



Alternative Land Management Techniques: Impacts on Organic Agriculture

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DESCRIPTION

Organic agricultural production techniques were developed in response to customer demands for food produced without synthetic chemical inputs and the desire to lessen the negative environmental effects of agriculture. Numerous advantageous aspects of food production have been linked to organic farming, including superior food quality free of pesticides, minimal greenhouse gas emissions, efficient energy usage, little nutrient leaching, high biodiversity, and adequate and sustainable food production. The underlying assumption has been that because organic farming solely uses natural tools and techniques, high-quality food and responsible environmental management are inevitable results. Unbiased assessments that pointed out the drawbacks of the cultivation of organic crops lately altered this perception.

There may be some degree of soil erosion, decreased fertility, or overgrazing on around 40% of the world's croplands. About 16% of agricultural land, including farmland in Africa and Central America and pastures in Africa, has yields that have been projected to be reduced by soil erosion. Currently, the increased rates of erosion being experienced are significantly altering the biogeochemical cycles of carbon, nitrogen, and phosphorus. The stabilizing effects of organic matter and plant cover are directly related to soils' resistance to erosion. The loss of soil carbon can cause catastrophic changes that drastically damage landscapes in areas like Asia and Africa where soil erosion is linked to decreased plant cover. The most widespread method of using land in certified organic crop production systems is the use of green and animal manures. Except for organic mulch/compost, which decreased, the number of farmers implementing on-farm organic methods stayed the same or climbed steadily. All of the methods, with the exception of rotational grazing, had proportionate declines in 2019. The laws governing organic methods and the rising expenses of production are the main difficulties certified organic producers confront.

The vitality and fertility of the soil must be preserved since it is the foundation of the agroecosystem. Numerous issues need to

be monitored and addressed in order to make progress toward better soil management, ranging from changing some of our paradigms and "values" about what agriculture is for to dealing with socioeconomic issues (such as population pressure, income distribution, market structure, and subsidies mechanisms) (e.g., commodity production vs. food security).

- **Land:** According to recent projections, the global food demand would increase by up to 70 percent by 2050. Around the world, an extra 120 million ha—an area twice the size of France—would be required to sustain food production by 2030, and the proportion of built-up area to agriculture will increase from an estimated 3.5% in 2000 to 5.1% (and then to 7% in 2050).
- **Water:** At the moment, agriculture uses 70% of the 3800 km³ of water that humans consume globally, industry uses 20%, and urbanised areas use 10%. Agriculture is anticipated to need 13% more water by 2050.
- **Biodiversity:** Agricultural development directly affects regional biodiversity through landscape transformation, which in turn causes local communities to be displaced and ecological services to be lost. For example, 37% of risks to bird species designated as vulnerable species are caused by farming, particularly land conversion to cropland. Large-scale industrial agriculture also significantly depletes crop biodiversity by causing the extinction of numerous agricultural species and varieties.
- **Synthetic fertilisers:** Between 1960 and 1995, cereal yields more than quadrupled globally, while N fertiliser usage on cereals grew seven-fold. However, N fertiliser efficiency—the ratio of cereal yields to N fertiliser inputs—declined from over 70 kg to about 25 kg grain per kg N. Only 18% to 49% of nitrogen provided as fertiliser is absorbed by crops, according to global statistics for maize, rice, and wheat; the remaining nitrogen is lost to runoff, leaching, or volatilization. Fertilizers containing nitrogen are crucial in intensive traditional agriculture. However, when it comes to environmental damage, their use turns out to be a significant reason for worry. Additionally, the diversity of soil and a number of soil processes are directly negatively impacted by synthetic

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fertilizers. Through diminishing internal biological cycles and pest control, the use of synthetic fertilisers and pesticides has a detrimental influence on agriculture by altering relationships within and between below- and above-ground soil components.

- Pesticides: The widespread use of pesticides on crops has caused a large number of pests and diseases to become pesticide-resistant. Excessive pesticide exposure can occur while a person is at work, in food, soil, water, or the air, or by directly consuming pesticide compounds. There are estimates that pesticides result in 220,000 fatalities and 26 million human poisonings per year. Some pesticides, along with other synthetic chemicals, directly affect the reproductive system of several high-level creatures by acting as endocrine disruptors, causing serious reproductive issues, and altering sexual behavior.

According to predictions, perennial crops will be better able to adapt to temperature rises of the kind most climate change

models forecast. Switchgrass (*Panicum virgatum*), a permanent feed (used as hay or grazed by cattle), and energy crop, is anticipated to yield 5000 kg more per hectare as a result of temperature increases of 3 to 8 degrees Celsius, whereas yields of annual species are predicted to decrease. The foundation of organic farming is maintaining and improving soil health. Organic farming relies on a number of farming techniques that fully use the natural cycles in order to protect soil fertility. Crop rotation, intercropping, polyculture, cover crops, and mulching are methods used in organic farming systems to increase soil fertility. Appropriate agricultural practices, biological control, and natural insecticides are used to control pests (mainly extracted from plants). The management of weeds, which is frequently the major issue for organic farming, includes using the right rotation, sowing time, mechanical cultivation, mulching, transplanting, burning, etc.