

*Commentary*

# Modes of management of crop production to improve soil health

Dongze Jose \*

Department of Agriculture, University of Limpopo, Limpopo, South Africa.

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## DESCRIPTION

In order to establish specific treatments that are intended to improve the soil quality for the chosen land use, soil management may focus on distinctions in soil types and soil features. To safeguard and conserve the resources found in the soil, specific soil management techniques are required.

A healthy soil management programme guarantees that the right minerals enter the food chain and that they don't become toxic or insufficient for plants. Both directly and indirectly, soil management impacts crop yield, environmental sustainability, and human health.

Using methods like green manure and composting to replenish nutrients removed from the soil by previous crops, organic farming relies more on the natural decomposition of organic matter than the typical conventional farm. This biological mechanism makes nutrients accessible to plants all through the growing season and is powered by microorganisms like mycorrhiza and earthworms. Crop rotation, cover crops, decreased tillage, and compost application are just a few of the techniques farmers utilize to increase soil fertility. Less soil organic matter is lost to the environment by minimizing tillage that uses a lot of fuel. This has an added benefit of carbon sequestration, which reduces greenhouse gases and helps reverse climate change. Reducing tillage may also improve soil structure and reduce the potential for soil erosion.

To thrive, plants require a variety of nutrients in varied amounts. For organic farmers, providing enough nitrogen and, in particular, synchronization ensuring that plants receive enough nitrogen at the precise moment when they require it is challenging tasks. Through legumes (more specifically, the family Fabaceae), which

fix nitrogen from the atmosphere through symbiosis with rhizobial bacteria, crop rotation and green manure ("cover crops") help to deliver nitrogen. Although the competition between the crop and the legume can be troublesome, intercropping, which is occasionally employed to control insects and diseases, can also improve soil nutrients. Wider spacing between crop rows is therefore necessary. Different plants leave behind varying amounts of nitrogen, which may help synchronisation.

Crop residues can be ploughed back into the soil. Organic farmers also use animal manure, some processed fertilizers like seed meal, and a variety of mineral powders like rock phosphate and green sand, a naturally occurring form of potash that provides potassium. pH adjustments may occasionally be necessary. Natural pH amendments include lime and sulfur, but in the U.S. some compounds such as iron sulfate, aluminum sulfate, magnesium sulfate, and soluble boron products are allowed in organic farming.

By cultivating nitrogen-fixing fodder grasses like white clover or alfalfa, mixed farms containing both livestock and crops can function as ley farms, which then cultivate cash crops or cereals once fertility has been established. In order to maintain soil fertility, farms without livestock (referred to as "stockless") may need to rely more on external inputs, such as imported manure, grain legumes, and green manures, albeit grain legumes may only be able to fix a small amount of nitrogen because they are harvested. Horticultural farms that use controlled environments to grow fruits and vegetables frequently rely even more on outside resources. In many cases, it is not cost-effective to transport manure more than a short distance from the source since it is highly hefty. Manure for organic farms' may become scarce if a sizable number of farms become organically managed.

\*Corresponding author: Dongze Jose, Email: [Jdongze33@hotmail.com](mailto:Jdongze33@hotmail.com)