

Carbon credits: grain farmers have much to gain

The carbon landscape is changing quickly as grain farmers realise the value that lies in building carbon in their soils. But how can farmers best utilise their land to gain maximum financial value? **Lindi Botha** spoke to expert **Dr Hendrik Smith**.



Conservation agriculture (CA) practices are gaining traction in South Africa, and CA has resulted in many farmers increasing the potential of their soils to a point where the whole agro-ecological system is regenerated. This is why the term regenerative agriculture is often favoured.

These practices also lead to crops being better protected against threats like drought, climate change, pests, diseases and increasing input costs. Thanks to no-till cultivation and cover crops, farmers are also making a significant contribution to reducing greenhouse gas emissions and sequestering carbon in the soil. This has the added potential of earning farmers extra income through carbon credits.

To gain the utmost benefit from these systems, Dr Hendrik Smith, conservation agricultural facilitator at ASSET Research and the Maize Trust, explains that the trifecta of a no-till system, permanent organic soil cover and biodiversity is needed.

“Minimal disturbance of the soil, a permanent soil cover and the trampling effect of cattle grazing on diverse cover crops, together with the micro-organisms and nutrients they support in the soil through manure and urine, create the best scenario for capturing carbon and lowering a farm’s carbon footprint.”

Studies undertaken under the CA Farmer Innovation Programme in the summer rainfall cropping areas of South Africa, which have been funded by the Maize Trust and implemented by ASSET Research, show that the most benefits could be obtained from a three-year rotation system. In the first year, a relay winter cover crop is planted in between a maize crop in around February. In the second year, this field is planted to a multispecies summer and winter cover crop, early enough in the season to allow for it to be grazed three times, recovering between grazing.

In the third year, soya bean will be planted in this field, with the relay winter cover crop sown as it was in the first year, or directly after the soya bean is harvested.

The grazing system used in conjunction with the cover crops is important to get the best benefits. Smith says that this requires high-density grazing, where double the amount of cattle would be allowed to graze the field than what the average rate would be.

“The cattle must graze quickly and then move on to maximise the trampling effect and the density of urine and manure on the soil. Urine and manure have a wonderful effect on soil health, especially [combined] with the cover crops and the micro-organisms they bring.”

He explains that carbon is primarily built up in the soil through photosynthesising crops. The diverse cropping systems explained above secrete

carbon into the soil through their roots, where a whole soil food web of 'carbon' is then built.

"By increasing the photosynthetic capacity of a field through the inclusion of cover crops, and the nutrients dispersed by the manure, you build far more carbon in the soil. This synergy between the cover crops and cattle creates tremendous benefits that you can't achieve if you have one without the other," explains Smith.

When choosing cover crops, he advises that farmers address shortages in the soil. Ideally, a mix of grasses, legumes and brassicas are included. "For summer cover crops, we advise fodder sorghum and millet as our grass species, and cowpeas, lablab and/or sun hemp for the legumes. Sunflower is also a good crop to bring into the mixture, because while it provides a flower above the soil that attracts beneficial insects, below the soil it has a very positive impact on the soil biology and increases micro-organisms. The strong root system loosens the soil and prevents compaction.

"Winter cover crops include grasses like oats, triticale and wheat. Legumes include grazing vetch, field peas, and brassicas include radishes and turnips."

'A NO-TILL SYSTEM, PERMANENT ORGANIC SOIL COVER AND BIODIVERSITY ARE ALL NEEDED'

Density is important when planting a relay system, and the row width needs to be adjusted.

"At a row width of 50cm, which is the norm these days, intercropping is difficult. But 75cm and wider works well. The relay crops don't affect the yield at all, and since you're getting income from the cash crop and the cover crop through grazing all in one season, it is essentially a double crop. It is this element of the system that brings the financial benefit, beyond the carbon credits."

Savings from using this system includes reduced production inputs and overhead costs. Completely halting tillage and the turnover of soil significantly reduces tractor usage and associated diesel consumption. Overhead costs of tractor and equipment maintenance are also significantly cut back. Field assessments conducted by Smith and his team have indicated that a reduction in power consumption, including diesel usage, tractor hours and tractor size, of 50% can be reasonably expected. There are also input savings from reduced fertiliser requirements due to the increase in soil health, amounting to between 15% and 50% over five years.

To gain the added advantage of carbon credits is a complicated and intensive process. Farmers need to register the clusters of land where carbon



DR HENDRIK SMITH

LEFT:

A relay cover crop planted in between a maize or soya bean crop ensures that the soil is permanently covered.

BELOW LEFT:

Cover crop seed should be mixed according to the farm's requirements, and can include up to 26 different crops. Farmers should take care to get the right balance.

OPPOSITE PAGE:

To gain the maximum benefits in terms of carbon sequestration, regenerative agricultural practices should be followed.

PHOTOS: LINDI BOTHA



will be sequestered (known as projects) through qualified companies. One such company is Cultivating Carbon, which was established by a group of local experts, including Smith. Various criteria also need to be fulfilled for a project to qualify, including additionality and permanence.

PROJECTS MUST BE REGISTERED

Smith explains that additionality needs to be proven by showing that the activities in the project and/or area are sequestering extra carbon. "In other words, it can't be carbon that would have been sequestered anyway as part of normal farming practices. Additional steps must be taken to reduce the carbon footprint. Furthermore, the project needs to have a long-term cycle so that enough of a gain can be registered. For this reason, projects of about 20 to 30 years are being looked at."

To circumvent the prohibitive costs and cumbersome administration of trading carbon

FAST FACTS

Regenerative agriculture offers the best method of gaining carbon credits.

Cultivating Carbon has registered a project for multiple farmers to circumvent the high cost of registering single farms.

The real financial benefit comes from savings in inputs.

credits, Cultivating Carbon is aiming to register projects in suitable areas in South Africa where multiple farms are following, or are aiming to follow, good CA practices, including no-till, cover crops and livestock integration. Smith explains that additionality can be claimed here, since only around 10% of the CA farmers in most areas are already following these practices and sequestering carbon. “There is a limit of up to 25% adoption that we can reach before we can’t prove additionality anymore. So at this stage, anything we add above 10% we can claim as additionality.”

Through Cultivating Carbon, 70% of carbon revenues generated are paid to participating farmers. The remaining 30% is used by Cultivating Carbon to bear the cost of carbon development, monitoring, evaluation and verification through an international carbon standard. They also provide technical assistance for farmers to navigate the complex waters of CA, carbon sequestration and measuring.



ABOVE: High-density grazing should be implemented on croplands to introduce micro-organisms from cattle manure.

Smith says the intention is to remove the technical and financial barriers to entry that are often associated with carbon markets, and to develop a project at scale that reduces the cost per farm and maximises returns for each farmer. Cultivating Carbon will seek verification through Verra, an internationally recognised standard recognised under South Africa’s carbon tax regulations.

THE CARBON CALCULATOR

As a starting point in each project, carbon in the soil must be measured and then continuously monitored to track sequestration. Sufficient soil samples are taken at a depth of 30cm, totalling around one sample per hectare. Care must be taken to use the exact same sampling protocol every five years to ensure that carbon can be accurately and uniformly measured.

Since each activity and production input on the farm has a carbon footprint, these too must be measured. Smith explains that most inputs

have a globally accepted, set footprint, and so the amount of each activity that is used can easily be measured. “Emission reductions due to decreases in fuel, fertiliser and lime usage are verified on an annual basis through existing annual financial reporting done on farm level.

“Electricity usage is also taken into account in the carbon calculator, so if you’re an irrigation farmer that uses coal-based Eskom power, your footprint will be higher.”

The benefit of the no-till, cover crops and grazing system is that inputs are reduced over time, which automatically results in a lower carbon footprint. Smith’s research has found that nitrogen-based fertiliser is the highest contributor to a farmer’s carbon footprint, averaging 60% to 70%. “If your nitrogen use is reducing by the mentioned 15% to 50%, it makes a big impact on the credits you could be earning. Your credits will also increase the longer you apply this system, because you will systematically reduce your reliance on artificial inputs that are carbon-heavy.”

Smith says that at a carbon price of R142/t of carbon dioxide equivalent, it is expected that a South African farmer implementing conservation agriculture could earn an additional R187/ha per annum in the eastern crop production areas. This is in addition to the R872/ha of savings in input costs for diesel, lime and nitrogenous fertilisers.

“The credits are not a get-rich scheme, but rather a cherry on the cake for CA farmers. The real income comes from the savings in input costs as a result of following a more sustainable farming system, which also happens to sequester carbon.”

As the global carbon-concerned community takes cognisance of the fact that methane emissions have a shorter life cycle than carbon dioxide, and therefore represent a lower carbon footprint, cattle farmers could reap further benefits. Smith says that whereas methane used to score 28 on the global warming potential scale, it now scores eight. “While the lower score is not currently used in carbon calculations, it will be in the future, meaning that cattle farmers will automatically have lower footprints.”

Commenting on the size of farm that a CA system is feasible to undertake, Smith notes that while it works on farms of any size, smaller units are usually easier to manage. “It’s a very intensive system, and smaller operations have a greater ability to manage all the different aspects. Furthermore, the more diversified the farm, the better. If you can include other livestock like pigs, chickens or geese, you can further increase the micro-organism diversity in the soil through their manure. This also gives the farm extra avenues of income, further enhancing the sustainability of the whole operation.”

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