should be a restrictive paragraph in land letting agreements which states that control of potato volunteers is part of that agreement.

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Artificial intelligence

Looking to the horizon, new digital technologies could provide additional tools for groundkeeper control.

In Scotland, a work package led by Jim Wilson and his SoilEssentials team within the five-year PCN Action Scotland project, is developing machine vision and artificial intelligence (AI) technology to accurately identify, target and control groundkeepers within fields.

With the project due for completion in 2025, work underway includes integration of the SoilEssentials KORE precision farming portal with drone imaging to generate whole field maps, which will quantify and pinpoint groundkeeper locations. This will allow zone spray applications to be used to control groundkeepers in a range of crops.

Most recently, the focus has shifted to developing Soil Essential's SKAi retrainable spot spraying system for real-time detection, identification and control of groundkeepers on a farm sprayer.

"We've had SKAi systems working across Scotland and the UK and Europe spot spraying a range of weeds. The initial targets were docks in grassland and we've moved onto potato volunteers in onions, broccoli and sugar beet during the last couple of years," says Jim.

"The aim this season is to get a commercial agricultural contractor fitted out with a sprayer and out spot spraying groundkeepers in broccoli crops in Scotland."

Elsewhere, Certis Belchim has recently announced a collaboration with Irish company MagrowTec, which uses magnetic assist technology to enhance plant protection product performance, which going forward could be developed for use with Crown MH, says the firm's Ed Bingham.

While there's no quick fix for potato volunteer control, maleic hydrazide continues to be an essential tool in integrated approaches to potato crop management, he concludes.

of the importance of volunteer control for an integrated approach and building sustainable potato crop management."

However, given the nature of the land rental system in place in the UK, recognition of this might not always be as it should be, he suggests. "In my view, there should be a restrictive paragraph in land letting agreements which states that control of potato volunteers is part of that agreement, so the land is let to the potato grower and they're then responsible for controlling the legacy effects of growing that crop."

Some might argue there's a case for regulation of volunteer potatoes similar to that already in place for PCN, for example. "To grow seed potatoes in Scotland you require a certificate and freedom from PCN at the level of detection in a soil sample. But there's no legislation in place in terms of potato volunteers.

"So although you require a six-year or eight-year rotation for seed and freedom from any PCN being found, there's no legislation which actually guides the grower or the landlord towards controlling potato volunteers – it's absolutely crazy," proclaims Eric.

He adds that in Scotland, discussions are taking place with growers, agronomists and the Scottish Government with regard to potato volunteers in the context of soil health. "What does 'soil health' mean? If you take it in a broader context, soil health should include freedom from, or at least a low level of, injurious pathogens such as PCN and possibly potato volunteers," he concludes. ■

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