

Organic Farming as a Resilient Response to Agricultural Climate Change in India

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The world's food security is seriously threatened by climate change, especially in India, where unpredictable rainfall and rising heat interrupt important crop growth stages. According to this research, organic farming is an essential mitigation and adaptation tactic. Organic systems provide a higher priority on ecological balance and soil health than industrial agriculture, which uses synthetic inputs to worsen global warming. According to the study, organic farming substantially lowers emissions of methane (CH₄) and nitrous oxide (N₂O) through biomass recycling and improves the sequestration of soil organic carbon (SOC), hence mitigating climate change. Additionally, because organic livestock techniques lessen the need for concentrated feeds, they reduce carbon emissions. In conclusion, switching to organic farming methods provides a scientifically validated means of reestablishing agricultural ecosystems and guaranteeing long-term environmental sustainability.

Introduction to Organic Farming and Climate Change

Organic farming is a system of agricultural production that prioritizes ecological balance, biodiversity, and soil fertility. It prioritizes natural processes over artificial inputs like chemical insecticides and fertilizers. In reaction to the industrialization of agriculture, organic farming emerged in the early 20th century, highlighting the interdependence of soil, plants, animals, and people. In order to address global issues including environmental degradation, climate change, and food security concerns, organic farming has emerged as a crucial tactic in the pursuit of sustainable agriculture. Organic farming, which has its roots in traditional farming methods but is supported by contemporary scientific findings, prioritizes soil health, biodiversity, and the health of agricultural ecosystems in an effort to establish a system that is sustainable on all levels economically, socially, and environmentally.



Global agriculture is facing serious and expanding issues as a result of climate change. Its numerous effects, including frequent flooding, hurricanes, global warming, sea level rise, and the melting of polar ice, have been present since the turn of the twenty-first century and have become more noticeable in different parts of the globe. The scientific community agrees that in addition to reducing agricultural output, climate change would jeopardize the security of food and livelihood, have an impact on global trade, and undermine the stability of human civilization. Given that it both contributes to and is a victim of climate change, the agricultural sector is especially sensitive. Anthropogenic activities, such as burning fossil fuels and engaging in unsustainable agricultural practices like intensive livestock rearing and excessive use of synthetic inputs, have contributed significantly to the global warming of the past century, which has increased by about 0.7°C.

To secure future food security, it is imperative to boost agricultural yields in a sustainable way while also making crops more resilient to climate change. Extreme heat and unpredictable rainfall brought on by climate change will make it more difficult for agriculture to supply the world's growing population with food. Rapid knowledge and applied crop design advancements could offer answers based on cutting-edge techniques, such as gene editing, genomics, soil microbiome modification, and crop management techniques. Given the scope of the climate change problem, it is necessary to evaluate what is already known and think about how agri-food system targets may need to be met through cooperative activities that

stimulate and promote better interactions between disciplines.

Impacts of Climate Change on Plant Production in Indian Agriculture

Climate change affects plant production in complex ways. While increased temperatures may enhance organic matter decomposition and biological nitrogen fixation, they also exacerbate evapotranspiration and reduce soil moisture retention. Variability in rainfall and shifts in seasonal patterns disrupt water availability, influencing crop growth and productivity. Critical crop stages such as flowering, pollination, and grain filling are highly susceptible to moisture stress, often resulting in yield losses.

The Role of Organic Farming in Mitigating Climate Change

1. Soil Organic Carbon's Mitigation Function in Agricultural Systems

Preserving and increasing soil organic carbon in agricultural systems is the best way to reduce the environmental impact of agriculture.

2. Lower Emissions of CH₄ and N₂O in Organic Farming

Reusing residual biomass as nutrients in organic farming increases soil fertility and lowers the demand for outside inputs. This procedure lowers emissions of nitrous oxide (N₂O) and methane (CH₄) because organic matter is sustainably repurposed.

3. Effects of Lower Concentrate Feed Consumption in Organic Animal Husbandry and Less Direct Land Use Change

By lowering the need for concentrated feed, organic livestock husbandry lessens the need to remove forests

for feed production. As a result, CO₂ emissions from soil carbon loss due to changes in land use are reduced.

4. Farmers Profit Financially When Greenhouse Gas Emissions in Agricultural Systems Are Reduced

According to research, mixing organic fertilizer and following the right tillage procedures can greatly increase soil carbon storage and reduce greenhouse gas emissions.

Conclusion

By improving soil health and increasing carbon

References

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sequestration, organic farming provides a crucial approach to tackling the climate catastrophe. It successfully slows down global warming and increases agricultural tolerance to unpredictable weather by lowering greenhouse gas emissions and synthetic inputs. Making the switch to these sustainable practices is crucial for maintaining environmental stability, economic viability, and long-term food security in a warming planet.