

Cover crop update August 2023

BBRO work has shown that cover crops ahead of sugar beet can have a positive impact on soil properties, helping to improve soil structure, soil biology, organic matter, and nutrition. This can have a positive effect on sugar beet yield. Benefits need to be balanced against the risk of the potential green-bridging effect of cover crops as hosts for aphids and virus as well as other pests, and foliar diseases.

There is some limited work on which cover crop species host viruses and BBRO are currently screening additional cover crop species as potential hosts of the sugar beet yellowing viruses.

It is possible to draw on existing knowledge and make the following guidelines regarding cover crops, highlighting that careful selection of cover crop species and management of the cover crop can reduce these risks.

Managing the 'green bridge' risk

- **Cover crops and overwinter aphid survival.** Aphid survival is strongly dependent on temperature with periods of frost and cold weather reducing aphid numbers. Increasingly mild winters mean that more aphids are surviving over winter. Cover crops can further increase this risk as they may allow higher numbers of aphids to survive compared to leaving land fallow over winter. This can result in a greater risk to subsequent sugar beet crops from the green bridge. Certain species such as brassicas, which include mustards and radishes, are very good hosts of aphids, including *Myzus persicae* which is the key vector of virus.
- **Cover crops as hosts of virus.** There is limited information on cover crop species as virus hosts. There is limited evidence from BBRO work that the following cover crop species host the beet poleroviruses (BMV and BChV or both):
 - White mustard
 - Vetch
 - Phacelia
 - Red clover

BBRO is undertaking further work to identify if other cover crop species host the polioviruses. Tests will also be undertaken to identify hosts of virus yellows (BYV). **Importantly** it is not known to what extent aphids can acquire virus from species which show virus symptoms, but it is considered a risk.

BBRO has also tested weed species as virus hosts and information on this can be found on page 68 of the BBRO Reference Book.





- **Brassica species** are a preferred food source for *Myzus persicae* and present a risk of hosting large numbers of aphids. This is why in situations where oilseed rape is grown near sugar beet crops, aphid

numbers have been shown to be greater. A pragmatic approach would be to **reduce** the use of brassica-based cover crop species 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*.

- **Early & thorough cover crop destruction** is essential to breaking the green bridge between cover crops and sugar beet. Ensure that cover crops are destroyed thoroughly, so no green material is left. Aim to destroy cover crops completely in time to have a **minimum of 5-6 weeks** ahead of drilling sugar beet. Where possible, timing cover crop destruction to coincide with predicted spells of freezing weather will help reduce aphid numbers as well as a more thorough biomass destruction. Glyphosate may be required to complete destruction depending on how efficient other methods, such as mechanical destruction and grazing, have been. Buckwheat has been shown to be very frost susceptible, whilst at the other extreme phacelia can be challenging to destroy thoroughly.
- **Cover crops and beet cyst nematode (BCN)**. Brassica cover crops do have a potential to be good hosts of BCN and could lead to a build-up in populations whilst they are grown. Resistant varieties of white mustard and radishes exist and could be used instead of susceptible varieties. We recommend asking your seed merchant for information on the BCN status of your cover crops before you purchase. Some resistant radishes and mustards have been reported to reduce BCN populations, although the consensus in the published literature is mixed and more research in the UK is needed before BBRO would support their widespread use for BCN management. *N.B. whilst resistant varieties are marketed as offering 70% or 90% population reductions of BCN, it is unlikely that these reflect field performances since this data is from standardised lab tests.*

Overwinter cover crop guidelines

- Be clear about what you want them to do before selecting your cover crop species. For example, improving soil structure, increasing organic matter or nutrient retention.
- Always, assess soil structure and health as a starting point. You can find information on the BBRO website on how to do this. This may help signpost what you want the cover crop to achieve. Remember that this may vary between fields.
- There is little evidence on the value of more expensive formulated multi-species mixes compared to simpler and cheaper mixes of 1-3 species, some of which can be sourced and prepared on-farm.
- **Production of early cover crop biomass is key** so target drilling into moisture as early as possible. Wait until rain to establish cover crops.
- Legumes fix nitrogen and BBRO trials have shown in cover crops with well-established legume species this can amount to 40 kg N/ha. Trials have shown that a high proportion of this nitrogen will be available with 4-6 weeks to the following crop.
- Don't skimp on seed rates. Link seed rates to soil conditions. Increase the seed rate in dry conditions and for later drilled crops. This may need to be as high as 30-40kg/ha for vetches and clovers which can be difficult to establish.
- Remember, target a 5-6-week gap between destruction and drilling sugar beet to reduce green bridging by pests and disease.

Cover crop species summaries		
<p style="text-align: center;">Grasses/cereals</p>  <p style="text-align: center;">Oats, rye, rye-grass</p>	<p style="text-align: center;">Legumes</p>  <p style="text-align: center;">Vetch, clover</p>	<p style="text-align: center;">Others</p>  <p style="text-align: center;">Phacelia, buckwheat</p>
<p>Fairly good autumn establishment. Wide range of sowing dates. Good early ground cover. Shallow root development, improving topsoil structure. Good for soil erosion control and stabilisation. Non-host of <i>Myzus persicae</i> and virus.</p>	<p>N-fixing 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. Some species may host virus.</p>	<p>Good autumn establishment. However, buckwheat is not frost tolerant. Some deep rooting for nutrient retention, Some good soil structuring. Particularly good for beneficials. Phacelia has been shown to host virus.</p>
	<p style="text-align: center;">Brassicas</p>  <p style="text-align: center;">Mustard, radish, turnip</p> <p>Good autumn growth. Compatible with existing farm Equipment. Potential Nematode trap crops. Deep rooting – soil structure & leaching mitigation. Sowing dates can be critical for different species (summer autumn). Green bridging of aphids a high risk.</p>	

The use of overwinter cover crops can have a positive impact on soil properties, helping to improve soil structure, soil biology, organic matter, and nutrition. BBRO work has shown that this can help improve the resilience of crops to stress, and the yield of sugar beet. The risk of green bridging can be managed by the careful selection of the cover crop species, especially in relation to other crops in the rotation and the effective destruction of the cover crop 5-6 weeks in advance of drilling sugar beet. Practicing good farm hygiene and the removal of other sources of pest, virus and disease on the farm is also essential when growing cover crops.

Cover crops following the use of Crusier SB treated seed.

Remember that there are following-crop restrictions for subsequent crops planted on the same area of land where Cruiser SB sugar beet has been drilled previously. Cruiser SB was applied under EA regulations in 2022 and 2023. Any crop excluded from the list below should be considered ‘restricted’ i.e., a minimum of 32 months from drilling of Sugar Beet. The 32-month restriction applies to those agri-environment options that allow flowers to grow or appear on the same ground on which Cruiser SB treated seed was sown in 2023.

Cover crops (including mixes) must also follow the 32-month restrictions.

	<i>Non-restricted</i>	<i>Restricted</i>
Rules	<i>No restrictions following Sugar Beet</i>	<i>A minimum of 32 months from drilling of Sugar Beet</i>
Crops	<ol style="list-style-type: none"> 1. <i>Wheat (including Durum Wheat)</i> 2. <i>Barley</i> 3. <i>Millet</i> 4. <i>Sorghum</i> 5. <i>Oat</i> 6. <i>Maize / Corn</i> 7. <i>Rye</i> 8. <i>Triticale</i> 9. <i>Canary seed</i> 10. <i>Spelt</i> 11. <i>Potato</i> 12. <i>Cabbage</i> 13. <i>Kale</i> 14. <i>Swede</i> 15. <i>Lettuce / Babyleaf / Spinach</i> 16. <i>Onions</i> 17. <i>Leeks</i> 18. <i>Carrots</i> 19. <i>Parsnips</i> 20. <i>Cauliflower</i> 21. <i>Broccoli</i> 22. <i>Turnip</i> 	<ol style="list-style-type: none"> 23. <i>Oilseed Rape</i> 24. <i>Linseed</i> 25. <i>Mustard</i> 26. <i>Soya Bean</i> 27. <i>Pea</i> 28. <i>Bean</i> 29. <i>Buckwheat</i> 30. <i>Clover</i> 31. <i>Phacelia</i> 32. <i>Chicory</i> 33. <i>Radish</i> 34. <i>Vetch</i> 35. <i>False Flax</i> 36. <i>Lucerne</i> 37. <i>Sunflower</i> 38. <i>Borage</i> 39. <i>Sainfoin</i> 40. <i>Nyger</i> 41. <i>Lupins</i>