



THE GREEN REVOLUTION 2.0: TRANSFORMING INDIAN AGRICULTURE WITH CLIMATE-RESILIENT PRACTICES

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INTRODUCTION

Climate change has created a number of challenges for Indian farming, such as irregular rainfall that can cause droughts or floods, high temperatures that can stress crops, scarce water supplies, an increase in pests and diseases, degraded soil, insufficient infrastructure, unstable markets, and few options for adaptation. These difficulties emphasise how critical it is to develop support networks and sustainable, climate-resilient farming methods in order to preserve Indian farmers' livelihoods.

Climate smart agriculture (CSA): It is an approach to farming that aims to increase agricultural productivity, improve resilience to climate change, and reduce greenhouse gas emissions, the goals of climate-smart agriculture (CSA) are to lower greenhouse gas emissions, boost resistance to climate change, and raise agricultural productivity.

CSA combines three primary goals:

1.Sustainable productivity: By encouraging the efficient use of resources (such as land, water, and inputs) and enhancing agricultural methods, CSA aims to sustainably raise agricultural productivity and incomes, particularly for smallholder farmers.

2. Conservation techniques :CSA's goal is to make agriculture more resilient to the effects of a changing climate, including more frequent and severe droughts, floods, and temperature swings. This includes

using soil conservation techniques, water management strategies, and crop types that are adaptable to climate change.

3.Mitigation: The CSA aims to lower greenhouse gas emissions from agriculture, which are a contributing factor to global warming. This can be accomplished by using techniques like agroforestry and conservation that store carbon in soils.

Precision agriculture: sometimes referred to as precision farming or precision ag, is a method of managing farms that maximises agricultural yields and profitability while lowering waste and environmental effect. It does this by utilising information technology, data analytics, and specialised equipment.

Important Elements of Precision Agriculture:

Geospatial Information System (GIS) and Global Positioning System (GPS) technologies are used to track field variability and make accurate maps of where to plant, fertilise, and spray. With the use of **variable rate technology (VRT)**, farmers can apply inputs—like insecticides or fertiliser—at different rates throughout a field, according to the particular requirements of various sections.

Remote sensing: To gather information on crop health, soil moisture, and other variables in real-time for decision-making, remote sensing technologies—such as drones and satellites—are deployed.

Automated machinery: Compared to human-operated equipment, automated machinery can carry out operations more precisely and efficiently. Examples of this type of machinery include self-driving tractors and harvesters.

Data management: Systems for gathering, storing, and analysing data

The 5Rs are frequently used in precision agriculture to maximise crop yields and minimise environmental impact while optimising the usage of agricultural inputs. **The right source, right rate, right time, right place, and right technique** of input application are known as the "5Rs." These ideas are used in precision agriculture in the following ways:

Right Source: Based on the needs of the soil and the crops, precision agriculture assists farmers in choosing the appropriate source of inputs, such as herbicides and fertilisers. The right type and composition of inputs are essential for the best crop growth, and this may be ascertained with the use of soil testing and data analysis.

Right Rate: With precision agriculture, farmers may apply inputs at a rate that is appropriate for each specific section of a field, taking into account its unique requirements. By precisely adjusting application rates according to crop and soil conditions, variable rate technology (VRT)

minimises waste and maximises nutrient uptake.

Right Timing: To optimise efficiency and reduce waste, precision agriculture assists farmers in applying inputs at the appropriate moment. Farmers are able to make timely decisions about when to apply inputs like irrigation, fertilisers, and pesticides because of real-time weather and soil condition monitoring.

Right Place: Precision farming guarantees that fertilisers are sprayed in precisely the right spots on a field, where they are most

required. Farmers may apply inputs precisely and minimise waste by creating application maps using GPS and GIS technologies.

Right Method: Precision farming assists farmers in selecting the appropriate approach for applying inputs in order to reduce their environmental footprint and optimise productivity. For instance, precision spraying can minimise pesticide drift and off-target impacts, while drip irrigation can reduce water waste compared to flood irrigation.

CONCLUSION

The emergence of Green Revolution 2.0 signifies a transformative shift towards climate-resilient and sustainable agriculture in India. Through the adoption of climate-smart agriculture, organic farming, agroforestry, and digital agriculture, Indian farmers are pioneering innovative solutions to address climate change impacts and ensure food security. Government initiatives such as the Paramparagat Krishi Vikas Yojana and the Pradhan Mantri Krishi Sinchayee Yojana play a pivotal role in promoting adoption and scaling up climate-resilient measures. However, challenges remain, including the need for wider adoption, infrastructure development, and access to financing for smallholder farmers. Continued collaboration, technological innovation, and policy support are essential to accelerate the transition towards a resilient and sustainable agricultural sector in India.

References

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