

Sustainable Agriculture: A Necessity of Future

ARTICLE ID: 0046

Pushendra¹, Siddhant Kr Pundir² and Ajay Rana³

¹Department of Genetics and Plant Breeding, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, 250110 (U.P.) India

²Department of Plant Pathology, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, 250110 (U.P.) India

³Department of Plant Pathology, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

Two of the most pressing issues facing humanity in the 21st century are climate change and food insecurity. Some of the current impacts of climate change such as heat waves, floods, droughts and storms are affecting lives and livelihoods. The world's southern continents are reportedly experiencing severe drought due to climate change, which negatively impacts

farmers, prompting them to reevaluate their practices. Farmers are taking a variety of adaptation measures to reduce the negative effects of climate change. The need for a holistic strategy is driven by climate change's



dual challenges of adaptation and mitigation, and the pressing need for agricultural production to rise by 60% by 2050 in order to fulfill food demand. So, the world needs to find ways to sustainable agriculture

agricultural production and farmers' livelihoods. Both population expansion and dietary changes are contributing to an increase in the demand for food. The effects of the environment on farm output only add to the difficulty. As a result of climate change, traditional farming practices are becoming less productive. Climate change is increasing the dangers faced by

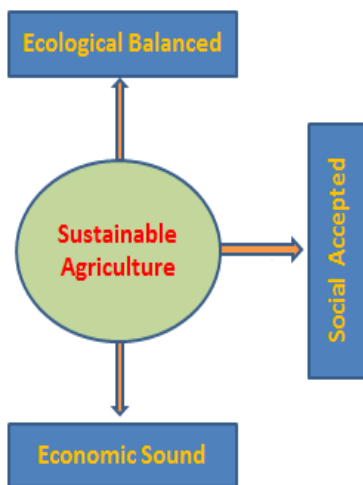
and the answer lies in Climate Smart Agriculture (CSA).

How to simply define the sustainable agriculture?

“Sustainable agriculture is a new method of agriculture which is following the three components- ecological balanced, economic sound and social accepted” (NGO, *Sustainable Agriculture Treaty*, 1992).

Sustainable development is the management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry and fisheries sectors) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable. (*Document CL 94/6 94th Session of the FAO Council, 1988*).

1. Ecological Balance: Ecological balance is a biological term used to describe an ecosystem where species coexist with other species to create a sustainable environment or in other words “A state of dynamic equilibrium within a community of organisms in which genetic, species and ecosystem diversity remain relatively stable, subject to gradual changes through natural succession.”



2. Economic Sound Agriculture: Economic sound agriculture a system of agriculture which is expected to be economically beneficial for farmers in a particular situation.

3. Social Accepted Agriculture: Social agriculture has different characteristics compared to traditional agriculture in that it integrates the production function for the market with the social function understood as a transfer of positive externalities that originate from agriculture and have repercussions on individuals in terms of the transfer of farming culture, production techniques and processing of agricultural products.

Viable Options for Sustainable Agriculture

1. Climate-Smart Agriculture: Climate-smart agriculture (CSA) is an integrated approach to managing landscapes-cropland, livestock, forests and fisheries that address the interlinked challenges of food security and climate change. CSA target the three pillars or objectives: (1) sustainably increase agricultural productivity and incomes; (2) adapt and build resilience to climate change; and (3) reduce/remove GHG (greenhouse gases) emissions, where possible.” Dimensions of climate smart practices include water smart, weather smart, energy smart, and carbon smart practices. They improve productivity, deal with land degradation, and improve soil health.

To effectively implement a climate-smart agriculture strategy, there are some components that are recommended by FAO: (1) Conservation of plant genetic resources for food and agriculture, (2) Crop variant development and (3) Seed production and delivery.

2. Biodiversity Management: In a cropping system, greater diversity of crops and other living organisms is an important criterion for ensuring farm resilience, economic stability, and profitability.

3. Integrated Pest Management: Climate change will affect the spread and establishment of a wide range of insect pests, diseases, and weeds. Integrated Pest Management is an ecosystem approach to crop production and protection.

4. Improved Water Use and Management: The water table across regions is depleting, and in many areas, the groundwater has become unusable due to its salinity. The situation is going to worsen in the future with climate change phenomena. Climate change, which will increase crop evapotranspiration, change the quantity of rainfall and rainfall patterns, and lead to greater variations in river runoff and groundwater recharge, will affect both rainfed and irrigated agriculture.

5. Sustainable Soil and Land Management: Integrated landscape planning and management are instrumental for achieving climate-smart agriculture. Soil protection can be achieved by practicing direct seeding in combination with the sustainable management of crop residues within a broader framework of integrated soil fertility management.

6. Sustainable Mechanization: The availability of appropriate machinery to carry out sustainable crop management practices increases productivity per unit of land. Tractor-operated tillage is the single most energy-consuming operation in crop production. Using smaller tractors, making fewer passes across the field, and reducing working hours, when combined with conservation agriculture, reduce carbon dioxide emissions, minimize soil disturbance, and curtail soil erosion and degradation that are common in tillage based crop systems.

7. Community Supported Efforts: CSA's value in minimising and adjusting to the effects of climate change on agriculture is becoming widely acknowledged on a global scale. There has been a worldwide uptick in community supported agriculture efforts. These efforts are made in an attempt to create agricultural systems that are both resilient and environmentally friendly. Improvements in agroforestry, sustainable water management, and precision agriculture are all concrete examples of CSA ideas in action, and they are not limited by any one country.

Some Initiatives of the Government of India towards achieving: Climate-Smart Agriculture

To mitigate the impending impact, the Government has taken many initiatives, some of which are as follows:

- ❖ National Innovation on Climate Resilient Agriculture (NICRA)
- ❖ National Mission on Sustainable Agriculture (NMSA)
- ❖ National Adaptation Fund for Climate Change (NAFCC)
- ❖ Climate Smart Village (CSV)
- ❖ Paramparagat Krishi Vikas Yojna (PKVY)
- ❖ Biotech-KISAN
- ❖ Sub-Mission on Agro-forestry

Conclusion

Sustainable agriculture is not merely an idealistic vision; it is a pragmatic necessity for the future of our planet. By prioritizing biodiversity, conserving natural resources, mitigating climate change, enhancing food security, and ensuring economic viability for farmers, sustainable agriculture offers a holistic approach to addressing the challenges of the 21st century.

Policymakers, farmers, and consumers alike must work collaboratively to promote and support the widespread adoption of sustainable agricultural practices, paving the way for a more resilient, equitable, and environmentally responsible food system.

References

1. Bhuwan Bhaskar (2023). Climate Sustainable Agriculture, *Kurukshetra, A Journal of Rural Development*, Volume 71 (9), p. 12-17.
2. FAO (1994). *Development and Education Exchange Papers (DEEP): Sustainable Agriculture and Rural Development: Part 1: Latin America and Asia*, Rome, p. 5.
3. Sgroi, F., (2022). Social agriculture is a strategy to prevent the phenomenon of abandonment in mountain areas and areas at risk of desertification. *Journal of Agriculture and Food Research*, 10, p.100454.