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Organic Farming For Combating Global Climate Change

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Abstract:

Organic farming is a way of faring that avoids the use of synthetic chemicals and genetically modified organisms (GMO's) a follows the principles of sustained agriculture. It prevents soil pollution. It also encourages the microorganism in soil and biogeochemical cycle. Organic farming, as an adaptation strategy to climate change and variability, is a concrete and sustainable option and has additional potential as a mitigation strategy. The careful management of nutrients and carbon sequestration in soils are significant contributors in adaptation and mitigation to climate change and variability in several climate zones and under a wide range of specific local conditions. Organic farming as a systematic approach for sustained biological diversity and climate change adaptation through production management, minimizing energy randomization of non-renewable resources; and carbon sequestration is a viable alternative. The purpose of potential organic farming is therefore to attempt a gradual reversal of the effects of climate change for building resilience and overall sustainability by addressing the key issues. Research is needed on yields and institutional environment for organic farming, as a miligation and sequestration potential.

Key words: Organic farming, climate change, mitigation means, sustainable development.

Introduction

Organic farming is not only a specific agricultural production system, it is also a systemic and encompassing approach to sustainable livelihoods in general, where due account is given to relevant factors of influence for sustainable development and vulnerability, be this on physical, economic, or socio-cultural levels (Eyhorn, 2007).Organic farming has a long tradition as a farming system and it has been adapted for many climate zones and local conditions; as a result, much and According to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), greenhouse gas (GHG) emissions from the agricultural sector account for 10–12% or5.1–6.1 Gt of the total anthropogenic annual emissions of CO2-equivalent. However, this accounting includes only direct agricultural emissions; emissions due to the production of agricultural inputs such as nitrogen fertilizers, synthetic pesticides and fossil fuels used for agricultural machinery and irrigation are not calculated (IPCC 2007).In general climate is one of the main determinants of agricultural production and climate alteration might cause variability in agricultural production. As climate pattern shifts, changes in the distribution of plant diseases and pests may also have adverse effects on agriculture. At the same time, agriculture proved to be one of the most adaptable human activities to varied climate Organic farming has an inherent potential to both reduce GHG emissions and to enhance carbon sequestration in the soil. Organic farming as a mitigation strategy may address both emissions avoidance and carbon sequestration. The first is achieved through:

- Lower N2O emissions (due to lower nitrogen input)—it is usually assumed that 1–2percent of the nitrogen applied to farming systems is emitted as N2O, irrespective of the form of the nitrogen input. The default value currently used by the IPCC is 1.25percent, but newer research finds considerably lower values, such as for semiarid areas (Barton ct al. 2008).
- Less CO2 emissions through erosion (due to better soil structure and more plant cover)—there usually is less erosion inorganic farming systems than in conventional ones.
- Lower CO2 emissions from farming system inputs (pesticides and fertilizers produced using fossil fuel).

Organic agriculture emphasizes closed nutrient cycles, biodiversity, and effective soil management providing the capacity to mitigate and even reverse the effects of climate change. Organic agriculture can decrease fossil fuel emissions and, like any well managed agricultural system, sequesters carbon in the soil. The elimination of synthetic nitrogen in organic systems decreases fossil fuel consumption by 33 percent and carbon sequestration takes CO_2 out of the atmosphere by putting it in the soil in the form of organic matter which is often lost in conventionally managed soils. Carbon sequestration occurs at especially high levels in organic no-till managed soil. Agriculture has been undervalued and underestimated as a means to combat global climate change. Soil carbon data show that regenerative organic agricultural practices are among the most effective strategies for mitigating CO_2emissions.

Some indicative observations of climate change:

- Rise in temperature is likely to affect milk production and reproductive functions adversely.
- The impact of increased temperature on milk production for India has been estimated about 1.6 million tons by 2020 and more than 15 million tons in 2050.
- The decline will be higher in cross bred cows (0.63%), buffaloes (0.50%) and indigenous (0.40%)
- Indian cattle cross bred Karan-Swiss and Karan-Fries are more sensitive to heat than Indian native breeds of cattle like Tharparkar and Sahiwal.
- Rise in mean sea level will affect the habitat of Garole sheep (marshy land in Sunderban area of West Bengal) leading to decline in its population.
- A rise of 2-6°C will impact growth, puberty and maturity of cross bred cattle by about 2 weeks than

indigenous breeds

- Buffalo being less thermo tolerant species, it will be affected more than cattle.
- Global warming leading to poor rainfall will affect the feed and fodder for livestock. In area of Rajasthan such scarcity of fodder in extreme summer may lead to reduction in livestock population.
- Reduction in river discharge due to combined effect of climate change and water withdrawal will lead to 75% freshwater fish biodiversity to become extinct by 2070
- Large number of fish species available in lower and middle Ganga river (Barrackpore to Kanpur) in 1950s and not recorded in upper stretch (Deopryyag to Kannuj) can be recorded now with the increase in minimum temperature of water to 15°C
- Warm water fish will benefit from increased water temperature where as cold-water fishes tend to suffer. For instance, a 2°C rise in water temperature found to reduce growth rate, survival and reproduction of rainbow trout.
- Global : 24 mha (1.6% Ag. Area): Nearly 130 countries produce organic product, Australia (10 mha) – lead country.
- Indian : 37000-41000 ha (SOEL survey), (0.3% of Ag. Area): 2.50 million ha (APEDA) (Including 2.43 mha of forest area with wild herb & medicinal plants.
- Holistic production system, harmony with nature, Avoids chemical fertiliser, pesticides etc.

More than 50 percent of fertilizers applied to the soil end up in the atmosphere or in local waterways, giving rise to the potent greenhouse gas nitrous oxide with global warming potential of 289 compared with CO_2.Ironically, fertilizer use is expected to significantly increase due to the adverse impacts of climate change on soil fertility (i.e., soil salinization).Studies showed that greenhouse emission would be 48-66 percent lower per hectare in organic farming systems in Europe, attributed to no input of chemical N fertilizers, less use of high energy consuming feedstuffs, low input of P, K mineral fertilizers, and elimination of pesticides.

Many experiments have found reduced leaching of nitrates from organic soils into ground and surface waters, which are a major source of nitrous oxide. A comprehensive review of 293 studies worldwide found that organic agriculture out yields conventional by a factor of 1.3 in the major crops compared, and that more than enough nitrogen can be provided by green manure alone, amounting to 171 percent of synthetic N fertilizer used currently.

Composting instead of rice straw burning reduces CO_2 emissions to the atmosphere. Organic pastures maintained as permanent meadows are strong mitigators of greenhouse emission. Grasslands sequester a lot of carbon in the soil. Tropical savannas have a carbon stock underground four times as big as that above ground, while temperate grasslands have more than 30 times as much carbon stock in the soil as above it, and sequester as much carbon as tropical forests.

Organic agriculture helps to counteract climate change by restoring soil organic matter content as well as reducing soil erosion and improving soil physical structure. Soils hold about 75 percent of terrestrial carbon and show a greater potential to sequester much more carbon than trees (Altierri).

Increased soil organic matter opens the structure of soil, improving water percolation by 25 to 50 percent, and reducing run-off and soil erosion. Organic soils also have better water-holding capacity, thus organic production is much more resistant to climate extremes such as droughts and floods and serves as important adaptation to climate change. Every kilogram of soil organic matter absorbs 20 times its weight in water. Organic matter is restored through the addition of manures, compost, mulches and cover crops. Studies found that organic carbon content of the soil increased in both organic and low-input systems compared with conventional systems, with larger pools of stored nutrients. It is estimated that up to 4 t CO_2 could be sequestered per hectare of organic soils each year.

Traditional farmers generally employ multiple cropping or polyculture systems and grow crops in agro forestry schemes to achieve several production and conservation objectives simultaneously. The root systems of perennial crops are more than ten times larger and go much deeper than those of annuals, which is why they are more effective in binding soil, retaining and purifying water, recycling nutrients, as well as increasing the carbon stock below ground, as in temperate grasslands. Saving forests from agriculture prevent emissions of 5.9 Gt CO_2e a year, or 10.6 percent of global emissions. A new study overturned previous misconceptions that old forests no longer grow sufficiently to sequester any carbon. Instead, the net primary productivity of forests is found to improve with age up to about 80 years and then only slowly decline.

Adaptation and Mitigation potential of organic farming

- Organic farming help to increase water holding capacity of soil improves soil fertility thereby making crops more resistant to climate extreme conditions.
- Organic farming helps to increase microbial activity in soil.
- Organic farming helps to sustain Agro-ecosystem.
- Plantation activity helps to deplete pollution level & maintain atmospheric moisture.
- Instead of burning of post harvested material it can be used as manure which helps to reduce pollution and financial stress.
- Organic farming helps in reducing direct and indirect energy use in relation to on farm and off farm

practices.

- Organic farming encourages the livestock/ animal husbandry.
- Recycling wastes of plant and animal origin in order to return nutrients to the land, thus minimizing the use of non-renewable resources.
- Reduce global warming by minimizing emission of greenhouse gases.
- Enhances biological diversity within the whole system and increase soil biological activity
- Minimizes indiscriminate use of pesticides affects on human and animal health, biodiversity of wildlife etc. & cause of environmental pollution. Maintains long-term soil fertility and overcome micronutrient deficiency.
- Reduce energy loss for both animal and machine, and risk of crop failure.
- Promote the healthy use of soil, water, and air, as well as minimize all forms of gaseous pollution that may result from modern agricultural practices.
- Highly adaptive to climatic change due to application of traditional skills, farmer's knowledge, soil fertility building techniques and a high degree of diversity.

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