



Cover crops

There is increasing evidence that the use of cover crops in arable rotations has a positive impact on soil health. Work on cover crops has demonstrated how they can improve the physical structure of the soil as well as improving soil biology and chemistry (nutrients). The use of an autumn established cover crop before sugar beet is therefore a good option but it is important to balance the advantages of cover crop against the risk of introducing a 'green bridge' for pests, diseases, and virus. This risk can be reduced by ensuring that the use of species such as brassicas is kept to a minimum and ensuring a good 5-6 week break between destroying the cover crop and drilling sugar beet in high-risk situations.

Getting cover crops established in good conditions to produce sufficient above ground biomass and below ground root mass is key to how effective they are. The ability to sow cover crops into soils with sufficient moisture and warmth should be a key factor in deciding whether to have a cover crop or what species to grow.

A BBRO survey of 12 sugar beet crops following a cover crop was undertaken in 2017 & 18. Replicated yield digs were undertaken to estimate the yield in areas where there had been a cover crop grown and where the land had been left in stubble before sugar beet.

The table below shows the number of sugar beet crops where the yield was increased.

	% of beet crops showing positive yield benefits
All fields with one cover crop	42%
Fields with more than one cover crop in the rotation	50%
Fields with reduced tillage regimes and cover crop(s)	58%

This reinforces the message that there may not always be a yield increase in your sugar beet crop following a cover crop. However, the chances of seeing a positive yield effect appear to be better over the longer term where more cover crops have been grown in the rotation and/or where cover crops used in conjunction with reduced tillage approaches. There is broader evidence from other studies that also support these interactions: increasing organic matter inputs such as cover crops and reduced tillage can act together to promote improved soil structure, increased biomass, biological activity, and diversity of soil organisms.



Cover crop check list

- Be clear about what you want them to do – for example, soil structuring, fertility/organic matter building or beet cyst nematode management before selecting cover crop species
- Good benefits on soil structure are possible. Consider which part of soil profile you want to improve. Cereal species (high seed rates into moist soils) for shallow structuring and brassica species and Phacelia are good for deeper structuring
- Assess soil structure if unsure. Use the VESS approach to do this
- Deeper rooting species will provide good nutrient retention
- Cereal species- good autumn establishment good for soil erosion and stabilisation
- Single and 2/3 species mixes work well with no clear advantage from more complex multispecies mixes
- Better performance from early drilling into moisture (early production of biomass is key)
- Increase the seed rate in dry conditions and for later drilled crops
- Inclusion of legumes will add nitrogen. Typically, 30-80kg N /ha can be fixed in the autumn but temperatures above 7/8°C are key, so drill early
- Legumes are slower growing and require good seedbeds and moisture to establish enough biomass. Mix legumes with non-legumes to reduce leaching risk. Legume mix cover crop will add nitrogen to the soil
- Assess nitrogen levels, particularly levels when legumes are grown as higher soil mineral nitrogen may allow for reductions in applied N to the sugar beet crop
- Nitrogen lock-up is not an issue where a five- to six-week gap is maintained. High C:N ratio cover crops such as woody brassica species may need longer
- Cover crops have been shown to increase earthworm numbers across a range of soil types
- Target a 5-6-week gap between destruction and drilling sugar beet to reduce green bridging by pests and disease. Work back from your intended sugar beet drilling date to create a sufficient window for full cover crop destruction
- Sheep grazing of cover crops works well as a method of destruction. Desiccation and crimping need to be carefully managed and can be difficult in crops with a large biomass, especially in wet conditions.

Beet Cyst Nematode and cover crops

Be aware of the risk of harbouring BCN on your cover crops as it is hosted by a wide range of Brassica species and can rapidly multiply on some cover crops, especially when planted early into warm soils, harming your future beet crop.

Recent BBRO research recommends the use of resistant brassica trap crops on infested fields, which will prevent significant population build-up, but reliable population reductions were not found from all varieties tested over two years of trials. Make sure you know the variety is resistant.

If you're concerned about BCN on your cover crops, pull up the roots and check for the characteristic white cysts. If found, destroy the cover crop immediately to prevent BCN numbers increasing, aiming for a 5–6-week gap between destroying the cover crop and drilling sugar beet and grow a BCN tolerant variety of sugar beet.