



Organic Farming: Good Practice for Soil Quality Preservation

Swiss researchers have recently published a 21-year study of the effects of farming on soil quality. Focussing on the level of farmyard manure and chemical use, they have shown that organic farming is the best agricultural practice for sustainable land management, in particular through the enhancement of the microbial activity in the soil leading to increased mineral exchange between plants and soil.

Soil is a key element in increasing crop yields. Maintaining its quality is therefore of great importance for the sustainable management of agricultural lands. Besides its inherent "static" quality linked to the nature of the geological material of the land, the "dynamic" quality of soil, which concerns for example its organic matter content, is largely influenced by human practice. Scientists have recently shown that with improved management practices, carbon stocks in the soil that are traditionally lost through land cultivation can be restored, thus removing CO₂ from the atmosphere. Furthermore, the use of animal manure has been shown to be influential in enriching soil carbon content. However, few long-term studies of soil quality have been performed on organic cultivated lands.

Swiss researchers have analysed the effects of fertilisation type, fertilisation intensity (number of livestock to produce manure) and plant protection on organic and biological matter in the soil, including microbial activity, in organic and conventional farming systems, compared in a crop rotation with grass-clover.

The experiments and measurements carried out over 21 years have shown that:

- At the end of the 21-year period, soil organic nitrogen and carbon content are 5% to 12% higher at normal manure intensity (i.e. 1.4 livestock units/ha) compared to reduced intensity (0.7 livestock units/ha). Compared to no manure use, the organic carbon content in soil is 26% higher under normal manure use in organic farming. In addition, organic matter content is up to 12% higher under composted farmyard manure use compared to rotted and stacked manure.
- The quality indicator for soil organic matter, which predicts changes in soil carbon, is up to 20% higher in organic farming systems compared to conventional farming, regardless of the fertilisation intensity.
- Microbial activity (respiration) is about 14% higher in organic compared to conventional farming and about 10% higher at normal intensity compared to lower intensity.
- Activity potentials of microorganisms (dehydrogenase-activity) are up to 71% higher in organic compared to conventional soils.

The authors conclude that organic farming with composted manure is the only agricultural practice that limits the decrease of carbon content in the soil. Finally, the soil quality and microbial biomass activity are enhanced under this farming practice compared to others.

In a broader context, the effects of agricultural practice on carbon fixation in soils might also be of great interest with respect to climate change. Furthermore, as soils are the basis of food production, preserving their quality with manure and low chemical use is essential for sustainable land management, even if these farming systems are not the most productive.

Source: Andreas Fließbach, Hans-Rudolf Oberholzer, Lucie Gunst and Paul Mäder (2006) "Soil organic matter and biological soil quality indicators after 21 years of organic and conventional farming", *Agriculture, Ecosystems and Environment* 118:273-284.

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Theme(s): Agriculture, land use, sustainable consumption and production.

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To cite this article/service: "[Science for Environment policy](#)"; European Commission DG Environment News Alert Service, edited by BIO Intelligence Service.