Managing potato blight for small growers

Potato late blight (*Phytophthora infestans*) is a real problem for most organic growers, in most seasons. The blight fungus is evolving and some varieties that used to show resistance have now lost it. It is likely that copper will not be available for use against blight in the near future. So, how can smaller growers adapt and ensure they can successfully produce potatoes for their markets? This Innovative Farmers field lab meeting, hosted by Fred Bonestroo, at Duchy Home Farm explored issues around potato blight (varietal selection, adapting soils to the fungus, cultural management options, mesh covers) aiming to work together to come up with trials and potential solutions.

Potato varieties field lab

Ben Raskin gave a brief overview of the previous field lab which looked at growing different potato varieties for blight resistance. The field lab involved a small number of growers across the UK (two growers in Gloucestershire and one in Scotland) as an introductory trial. The group tested the performance of up to 11 varieties of potato against blight. There were some differences between sites, with Cara holding up better against blight than Carolus in Scotland, whilst the reverse was true in Gloucestershire. The group then performed a taste test to help convince consumers and retailers that different varieties can also be good to eat. This led to a discussion on consumers buying habits and how conservative they can be in some parts of the country. Are organic consumers being denied choice in the range of varieties available to them? Should we stop naming varieties we sell and just sell them by their intended purpose? Or should we encourage celebrity chefs to name blight-resistant varieties in their recipes?

Update on the blight pathogen

David Shaw from the Sarvari Research Trust updated us on the state of play with the blight pathogen and resistant varieties. Varietal resistance changes all the time and between seasons and locations. Many varieties that growers think of as being resistant are no longer so. Remarka and Cara can sometimes be highly resistant and at other times not. Lady Balfour, bred specifically for the organic sector has lost resistance in the foliage but still has enough resistance in the tubers to get a crop once the foliage has gone down. The 2017 season was dryish in early summer resulting in the late spread of blight over the country. The same two strains of blight (Blue 13 and Pink 6) are still predominant. Blue 13 first appeared in 2005 and Pink 6 in 2004, though 2011 was a big year for it when it consisted of 80% of the samples. The hot news is that a new genotype has invaded UK from the near continent. Known as Dark Green 37, which spread from a toe-hold in 2016 to many sites in West Midlands in 2017. It is of some concern to those using fungicides as it is resistant to Shirlan, a frequently used product containing fluazinam. The good news is that its virulence spectrum (ability to knock out resistance genes) is not as wide as that of Blue 13.

David showed us a disease progression curve that highlighted a number of varieties with very slow blighting in the foliage. These include Bionica, Sarpo Mira, Athlete, Axona, Carolus and Allouette. The stability of the resistance depends on whether varieties have single gene resistance or a combination of resistant genes, which produces much stronger resistance and lasts longer. The table shows that Sarpo Mira contains at least five resistant genes explaining how its resistance has been stable over the last 15 years or so.

Parent	R-Genes present
Sarpo Mira	R3a, R3b, R4, Rpi-Smira1, R8, others?
Bionica	Rpi-blb2, R2
Axona	Rpi-Smira1, R8 (?)
Carolus	Rpi-chc1

Resistance genes can fail if the blight pathogen mutates. The more a pathogen is exposed to the resistant genes the quicker a mutant will be selected. David argued that a little a bit of fungicide is necessary to protect a resistant crop from exposure. This could seem a backward step, but what if a 'friendlier' fungicide could be developed? A lot of labs are trying different substances that are extracted from plants and others are trialling microbial applications - bacteria applied to the surface to prevent blight infection. Bangor University has trialled ivy-based sprays, containing a purified form of saponin – α-hederin, which have been remarkably effective. Development of commercial applications will however take a few years.

Photo: Sarvari Research Trust

Blighted potato tubers - look under the skin

The Sarvari Research Trust is also working on tomato blight. They won a prize for Best Business Innovation in an award sponsored by Siemens Healthcare Diagnostics Products Ltd. In a PhD studentship at Bangor University James Stroud applied marker-assisted selection with field disease screening to test a range of tomato hybrids for resistance to late blight. The hybrids were developed by Simon Crawford at Burpee Europe. Crimson Crush was found to have two separate resistance genes and was blight free in the field experiments. It also has early ripening and tastes good! It is being marketed by Suttons Seeds.

Discussion

Novel approaches for blight control

- Using mesh covers, as described in the article in the last issue (OG41). Work in New Zealand has shown mesh crop covers can be effective at reducing blight with a strong correlation between decreasing UV light levels and decreasing foliar blight. Yields have increased up to 30% and gross margins by 27-75%.
- Soil immunisation. Some of the ideas of Irish grower John D'hondt were presented. Particularly, the idea of increasing soil resistance to blight by not rotating, leaving all infected material in situ and planting into that. It might seem counter-intuitive but the idea is to create favourable environments for the predators, enemies, parasites, competitors and antagonists of the blight pathogen by providing lots of food – diseased crops and plenty of compost. This is also the Shumei Natural Agriculture Approach (see OG9, OG28) and host Fred is growing potatoes for Shumei using their principles.
- Mulching. This arose from work carried out in the OSCAR (Optimising Subsidiary Crop Applications in Rotations) project, which focused on minimum tillage methods in organic farming. Trials showed that min-till and a thick layer of mulch can reduce late blight. The mechanism was thought to be light reflection from the dried mulch affecting germination of the late blight sporangia (See OG33).
- Agroforestry. Work at Wakelyns Agroforestry demonstrated that physical barriers of tree rows can prevent spread of blight from West to East.

Photos: ORC

Top: Hazel agroforestry system, Wakelyns 2012: western alley – blighted rows removed

Bottom: Hazel system 2012: eastern alley – no plants removed

After quite a bit of discussion on the options presented, it was felt that trialling the use of mesh covers for blight control would be relatively simple to do.

There was some resistance to using crop covers on another crop – and on a field crop at that. Growers are already using crop covers on brassicas and increasingly on leeks too, to prevent leek moth and allium leaf miner. Also, the time needed to handle them, restricting growth through bent stems, and damage inflicted when taking covers on and off, was considered a drawback. It was pointed out, however, that you might not need to put the covers on that early and could cover the crops once the last weeding has been done, so that it wouldn't need to be removed until harvest, apart for crop inspections. The mesh cover could be put on after ridging up and around the time that blight is first reported. The potential yield advantages should also not be discounted.

The proposed trials consist of a minimum of two replicates with plots at least 3 rows wide x 10m long, comparing plots with mesh cover and without (control). The time when the first disease symptoms appeared on the crop would be noted and then weekly assessments, ideally, on disease progression using simple assessments on percentage leaf area affected. Any positive or negative effects of the mesh cover, beyond any effect on blight, should be noted. Finally, quantitative and qualitative recording of yields from sample digs on the plots will be carried out.

If you are interested in taking part in the trials please contact dominic.a@organicresearchcentre.com

Phil Sumption