Control the Green Bridge - don’t keep virus & disease alive!

The term ‘green bridge effect’ is used to describe any green plant material which survives over-winter and acts as a host for pests and diseases. Effectively these plants ‘bridge the gap’ between cropping seasons for pests and diseases, enabling early spread and infection within subsequent crops. Weed species, cover crops and crop volunteers can all act as a green bridge, as well as any leaf growth on spoil heaps and clamps.

Whilst this article focuses on virus, it is important to appreciate that foliar diseases such as rust, powdery mildew and cercospora can all be green bridged. Green bridging is a particularly important source of cercospora infection. Cercospora (right) has been a serious issue in many 2020 crops and we need to do everything we can to reduce the risk of infection in subsequent crops.

Green bridging is an equally important source of infection for foliar diseases as it is for virus

Pic 1. Cercospora leaf spot

Attention to detail is key to controlling the green bridge:

- Monitor harvesting closely in order to minimise the number of roots left in the soil
- Regularly re-check fields and remove any groundkeepers.
- Carefully dispose of all crop debris under cleaner loaders and around clamps
- Clear and destroy any remaining spoil heaps before the new crop emerges.
- Control any leaf growth on beet clamps.
- Keep crop volunteers and weed species under control with well-timed, comprehensive herbicide programmes.

Pic 2.Variable root size - adjust harvester settings

Pic 3. Monitor surface losses

Pic 4. Carefully dispose of spoil

5. New leaf growth on spoil

6. Leaf growth in clamp

7. Bolted plants on spoil in spring

An example of the Green Bridge effect in action...

Several beet plants are left behind in the field after harvesting. One of these plants had become infected with BYV over the summer. This beet had been topped but survives through the mild winter and produces fresh leaves the following spring. These fresh, young leaves attract *Myzus persicae* aphids migrating from a nearby hedge, where they have been overwintering on weeds. The aphids feed on this plant before moving off into the neighbouring field of recently drilled beet – so introducing BYV into the new beet crop

By maintaining good farm-hygiene and removing these groundkeepers the risk of virus entering the new beet crop is reduced.

Pic 8. Bolted groundkeeper in the spring

What other plant species may host aphids & virus?

When determining the risk of virus yellows for a crop, the presence of both aphid host and virus host plants must be considered. In some cases, the same species can be both an over-wintering aphid host and a virus host. These plants species pose the highest risk.

Aphid hosts

Myzus persicae has a large range of host plants including brassicas, potatoes, legumes, lettuce and sugar beet. However, brassica species appear to be their preferred over-winter host where they can survive as live adults and/or offspring. This puts beet crops neighbouring rape fields at particular risk of early infestation and potentially virus infection. *Myzus persicae* aphids can also overwinter as eggs on peach trees (hence the common name peach-potato aphid), although, in the UK, this is not a major source of aphids for the following spring crop.

Virus hosts

Infected sugar beet, either groundkeepers or leaf material on clamps, are one of the most important sources of virus. Some weed species can also be infected by beet viruses. Current known hosts of BYV and BMYV are listed below (BBRO testing is ongoing to update this list to include cover crop species and known insusceptible species):

BYV:

- Common chickweed (Stellaria media)
- Common orache (Atriplex patula)
- Common poppy (Papaver rhoeas)
- Common purslane (Portulaca oleracea)
- Corn spurry (Spergula arvensis)
- Garden orache (Atriplex hortensis)
- Red dead nettle (Laminum purpureum)

BMYV

- Scarlet pimpernel (Anagallis arvensis)
- Shepherd's purse (Capsella bursa-pastoris)
- Corn marigold (Chrysanthemum segetum)
- Red dead nettle (Laminum purpureum)
- Common poppy (Papaver rhoeas)
- Groundsel (Senecio vulgaris)
- Corn spurry (Spergula arvensis)
- Common chickweed (Stellaria media)
- Field pansy (Viola arvensis)

What about cover crops?

The comments below apply to overwintered cover crops which are destroyed ahead of sugar beet as opposed to cover crops which are undersown in sugar beet crops for managing wind-blow. BBRO is currently investigating how undersown barley (not a host of the virus) may potentially help reduce virus infection.

- Aphid survival overwinter is dependent on temperature. Periods of frost will reduce aphid numbers considerably. Concern about our increasingly mild winters means more aphids may survive and with the higher background levels of virus this means there will potentially be more sources of infective aphids surviving overwinter on cover crops.
- Certain species such as brassicas which include mustards and radishes are better hosts of the aphid *Myzus persicae* than other species, although, except for white mustard, they do not host the virus.
- Very few of the other more commonly grown cover crop species are hosts of the virus.
- A pragmatic approach would be to reduce the use of brassica-based cover crops to help reduce the potential build-up of aphid numbers. Many growers use rye or

oat-based cover crops, and these are likely to be poorer hosts of *Myzus persicae* and therefore good choices. Inclusion of another partner species such as buckwheat, vetch or phacelia should not be an issue.

- Ensure that cover crops are destroyed thoroughly, so **no green material** is left, on which aphids can survive. Buckwheat has been shown to be very frost susceptible and tends not to survive a frost. At the other extreme, phacelia can be challenging to destroy thoroughly.
- Target to destroy cover crops a **minimum of 5-6 weeks** ahead of drilling sugar beet.
- Where possible, timing cover crop destruction, particularly mechanical destruction and grazing to coincide with predicted spells of cold weather as this will help reduce aphid numbers even further.

At a field level, virus yellows risk will be influenced by the frequency and proximity of aphid and virus host plants. The chart below shows that the highest risk occurs when both over-wintering aphid hosts and virus sources are found close to the new beet crop.

Recognising where the risks of green bridging are greatest and targeting removal of the key potential sources of virus will have a significant effect of reducing virus infection in your next sugar beet crops.

Near the field there are...	No over-wintering aphid host plants	Few over-wintering host plants	Many over-wintering host plants
No virus host plants	Low risk		
Few virus host plants			
Many virus host plants			High risk

Help in the fight to reduce virus infection #DontKeepVirusYellowsAlive