



Climate based Agriculture

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Abstract

Extreme temperature, frequent and intensive flood, cyclone and other natural disasters due to climate change became acute and expecting to be severe in future. Water scarcity is a growing concern in many parts due to irregular monsoons and depleting groundwater reserves. Rapid deforestation and land degradation contribute significantly to climate change. To adapt to these changing conditions and ensure food security, the agricultural sector in India is witnessing several emerging trends that are aimed at harnessing climate-based strategies.

Introduction

Climate changes may affect many different aspects of agricultural production. With greater climate variability, shifting temperature and precipitation patterns, and other global change components, we expect to see a range of crop and ecosystem responses that will affect integral agricultural processes. Such effects include changes in nutrient cycling and soil moisture, as well as shifts in pest occurrences and plant diseases, all of which will greatly influence food production and food security. These changes are expected to increase abiotic and biotic stress, forcing agricultural systems to function under greater levels of perturbation in the future. To adapt to these changing conditions and ensure food security, the agricultural sector in India is witnessing several emerging trends that are aimed at harnessing climate-based strategies.

Crop Diversification

Extreme temperature, frequent and intensive flood, cyclone and other natural disasters due to climate change became acute and expecting to be severe in future. In the same time, crop diversification could be an effective adaptation option under this situation it protects natural biodiversity, strengthening the ability of the agro-ecosystem to respond to these stressed s, minimizing environmental pollution, reducing the risk of total crop failure, reducing incidence of insect pests, diseases and weed problems and secure food supply opportunities and also providing producers with alternative means of generating income. It provides better conditions for food security



and enables farmers to grow surplus products for sale at market and thus obtain increased income to meet other needs related to household well-being. Farmers need to gain knowledge and skills in affected areas about crop-production techniques, integrated farming systems (including crop rotation and intercropping), and climate-resilient production techniques. It can be implemented in a variety of forms and at a variety of scales, allowing farmers to choose a strategy that both increases resilience and provides economic benefits.

Water Management

Water scarcity is a growing concern in many parts of India due to irregular monsoons and depleting groundwater reserves. Climate-smart agriculture emphasizes the efficient management of water resources. This includes adopting techniques like drip irrigation, rainwater harvesting, and constructing small-scale water storage structures. Additionally, farmers are encouraged to shift towards drought-tolerant crop varieties and utilize water-saving techniques such as mulching and conservation tillage. Effective water management strategies help conserve this precious resource, increase water-use efficiency, and enhance resilience to climate change impacts.

Agroforestry and Afforestation

Rapid deforestation and land degradation contribute significantly to climate change. In response, agroforestry practices, which involve integrating trees with crops and livestock, are gaining popularity. Agroforestry not only enhances soil fertility, conserves water, and prevents erosion but also acts as a carbon sink, mitigating greenhouse gas emissions. Furthermore, afforestation initiatives, such as the National Afforestation Program, promote tree planting to increase forest cover, restore degraded lands, and sequester carbon dioxide. These practices contribute to climate change mitigation while simultaneously providing additional income streams for farmers.

Conservation Agriculture

Conservation agriculture encompasses a set of practices aimed at sustainable and climate-resilient farming. It involves minimizing soil disturbance through reduced tillage or zero-tillage techniques, maintaining soil cover using crop residues or cover crops, and practicing crop rotation. Conservation agriculture enhances soil health, reduces water runoff, increases carbon sequestration, and conserves soil moisture, making it well-suited for climate change adaptation. The Indian government has been actively promoting conservation agriculture through various schemes and programmes.



Weather-based Crop Advisory Systems

Advancements in technology have facilitated the development of weather-based crop advisory systems in India. These systems utilize weather forecasts and agro-climatic data to provide real-time guidance and advisory services to farmers. By incorporating weather information, farmers can make informed decisions regarding sowing, irrigation, and pest management. Weather-based crop advisory systems not only optimize resource utilization but also help farmers adapt their farming practices to changing climatic conditions, reducing the risk of crop failure.

Climate-Smart Agriculture

CSA is an integrated approach to managing landscapes—cropland, livestock, forests and fisheries—that addresses the interlinked challenges of food security and accelerating climate change. CSA aims to simultaneously achieve three outcomes:

1. **Increased productivity:** Produce more and better food to improve nutrition security and boost incomes, especially of 75 percent of the world's poor who live in rural areas and mainly rely on agriculture for their livelihoods.
2. **Enhanced resilience:** Reduce vulnerability to drought, pests, diseases and other climate-related risks and shocks; and improve capacity to adapt and grow in the face of longer-term stresses like shortened seasons and erratic weather patterns.
3. **Reduced emissions:** Pursue lower emissions for each calorie or kilo of food produced, avoid deforestation from agriculture and identify ways to absorb carbon out of the atmosphere.

Conclusion

Climate change poses a significant challenge to Indian agriculture, threatening food security and livelihoods. However, the emerging climate-based agriculture trends discussed in this essay offer hope for a sustainable and resilient future. By embracing practices such as crop diversification, water management, agroforestry, conservation agriculture, and weather-based crop advisory systems, India's agricultural sector can adapt to the changing climate and mitigate its impact. It is crucial for policymakers, farmers, and stakeholders to collaborate and promote these trends to ensure a climate-smart and sustainable agricultural system in India. Only through collective efforts can we secure food production, conserve natural resources, and build a climate-resilient future for generations to come.

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