

## Organic Farming as Natural Tool for Environmental Protection

<sup>1</sup> Poonam Sangwan, <sup>2</sup> ShilpaKaushal, <sup>3</sup> Hitika Bali  
University Institute of Agricultural Sciences (UIAS) –  
Chandigarh University, Gharuan (Mohali)

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### Abstract

In modern time, increasing level of pollution in everywhere is the key challenge in sustainable development of our environment. Day by day, the increasing demands and lavish life style of people leads to environmental deterioration. Our agricultural system is also affected by pollution. Modern agricultural practices like use of synthetic fertilizers, herbicides, pesticides etc. to increase crop yield participates in environmental pollution. All these approaches overall disturb the nutrient balance of soil and therefore results in reduction of soil fertility. To deal with this ongoing problem, Organic farming gives a natural way of crop cultivation by the use of environment friendly, animal and plant based local organic resources. And these resources are highly enriched in nutrients required for crop plants. Many environmental policies has been framed all over the globe that focus on the importance of organic farming in achieving the goal of sustainable development of environment.[Jan Moudryjr. ,2014]. Due to raised environmental concerns in modern agricultural practices, the role of organic farming has increased considerably with having net sale of about 40 billion US dollars every year. But this is not last, the organic sector yet to achieve its full potential. Organic farming has a direct relationship with environmental sustainability because it plays an important role in enhancing natural health of environment.

**Keywords:** agriculture, environment, organic farming, policies, pollution.

### Introduction

In the nature, there's no viable system which will work without some or other negative feedback. Any interference with the system doesn't have an effect on solely in a technique however it essentially evokes other usual unpredictable reactions. In Europe lately, there are quite natural self-moving systems with closed energy flows rather exceptionally. This is often thanks to a major setting disturbance by humans. In terms of



space, the most human action n busy in natural ecosystems was agriculture. In 80% area of the world is under extensive farming systems and on 20%, area is under intensive farming systems. The ongoing trend is the maximising agricultural production intensification in many developing countries (China, Brazil, Russia, etc.) and reduction in chemical use, respectively substitute them by biological or rational means in developed countries, especially in the EU. Due to the fastest growing human population and its growing demands on sufficient of varied and quality food, a certain degree of agro ecosystems intensification is necessary. However, it is crucial that agro ecosystems have a sustainable character.

Increasing level of pollution in everywhere is the key challenge in sustainable development of our environment. Modern agricultural practices like use of synthetic fertilizers, herbicides, pesticides etc. to increase crop yield participates in environmental pollution. Organic farming gives a natural way of crop cultivation by the use of environment friendly, animal and plant based local organic resources. And these resources are highly enriched in nutrients required for crop plants. This helps in increasing the microbial activities and increases the soil health. Organic farming is an efficient and trusting agricultural approach for environmental sustainability. As this approach provides yield stability, increasing soil health, no environmental concerns, organic food and reduction in the use of synthesized fertilizers. There are many different agricultural approaches currently working on reducing the environmental concerns but the use of organic farming, no doubt, found the best scientifically proved environment friendly approach that helps in maintaining environmental balance of our agriculture and ecological systems. In organic farming, more concern is given to the environmental health. Due to its environment friendly approach, it helps in reducing many form of pollution like soil, water and air. Therefore, organic farming acts as natural tool for environmental protection and sustainable development

### **Effect of organic farming on different environmental factors:**

#### **Soil Environment**

Soil is one of the most important natural resources among all and plays a vital role in agriculture. Healthy soil very is essential for growth and development of healthy plants. Other than the production function, the soil also has many other functions like filtering, buffering, transformation and it is the basic environment for organisms and also its socio-

economic function is also very important. There are many positive changes occurred within organic farming. These are as following;

- a. Soil organic matter (up to 30% higher organic carbon content),
- b. Increased soil biological activity (by 30-100 %), biomass decomposition indicator,
- c. Higher total edaphon biomass (by 50-80 %),
- d. Increased saprophytic fungi population, increased root colonization by mycorrhiza,
- e. More and better efficient use of the acceptable resources by soil microorganisms,
- f. Improved physical and chemical soil properties, soil structure
- g. Improved hydrosopicity and erosion threat reduction.

The research on soil organic matter is mostly focused on the organic carbon content and its changes occurred during conversion to organic farming. Many studies have stated that areas under organic cultivation posses more organic carbon content as compared to the areas that are under conventional cultivation. Many long-term experiments and studies have confirmed the hypothesis that organic farming methods helps in protecting the soil organic matter.[Jan Moudrýjr.,2014].

In organic farming, the important role for nitrogen plant nutrition is played by the symbiotic fixation by many microorganisms. In the soil, there is also a non symbiotic fixation that is done by the soil free-living heterotrophic aerobic bacteria. The main part where nutrient cycle takes part is Rizosphere due to the interaction between soil, roots and microorganisms colonizing the plant root environment. In soils that are organically cultivated, 40% more mycorrhiza have been observed than in soils within integrated farming. [International Journal of Research & Review (IJRR),2020]

An important role is also played by the earthworms because of their sensitivity to the soil environment disturbance. Organic farming posses 50% more biomass and 50% more number of earthworms as compared to the integrated farming, diverse biodiversity of earth-worm species, changes in the population composition that has been indicated by a larger number of juvenile earthworms. Earthworms are useful in many ways as they aerate and mix the soil, help greatly with organic matter decomposition.

A very serious problem that faced in larger areas, especially of arable land, is a water and wind erosion. Organic farming gives a very positive impact on its reduction and its all credit goes to more diverse crop rotations with a very higher share of clover and grass-legume

mixtures, a increased percentage of catch crops a lower representation of wide-row crops (e.g. corn), and under seeding prolonging the soil cover all over the year, a more intensive organic fertilization and many other factors. But a danger of this erosion can occur in organic farming (and sometimes even higher than in conventionally cultivated areas), because of more continuous mechanical tillage or due to slower plant development due to a lower mineral nitrogen content in the soil. Structural soils are well more resistant to erosion. When comparing overall factors, it could be found that a positive predominates.

### **Nutrient Recirculation**

The basic principles of organic farming are ;a) the most closed nutrient cycle, b) minimal nutrient loss and c) limited nutrient supply to the system. In order to maintain the soil production capacity, its mandatory to replace nutrients that are drawn from soil because of harvests and by biologically transformed organic matter in the soil. To ensure the Regular supply of organic matter into the soil the crops grown in order to enrich the soil with organic matter (clover, catch crops for green manure), crop residues, residues of cultivated plant roots and manure. Soil organic matter is the continuous reservoir of nutrients and energy for the soil environment. Soil organic matter is important factor of soil environment stabilization.

The conditions for growing crops without mineral fertilizers:

- Consistent application of all manure
- Direct application of recycled biomass.
- Compost production in compliance with the technological process
- We can use uncontaminated nutrient resources
- In order to improve habitat and nutritional status of crops we can use peat and humic substances
- We can use indirect fertilizers containing nitrogen fixating bacteria (free-living in the soil, rhizobia)
- Use of bacteria that access e.g. S, P, K and other nutrients form soil reserves.

Less than 10% is humified from the total amount of organic matter. The increased amount of permanent humus in the soil is a matter of long duration of time. Fastest decaying/rapidly decaying- Water soluble carbohydrates, Averagely decaying-cellulose, Slowly decaying - lignin's and pectin's. The rate of decomposition of different organic matter sources is different and depending. Budget of organic matter in the soil consisting in

replacing mineralized organic matter depends on inputs of the range of mineralization and losses.

Substance	Crop		
	corn	alfalfa	wheat
Water-soluble sugars	6.72	4.36	4.68
Hemicellulose and starch	42.61	14.85	23.30
Cellulose	23.29	32.25	42.12
Proteins	4.75	16.44	4.31
Lignin rest	18.27	29.60	23.00

Chemical composition of crop residues (% dry matter).

### Water in Landscape

Pesticides and morforegulators are disposed from the organic farming system reduces the contamination of the environment also includes surface and the groundwater by residues of these substances. In organically cultivated fields, the surface water and groundwater are less contaminated with plant protection products. These activities harm to aquatic life , disregarded to the concentrations. Prohibition of use of slightly soluble synthetic nitrogen fertilizers in organic agro ecosystems reduces significantly the load of surface-and groundwater by nitrates.

Organic farming should be the preferred farming system especially in the field of water conservation. Organic farming fertilizes the soil in a way so that groundwater could be saved from pollution. Organic farming in addition to manure and liquid manure, there is green manure that can be used as fertilizer. Legumes are properly indulged into the crop rotation to reduce the leaching of nitrogen into groundwater. As a result of leaching and due to erosion the nitrates in water causes contamination of the hydrosphere.

### Air Quality

Agricultural activities have great impact on the quality of air .Organic farming contributes to the creation of anthropogenic greenhouse gases with about 14%. Also the ratio differentiates according to particular country depending upon the agricultural production intensity. Because of its large area impact, agriculture belongs to the largest producers after industry & mining. Agriculture contributes to annual increase of GHG emissions with

approximately one 5<sup>th</sup>. Even higher value is stated [Cerri CC., 2009] also the report shows the proportion of 27%. With the increase in consumption of food and agricultural intensification, the percentage is increasing. While adding pre-farming and post-farming phases to the agricultural frame i or quantifying food life cycle, the emission load is even increased.

There are different ways in Agriculture to produces emissions. For instance, CO<sub>2</sub> is released while the consuming the fossil fuels. Also within reduction of organic matter N<sub>2</sub>O is released as a result of application of fertilizer and within soil processes,essentially in case the production of crops . The emission production is influenced by the intensity and also from the farming system.

Organic farming has a number of tools which help to reduce emissions [Niggli U., 2011].According to the IPCC fourth assessment report the optimal measures for mitigation (reducing stress) in organic agriculture are as follows:

- Crop rotation and character of the agricultural system
- Management of nutrients and fertilization
- Livestock, improving the pasture utilization and fodder supply
- Soil fertility management and restoration of degraded soil

Within the eco friendly approach, organic farming systems in general seek more accurately to work with energy and to decrease inputs and to close the farm cycle immediately. This leads to a higher emission reduction particularly due to the reduction of synthetic nitrogen fertilizers whose production is among the largest producers of GHG emissions.[ Knudsen MT,2010]. Thanks to the use of organic fertilizers and the addition of greater proportion of leguminous plants in crop rotations, the organic farming can contribute noticeable to the emission load formation. Thanks to these measures, mainly N<sub>2</sub>O emissions are reduced while the N<sub>2</sub>O is identified as a salient greenhouse gas and its effect on climate is often referred to as 300 times greater as compared with the effect of CO<sub>2</sub>.

Another positive aspect of organic farming in terms of greenhouse gas emissions is the deduction of the number of animals per unit of area and limitation of point load caused by high concentrations of animals in one place which is typical for intensive industrial agriculture. Extensiveness of livestock production within organic farming system leads to reduction of methane production and in addition leads to further positive effects on soil and water quality, and in the broader context, also on biodiversity.

Measures	Impact
Fertilization	Using leguminous plants in crop rotations for the fixation of nitrogen and using organic fertilizers replace the use of synthetic fertilizers and the capacity of the soil for carbon sequestration is increased.
Protection against weeds	Thanks to the emphasis on the structure of crop rotations, mechanical, biological and other non-chemical methods of plant protection, the application of herbicides is eliminated.
Protection against pests	Thanks to the selection of resistant varieties, crop rotation edition, use of cover crops, intercrops and undersowing and support of predators and antagonists, the use of insecticides is reduced.
Protection against fungi and mildew	Due to the cultivation of resistant varieties, changes of crop rotation structure, emphasis on seed quality and the use of non-chemical methods of protection, the use of fungicides is reduced or even eliminated.
Closed farm cycle	Ensuring the maximum share of feed on the farm and the correct management of the herd minimize the need to purchase feed.
Continuous soil cover	Minimizing of periods without vegetation cover helps to increase the content of soil organic matter and its decomposition which reduces the need for fertilization.

Tools for reducing the emission load resulting from the specifics of organic farming. In terms of reducing greenhouse gas emissions, another benefit of organic farming is the fact that organically cultivated arable land stores more carbon into humus. Thus the increase in atmospheric CO<sub>2</sub> is limited and this helps in climate stabilisation. Binding of carbon dioxide is precisely higher in a longer crop rotation with perennial legume-grass mixture and with fertilization with manure. It is due to the increasing humus content in the soil, longer green land cover with catch crops and more powerful root system of main crops.[LaSalle T., 2008]

Rodale Institute's Farming Systems Trial states that the introduction of organic farming nationwide in the USA would manage to reduce CO<sub>2</sub> emissions by up to a quarter because of increased carbon sequestration in soils. Emissions of CO<sub>2</sub> from organic farms are up to 50% lower per hectare. The balance of carbon dioxide is mainly influenced by non-use of synthetic nitrogen fertilizers and pesticides and also by low doses of phosphorus and potassium, as well as low doses of grain fodder.

### **Biodiversity**

The positive effect of organic farming on biodiversity is based on an effort to extend the range of cultivated crops and livestock and thereby to increase a genetic species and ecosystem diversity. On this basis of environment friendly agro ecosystem management, the functional agro biodiversity has increased. Growing biodiversity at every aspects predators,

parasites, wild plants, pollinators, soil fauna and flora...) supports the ecosystem functions (population control, competition, allelopathy, organic matter decomposition, nutrient sorption and their cycle...). It contributes to the agro ecosystem stability and sustainability. It improves resistance of production organisms against harmful agent's gradation and contributes to their effective control, improves the nutrient utilization in agro ecosystem and reduces eutrophication. It contributes to the reduction of erosion and improves the moisture use, helps to increase diversity and more of wild flora and fauna in the landscape. On the edges of the fields of organic farmers, there are by 25% more birds surveyed than within conventional farming 44% more in autumn and winter season. It includes both species characteristic of the individual habitats-species from forest, field, meadow and species from marginal environments-"edge species"-ecotone species that need more landscape elements for their survival.

On the fields of organic farming, there are more accompanying plant species grown, in the ground layer 20-400% more species of wild plants. Among other things, many endangered species of weeds. Beneficial organisms give preference to natural areas adjacent to the organic fields. Significantly the areas adjacent to the cultivated organic fields support more beneficial organisms (such as ground beetles, spiders, wolf spiders-Lycosidae family and others for nature conservation significant fauna species) than the natural areas adjacent to the integrated areas or areas under the extensive farming. In many fields the number of earthworms, ground beetles, spiders (especially the Wolf spiders) and birds in the cultural landscape was higher in organically cultivated areas than in the conventional areas.

In the organically cultivated farms, there are more than 85% of plant species, a third more bats and about 17% more spiders and 5% more bird species. On the organic field, there are nine times more species of plants and accompanying weeds growing, there live 15% more ground beetles and 25% more earthworms than in the fields within integrated farming. Increased variety of plants, hedges, grassy field edges smaller areas of land, smaller corn ear density, area gardening, stubble and green soil cover in winter provides favourable conditions.

### **Conclusion**

The understanding of environmental aims in organic farming benificates not only to the increase (preservation) of soil fertility and plant and animal health but also persuades positive



outermost effects in biodiversity, energy, climate, and the environment. The organic farming systems are built on sustainable development principles and the comprehensive world approach. It is a production system emphasised on conservation and improvement of natural resources and the environment at the same time. As for the system concept, there is an attempt to balance the economic, environmental and social aspects and relations on global and grassroots level. Agricultural activity itself is contemplating a process of reasonable ecosystem exploitation with respect to its stability and sustainability. Just this separation of both the proposals, i.e the intensive industrial agriculture on one hand and the sustainable organic farming systems on the other, distinguishes them from the environmental point of view. Within the organic farming systems the quality of soil stays the salient interest. Soil erosion manages measures which include cover crops, mulching, limited soil cultivation, windbreaks planting, use of lighter and smaller machinery and keep an optimal soil structure and looseness. These preservative soil cultivation ideas are merged with lesser need of pesticides. Thus the secured sufficient nutrient cycle and organic matter content in the soil leading to an optimal soil biological activity and fertility.

The principles of organic farming guarantees the protection of water sources and soil moisture, prevent the underground and surface waters from pollutants and sediments. Organic farming purposely supports biodiversity, takes advantage of more adaptable animal and crop species and diversity to the habitat conditions, uses varied crop rotations, species and variety mixtures, applies technical and organizational measures friendly to the organisms and the surroundings. Organic farming systems are more environment friendly with regard to the greenhouse gases emissions production. Above all, this emission reduction achieved thanks to the limited use of synthetic fertilizers ,pesticides and lower livestock production intensity.

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