*General Article* Chapter- 09

# EFFECT OF CLIMATE CHANGE ON AGRICULTURE

*Krishan Kumar Singh and Amanpreet Singh Sran*

**Abstract**

Climate change become a greatest threat to agricultural systems. Productivity of agriculture is vulnerable by amendment in climate. Climate change has a greater impact in the production of Indian agriculture. Climate change as 'a change of climate that is attributed directly or indirectly to human action that alters the composition of the worldwide atmosphere and that is additionally to natural environmental condition variability observed over comparable time periods.Supports life on this planet. Changes in the biosphere, biodiversity and characteristic assets are unfavorably influencing human wellbeing and personal satisfaction. The use of biochar as soil amendments is proposed as new approach for mitigating man induced climate change along with improving soil productivity. The impact of environmental change presents numerous dangers; one of the significant outcomes is achieving changes in the quality and amount water assets furthermore, crop profitability. It very well may be presumed that the Indian district is exceptionally delicate to environmental change.

**Keywords:** Agriculture, Organic matter, Climate change, Crop profitability

Department of Agriculture,Maharishi Markandeshwar (Deemed to be University), Mullana, Ambala, Haryana -India
E-mail: forekrishna@gmail.com

## Introduction

Climate change is any significant long-term change in the expected patterns of average weather of region over a significant period of time. The effects of these variations on other parts of the Earth. These changes may take tens, hundreds or perhaps millions of years. But increased in anthropogenic activities such as industrialization, urbanization, deforestation, agriculture, change in land use pattern etc. One of the significant difficulties confronting mankind is to give an impartial way of life for present and people in the future: sufficient food, water, energy, safe house and a solid climate. Yet, worldwide natural issues, for example, land debasement, loss of biodiversity, stratospheric ozone consumption alongside human-actuated environmental change, compromises our capacity to meet the fundamental human necessities (Singh *et al*. 2021). The Third Evaluation Report (TAR) of the Intergovernmental Board on Environmental Change (IPCC) reaffirms that the environment is changing in manners that can't be represented by characteristic changeability and that 'an Earth-wide temperature boost' is going on. Worldwide mean temperatures have risen (0.6oC somewhat recently), with the most recent decade being the hottest on record. Environmental change will, in numerous pieces of the world, unfavorably influence financial areas, including water assets, horticulture, ranger service, fisheries and human settlements, biological frameworks and human wellbeing, particularly in non-industrial nations because of their weakness. Weakness to environmental change is firmly identified with destitution, as the poor have less monetary and specialized assets. They are vigorously reliant on environment touchy areas like farming and ranger service; they regularly live on minor land and their financial designs are delicate. This is valid for a non-industrial nation like India where agribusiness stays the pillar of the economy, contributing almost 27% of the all-out GDP (Gross domestic product) and utilizing almost 66% of the nation's populace. Farming fares represent 13 to 18% of absolute yearly fares of the country. In any case, given that 62% of the edited territory is as yet subject to precipitation, Indian horticulture keeps on being in a general sense reliant on the climate (Chattopadhyay, 2000).

Environmental change will financially affect agribusiness, remembering changes for ranch productivity, costs, supply, request and exchange. The size and topographical appropriation of such environment instigated changes may influence our capacity to extend the food creation as needed to take care of the general population. Environmental change could hence have sweeping consequences for the examples of exchange among countries, improvement and food security.

## Environmental Issues

### The Role of Temperature

Higher temperatures will be influence production patterns. Directly, as some plant growth and health may benefit from fewer freezes and chills, while some other crops may be damaged by higher temperatures; or indirectly through the temperature effect on water demand and supply, on the expansion of insects on weeds expansion into different-latitude Habitat.

**Impacts of Climate Change in Agriculture**

With notable regional characteristics, agriculture is a climate-dependent bio-industry. Ecosystem characteristic refers as regional characteristics and determined by the climate of the region. Change in agricultural climatic element such as precipitation, temperature and sunlight disturb the agricultural ecosystem and further influencing the livestock and hydrology sectors. Nordnaus 1991 demonstrate that there are many impacts expected from global climate change, one of the largest impacts is expected on agriculture. By the using crop simulation models, the study revealed that the yields of grains in many developing countries would fall with the increase in warming (Porter *et al*. 2014).

Negative impacts of increasing temperature in agricultural sector includes, decrease in quality and quantity of crop due to reduced growth period subsequent high levels of temperature rise, decrease of sugar content, reduction in storage ability of fruits, inferior coloration, growth of harmful insects in agricultural crops.

**Impact of Environmental Change on Soil Health**

The soil framework reacts to the transient occasions like roundabout invasion of precipitation and furthermore goes through long haul changes, for example, physical and substance enduring because of climatic change. The possible changes in the soil framing factors straightforwardly coming about because of worldwide environmental change would be in the natural matter inventory, temperature systems, hydrology and changes in the likely evapotranspiration. Both the natural matter and carbon to nitrogen ratio(C: N proportion) will reduce in a hotter soil temperature system. Drier soil conditions will stifle both root development and decay of natural matter and will expand weakness to disintegration. Expanded vanishing from the dirt and sped up happening from the actual plants will cause soil dampness stress (Singh *et al*. 2021).

Soils structure through the diverse collaboration of various powers, including environment, help, parent material, organic entities, all acting over the long run. It requires millennia for a dirt to frame and most soils are as yet creating following changes in a portion of these dirt shaping elements, especially environment and vegetation, in the course of recent many years. Environment is perhaps the main elements influencing the arrangement of soil with significant ramifications for their turn of events, use and the board point of view concerning soil structure, strength, soil water holding limit, supplement accessibility and disintegration. Further Aberrant impacts relates to changes in development rates or water-use efficiencies, through ocean level ascent, through environment incited reduction or expansion in vegetative cover or anthropogenic intercession. Accepting consistent contributions of carbon to soils from vegetation, diverse gauge foreseesthose normal changes in temperature, precipitation and dissipation will cause critical change in natural matter turnover and CO2 elements.

**Effect of Integrated Farming Systems**

The integrated farming system (IFS) is 'an agriculture that is sustainable and efficiently productive and allows the welfare of man, animal and plant'. IFS is also an approach of obtaining high productivity with substantial fertilizer economy. It relies on organic recycling for maintaining soil productivity and livestock plays a key role in the

system wholeness. The dairy and small ruminants (goat/sheep) are prominent. Because 85 % of Indian farmers and 98.4 % Raichur farmers practicing crop based cropping system research on IFS was initiated in Agricultural Research Station coming Falling under UAS, Raichur, in eighties and after the formation of the University the efforts were renewed both for rainfed and irrigated situations on the farms under RKVY, GoK project and under ICAR project, and on SC and ST farmers under SCP/TSP project and on 100 acres blocks under each RSK, through RKVY, IFS funding. Crossbred cows, shirohi, Jmnapari and barberi goats, Giriraj poultry, horticulture crops involving flowers, fruits, and vegetables, agricultural crops comprising commercial and food species, timber species on bunds, bio-digester, and vermicompost units formed predominant components of IFS unit (Jabran*et al.* 2020).

**Effect on Pest, Diseases and Weeds**

Frequency of irritation and sicknesses would be generally extreme in tropical locales because of positive environment/climate conditions, different editing and accessibility of substitute bugs consistently. Environmental change is probably going to cause a spread of tropical and subtropical weed species into calm zones and to build the quantities of numerous mild weed species right now restricted by the low temperature at high scopes.

The above realities request earnest measures, from mainstream researchers and the public authority. A portion of the variation measures at the ranchers' level could be:

1. For short-season yields like wheat, rice, grain, oats, and numerous vegetable harvests, expansion of the developing season may permit more yields in a year.
2. Longer-season cultivars can be planted to give a steadier yield under more factor conditions.
3. Changes in editing design (move from rice–wheat trimming framework to other positive yield blend) might be received. Harvest broadening in Canada and in China has been recognized as a versatile reaction.
4. Heat and dry season lenient, bother safe, salt open minded assortments would be gainful. Hereditary designing and quality planning offer the potential for presenting a more extensive scope of attributes.
5. Minimum, diminished or preservation culturing advancements, in mix with planting of cover harvests and green compost crops, offer significant prospects to invert existing soil natural matter, soil dampness, soil disintegration, and supplement misfortune to battle further misfortunes because of environmental change.
6. Water assets in the semi-bone-dry districts are relied upon to diminish because of environmental change. Expanded dissipation (coming about because of higher temperature), joined with changes in precipitation qualities (sum, fluctuation and recurrence), can possibly influence horticulture - the prevalent client of water. Better water the board is needed for upgrading crop profitability and guaranteeing food security. For the most part, inundated farming is less unfavorably influenced than dry land horticulture however adding water system is an exorbitant issue as it is reliant upon the accessibility of water supplies.

7. Added nitrogen and different composts would probably be important to exploit the CO2 impact however effect sly may affect people and amphibian environments.

**Strategies for Facing the Challenges**

Explicit measures can possibly give an effective versatile reaction in the event that they are received in proper circumstances. An assortment of issues should be thought of, including land-use arranging, watershed the executives, catastrophe weakness appraisal, thought of port and rail ampleness, exchange strategy, and the different projects nations use to energize or control creation, limit food costs, and oversee asset contributions to horticulture.

Significant systems for improving the capacity of agribusiness to react to assorted requests and pressing factors include:

1. Improved preparing and general schooling of populaces reliant on farming.
2. Research on new assortment improvement, joining different qualities, for example, warmth and dry season lenient, salt and bug safe ought to be given prime significance.
3. Food programs and other federal retirement aide programs, to give protection against neighborhood supply changes.
4. Infrastructure offices like transportation, dissemination and market should be improved.
5. Existing strategies may restrict effective reaction to environmental change. Changes in strategies, for example, crop endowment plans, land residency frameworks, water evaluating and distribution, and global exchange obstructions could expand the versatile capacity of horticulture.

**Conclusion**

The challenge for the field of climate change impacts on orchards including the design of appropriate adaptation and mitigation solutions is to integrate insights from the physical, bio-physical and social sciences in to comprehensive understanding of climate-agriculture interactions at seasonal to interannual and decadal to century timescales, as well as at regional and global spatial scales. The ultimate challenge is to apply this knowledge to "real-world" orchard practices and planning worldwide, so the long-term sustainability may be effectively enhanced under climate change, by finding the optimal synergies between the necessary adaptation and mitigation strategies. To mitigate the adverse effects of climate change on the production and quality of horticultural produce, strategic and technological counter measures should be developed, as well as adaptation technologies against increased temperature and other climatic abnormalities. In addition, a more reliable and accurate impact assessment of climate change in its nature, degree of severity, duration and pattern on of orchard management must be established.

**Reference**

Chattopadhyay, R. (2000). Simulating the impact of climatic variability and climate change on the productivity of sugarcane. Ph.D. Thesis, Division of Environmental Sciences, Indian Agricultural Research Institute, New Delhi.

Jabran K., Florentine S., Chauhan B.S. (2020) Impacts of Climate Change on Weeds, Insect Pests, Plant Diseases and Crop Yields: Synthesis. In: Jabran K., Florentine S., Chauhan B. (eds) Crop Protection Under Changing Climate. Springer, Cham. https://doi.org/10.1007/978-3-030-46111-9_8

Porter, J.R., L. Xie, A.J. Challinor, K. Cochrane, S.M. Howden, M.M. Iqbal, D.B. Lobell, &Travasso, M.I. (2014). Food security and food production systems. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability.Part A: Global and Sectoral Aspects. Contribution of Change.

Singh, K.K., Meena, R.K., Singh, S.P. and Chauhan, J.S. (2021). Approaches to Relieve a Worldwide Global Warming through Agriculture, In: Akshat Uniyal&Isha Sharma, (eds) Trends in Agriculture: Traditional and Modern Approaches. pp. 279-289. Agrobios Research: An Imprint of Agrobios (India), Jodhpur.