

MAXIMISING CARBON STORAGE FROM COVER CROPS

Sequestering carbon

Cover crops can increase soil organic carbon (SOC) levels, improving soil health and climate change mitigation. Losses of SOC in the top 30 cm cultivation zone is a potential risk to crop productivity and a source of CO₂ emissions. Organic matter is added to the soil via plant biomass and feeding a more diverse soil microbial community.

Enhanced levels of SOC due to cover cropping depends on the quantity and quality of residues and their decomposition rates. Total cover crop biomass is largely determined by species management, soil conditions and fertility, rainfall and temperature.

Optimising cover crop growth

Cover crop establishment is critical to subsequent growth and performance. A field trial was established on a sandy loam soil at Niab's Morley trials site in Norfolk, to understand the impact of drill-date and seed rate (SR) (Figure 1). Figure 2 shows the result for above- (AGB) and below-ground biomass (BGB).

Figure 1. Components of three cover crop mixes for a trial based at Morley, Norfolk, UK (seed supplied by Cotswold Seeds Ltd.)

Mixture	Components	Standard SR (x1, kg/ha)	Higher SR (x1.35, kg/ha)
Legume mixture	Buckwheat (Lileja), Black oats (Luxurial), Lucerne (Milky-Max), Vetch (Early English), Forage pea (Arvica), Yellow trefoil (Virgo Pajbjerg)	34.0	45.9
Bio-cultivation mixture	Diversity ribgrass (plantain), Chicory blend (Puna, Endure), Phacelia (Lilla)	4.0	5.4
Farm Standard	Phacelia, Black oats (Bristol), Buckwheat	21.5	n/a
Control	Weedy stubble - no seed, no inputs	0	0

Findings from the trial

- In January, the greatest effect on biomass was due to an earlier drill date, which substantially increased biomass compared to later drill dates (Figure 2). Earlier drill dates enabled good growth during warmer conditions.
- The legume mix performed better at the earliest drill date and at the standard SR in January.
- In January, higher SR led to lower AGB compared to standard SR, probably due to competition for resources.
- If cover crops must be destroyed early (January) earlier establishment was key to maximising biomass.
- The legume mix at standard SR produced the largest BGB.

CHCx3 is funded by Defra under the Farming Futures R&D Fund: Climate Smart Farming. It forms part of Defra's Farming Innovation Programme, delivered in partnership with Innovate UK.

Figure 2. AGB and BGB sampled in January for three cover crop mixtures drilled on three dates and at two seed rates

