

The importance of soil health in sustainable agriculture

By Sinenhlanhla Mncwango | 4 October 2024 | 5:30 am

As the effects of climate change become more pronounced, the role of soil health in enhancing agricultural resilience cannot be overstated. Dr Hendrik Smith, conservation agriculture facilitator at ASSET Research, and Prof Gerhard du Preez, associate professor at North-West University, spoke to Sinenhlanhla Mncwango about the basics of soil health and how it can be improved.



Cattle grazing in a field of sunflowers and other crops, illustrating the integration of livestock with crop farming for enhanced soil health and agricultural sustainability.

Photo: Hendrick Smith

2 SHARES
Email 0
Tweet 0
Share 0
Share 1
Flip
Print 1

Soil health is increasingly recognised as a cornerstone of sustainable agriculture. As the foundation upon which plants grow and ecosystems thrive, healthy soil is critical for maintaining agricultural productivity and ensuring environmental sustainability.

The importance of soil health extends far beyond the immediate benefits to crops; it is integral to the long-term viability of agricultural systems.

According to Dr Hendrik Smith, a conservation agriculture facilitator at ASSET Research, everything comes down to carbon being taken out of the atmosphere and being put back into the soil where it belongs. This process increases the soil structure or the soil carbon sponge.

Smith says the soil carbon sponge helps the soil absorb and hold more water. He adds that carbon also helps rainwater infiltrate the soil more effectively. In addition, the more carbon there is in the soil the better, because it contributes to climate change mitigation. It also promotes plant growth, which further helps to cool the earth.

“Carbon levels improve the natural soil fertility, the natural nutrients in the soil, which helps reduce your fertiliser bill, and it is healthier because it has fewer soilborne diseases. It is also easier for plants to grow because of the soil structure and the soil pores that look better because of less compaction in the soil.”

How to improve soil health

Smith says there are different principles and practices of regenerative and conservation agriculture that need to be followed when promoting soil health.

The first one is to have little to no chemical disturbance of the soil by means of no-till planting. “Farmers can also maximise the soil surface cover by protecting the soil surface with residue or living plants in the form of cover crops,” he adds.

Smith explains that no-till farming, also known as zero tillage or direct drilling, is an agricultural method where crops or pasture are grown without disturbing the soil. This technique reduces soil erosion caused by tillage, particularly in dry, sandy soil and on sloping terrain.

Another sustainable agriculture practice that farmers can make use of, according to Smith, is crop diversification. He adds that the more plants in the rotation integrated with livestock, the better.

And if farmers have more diversity on their farms, they can make use of cash crop rotations, multispecies cover crop rotations in between the cash crops, and multispecies cover crops integrated with livestock.

“Another method that farmers can use is to leave living roots in their soil for as long as possible throughout the production cycle. This is a very important thing to do because those living roots in the soil release a lot of liquids, nutrients and carbon, which has been drawn down by photosynthesis through the plants, and that feeds the soil biology and grows and builds the soil carbon,” he says.

According to Smith, if a farmer follows these principles correctly, they can boost soil health, build resilience and reduce costs.

Fundamentals of sustainable agriculture

Prof Gerhard du Preez, senior lecturer in agricultural sciences at North-West University, says soil health is a fundamental requirement if you want to farm more sustainably.

He notes that if a farmer wants to reduce their dependence on agricultural chemicals, make use of nature to suppress pests and diseases, and be able to cycle nutrients to the soil so that crops can grow better, all of these are dependent on the health status of the soil.

“That is why when we say soil health, we consider the physical aspects, which include soil texture, the chemical component and the nutrient availability.



"And then we think about the biological component of soil health, which includes the organisms in the soil that fulfil multiple processes that help us cycle nutrients and make them available to the crops. Soil health is very important, especially with the drive to farm more sustainably," he stresses.

Du Preez says farmers can explore practices to help improve soil quality, which leads to increased soil health. According to him, the most popular practice among South African farmers is implementing systems like conservation and regenerative agriculture.

Understanding different farming contexts

"This practice is mostly about seeing what is happening on your farm and what specific practices can be applied that are known to improve soil health within your context.

"So, you have to diversify your crops and have multiple crops in rotation. Farmers can also integrate livestock and have them graze in the farming system as well," he says.

Du Preez advises farmers to avoid having fallow periods in their soil with nothing growing because, without living roots, the soil cannot retain moisture and nutrients. He explains that even during winter months, it is important to have living roots because they sustain plant biology and promote soil health.

For him, what is important is to understand the context of the farm: the environmental context and the management context.

"With the environmental context, you need to define what kind of soil you have; it can either be clay or sandy soil. You also have to define whether you farm in an arid or wet region, what the topography of the environment is, and what the potential threats are in terms of pests and diseases," he says.

Du Preez adds that it is important for a farmer to know the potential opportunities that beneficial organisms can offer their farming system. They also need to have a really good understanding of what kind of environments they have on their farms.

"In terms of management, for the farmer to change to a no-till system, they need to invest in specialised equipment and implements. Therefore, they need to understand what they can achieve with capital and infrastructure they have available to them.

"From there, they need to follow a gradual process and link with someone who has experience with conservation agriculture. They can also practise organic agriculture to promote soil health," says Du Preez.

How to start sustainable farming

He says that farmers shouldn't immediately start converting their entire farms to sustainable operations, but should rather start with smaller portions to gain experience and learn from what is happening on them.

When a small portion shows signs of progress and success, the farmer can then gradually convert more and more areas of their farm to a sustainable approach.

"Farmers need to monitor soil health through data collection. If you don't have data, you can't make important decisions.

"There are different laboratories that farmers can visit that can help with annual and seasonal soil measurements to see if their processes promote soil health or if they aren't making a difference. They will then be able to make calculated adjustments," he says.

Email Dr Hendrik Smith at smith.hendrik@gmail.com and Prof Gerhard du Preez at gerhard.dupreez@nwu.ac.za.

Sinenhlanhla Mncwango

Sinenhlanhla Mncwango is originally from the small town of Vryheid in Northern KwaZulu-Natal and now lives in Gauteng. She has an honours degree in journalism from the University of Johannesburg. Her experience spans online news, sports journalism and radio. In her spare time, she enjoys a good game of cricket or hockey and loves learning new languages.

farmer's weekly

