

In focus

A series of deep dives into AGCO Finance's whitepaper
Farming for a better future.



**The many benefits
of cover crops**

Introduction

The idea of cover crops is not new. You can go back 3000 years to China to find evidence of its use or to ancient Greece or Rome to see 'green manure' being used to enrich and protect the soil during fallow periods. But the idea is gaining ground again as a strong support to farms that practice no till and reduced till methods, enabling them to maximise nutrients in the soil and improve productivity. And it's also increasingly important as a way to bolster the soil's ability to sequester extra carbon, helping to fight the very real and immediate climate change threat.

Also, experts now believe that using cover crops – planting grasses, legumes or brassicas on otherwise bare soil – is a necessary accompaniment to conservation tillage to make sure farms get the expected results. Cover crops use the sun's energy and CO₂ from the atmosphere to grow and in the process add to the soil's organic matter with their roots and surface residue. It's known as green manure because it's traditionally killed on the surface or incorporated into the soil before maturation. High in nitrogen, it decomposes quickly.

Crucially, cover crops minimise run off and soil erosion, as green leaves absorb some of the precipitation and living roots hold onto the soil. Already, we know from various studies that conservation tillage can potentially sequester carbon at a rate of 0.7 tons of CO₂ per hectare annually. So, post-COP 26, it is important farmers learn more about the methods and benefits of cover crop planting as a complement to conservation tillage.

Cover crops benefits

There are a wide range of benefits to cover crop farming (see box 1) ranging from reducing soil erosion and compaction to better nutrient cycling to less runoffs of nutrients and sediment to waterways. A five-year experiment with crimson clover in California showed increases in organic matter, for example, of 1.3% to 2.6% in the top 5-15 cm of topsoil, leading to an 8.5% increase in organic matter. And in this case, soil nitrogen was boosted by a rate of 12.8%. Cover crops also act as a natural way to control pests. For instance, pollen and nectar from the cover crops acts as an important food source for predatory mites and parasitic wasps that prey on certain pests.

Eight benefits of cover crops

1. Reduced soil erosion and compaction
2. Improved water infiltration and storage
3. Weed and pest suppression
4. Better nutrient cycling
5. Less runoff of nutrients and sediment to waterways
6. Reduced nitrate leaching
7. Reduced flooding in watersheds
8. Greater soil carbon sequestration



Three main types of cover crops

Farmers looking into cover crops for the first time obviously need to base their decisions on the type of soil and climate they have. But it's worth being aware that the three main types of cover crop – grasses, legumes and brassicas – have their own particular pros and cons.

There are three plus points for using grasses as cover crops. They are great scavengers of nutrients, especially nitrogen, they produce abundant biomass above and below ground adding new organic matter and they are good weed

controllers, suppressing its germination and growth. Cereal rye, for instance, has allelopathic chemical elements which suppress the growth of broadleaf weed seeds. Where grasses are not so good is on the amount of soil nutrient content they leave behind for the next crop.

Legumes, often best grown in the spring, are known for being effective at fixing nitrogen into the soil. Indeed, varieties such as crimson clover and hairy vetch, which can be grown in harsher winter conditions, can deliver more than a hundred

pounds of nitrogen to the next crop for every 0.4 hectare. They can also capture crucial nitrates that would otherwise leak away. For example, deep rooted legumes such as cereal rye can capture nitrogen leaking from other cover crops, which have not survived the frost for example.

So while legumes tend to produce less carbon in the residue, they are rich in nitrogen and release nutrients faster than grasses. However, they don't add so much organic matter to the soil.

If you want to reduce pesticide use, brassicas are best as they release glucosinolates, natural chemicals that fight off pests. They also reduce soil compaction and allow water to

penetrate the soil more freely. Oilseed (forage) radish, to take one example, breaks through compacted layers of soil with its large taproot more than a foot long.

Cover crops integration

There are several alternative ways to grow cover crops. Where you want to maximise the build-up of organic matter, you can achieve this by planting cover crops throughout the growing season. Alternatively, farmers can plant cover crops using no till methods after a cash crop harvest. If you have a short growing season, you could consider inter-seeding cover crops along with the main crops, which has several benefits such as erosion control, higher water infiltration, more nitrate for future crops and less insect damage.



The interest in cover crops grows

Turning to methods such as cover crops has clear financial benefits, helping to create savings such as less fertilizer use as well as making for a positive return on farm profits in the medium to long term for the varied reasons stated. Farmers, unsure about making the leap, will find that there are financial instruments available to help them get there. And there is clear evidence of the benefits out there. A recent US study of farmers showed that in the drought year of 2012, using cover crops improved soybean yields by 12% and corn by 10%. It also showed many farmers in the study made significant savings on the use of fertiliser and herbicides on their cash crops

because they grew cover crops. Overall, the study proved that using cover crops improved the bottom line, which could help explain why their use increased by 50%, according to the same US study, in the years 2012-2017. In 2017, US farmers planted an estimated 15.4 million acres of cover crops, a clear sign that the age-old techniques of 'green manure' makes good sense in the modern farming world. Add to this, the fact that it can make soil more resilient in the face of more extreme weather conditions and help farmers tap into future carbon sequestration markets, and it seems worth exploring taking up this ancient method.

Recommended Reading:

Farming for a better future, AGCO Finance whitepaper, December 2021.

Cover Crops, Chapter 10 in Magdoff, F. & Van Es, H., Building Soils for Better Crops: ecological management for healthy soils (4th edition), SARE: 2021.

Cover Crop Trends, Programs, and Practices in the United States (U.S. Department of Agriculture (Wallander, S, Smith, D, Bowman, M & Claassen), Economic Research Service, Economic Information Bulletin, No. 222, February 2021.