Overwinter cover crop update August 2020

Previous BBRO work has clearly shown that cover crops ahead of sugar beet can have a positive impact on soils properties, helping to improve soil structure, soil biology, organic matter and nutrition. These effects are frequently translated into improved sugar beet yields. However, in the face of increasing levels of the yellowing viruses, are these benefits outweighed by the potential green-bridging effect of cover crops on aphids?

Unfortunately, there is little recent definitive work on this aspect although BBRO have been screening different plant (weed and cover crop) species as potential hosts of the Beet mild yellowing virus and Beet yellows virus that are involved in the virus yellows complex. It is possible to draw on existing knowledge and make the following comments, highlighting that careful selection of cover crop species and management of the cover crop can reduce these risks.

These comments 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 aphids or virus) may potentially help reduce virus infection.

- Aphid survival overwinter is dependent on temperature. Periods of frost will reduce aphid numbers considerably. A 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 or weeds that subsequently emerge in these fields.
- Many aphids over winter as adults either as winged or wingless forms and often there is an autumn migration of aphids that could migrate and multiply in cover crops ahead of beet.
- Certain species such as brassicas which include mustards and radishes are better hosts of the key aphid (*Myzus persicae*) than other species, although they do not host the virus. However, white mustard has recently been shown to be a host one of the yellowing viruses.
- 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/eggs could survive.
- Buckwheat has been shown to be very frost susceptible and tends not to survive a period of cold weather . 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, ideally forecasted frost, will help reduce aphid numbers even further.

Overwinter cover crop checklist

- Be clear about what you want them to do before selecting your cover crop species. For example, improving soil structure and fertility, nutrient retention or building organic matter.
- Assess soil structure if unsure. The 2019 BBRO Reference book provides a practical guide to using the VESS approach to do this. You can also find this on the BBRO website.
- Cover crops have been shown to increase earthworm numbers across a range of soil types. Check on earthworm numbers when assessing soil structure.
- Production of early cover crop biomass is key so target drilling into moisture as early as possible**.** Wait until rain to establish cover crops.
- Don't skimp on seed rates. Link seed rates to soil conditions. Increase the seed rate in dry conditions and for later drilled crops.
- Sheep grazing of cover crops works well as a method of destruction. Desiccation and crimping need to carefully managed and can be difficult in crops with a large biomass. Ensure all green material is destroyed.
- Remember, target a 5-6-week gap between destruction and drilling sugar beet to reduce green bridging by pests and disease.

Cover crop species (excluding brassicas)		
Grasses/cereals	**Legumes**	**Others**
		
Oats, rye, rye-grass	**Vetch, clover**	**Phacelia, buckwheat**
Fairly good autumn establishment. Wide range of sowing dates. Good early ground cover. Relatively shallow root development, improving topsoil structure. Good for soil erosion control and stabilisation. Non-host of *Myzus persicae* and virus.	N-fixing, improves fertility. Good for addition of organic matter. Need moisture for good establishment. Need early drilling as they can be slow to develop biomass. Medium-shallow rooting. Good for beneficials. Can host *Myzus persicae* but not virus.	Relatively good autumn establishment. However, buckwheat is not frost tolerant. Some deep rooting for nutrient retention, Some good soil structuring. Very good for beneficials. Non-host of virus.