

CLIMATE RESILIENT AGRICULTURE: THE NEED OF HOUR

Article Id: AL202176

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India is a country whose mass proportion of the population depends on agriculture. At present, climate change has become an important issue in agriculture to ensure food and nutritional security for a continuously growing population. Climate change has its impact at the global level, but some of the countries like India; are more vulnerable in terms of the huge population depending largely on the agriculture sector. The Government of India has accorded high priority for research and development to cope-up with climate change in the agriculture sector.



Climate-resilient agriculture (CRA) is an approach which includes the sustainable use of existing natural resources through crop and livestock production systems to achieve long-term and higher productivity along with farm incomes under climate variabilities.

“Climate change is already affecting agriculture and food security” (FAO Report, The State of Food and Agriculture, 2016). Without urgent action, millions & more people will be at a high risk of hunger and poverty.

Climate resilience is a fundamental concept of managing the risks of climate change. In this context, resilience refers to the ability of an agricultural system to anticipate, absorb,

prepare for as well as adapt to and recover from the impacts of changes in climate and extreme weather conditions.

The Need for Climate Resilience

Climate related hazards are having a big impact on the lives of people, especially the poor. Extremely heavy rainfall or hardly any rain at all on the other side, rise and fluctuations in temperature, sudden hailstorms & frequency of droughts, floods & storms are happening with uncertainty and this is expected to increase further in future.

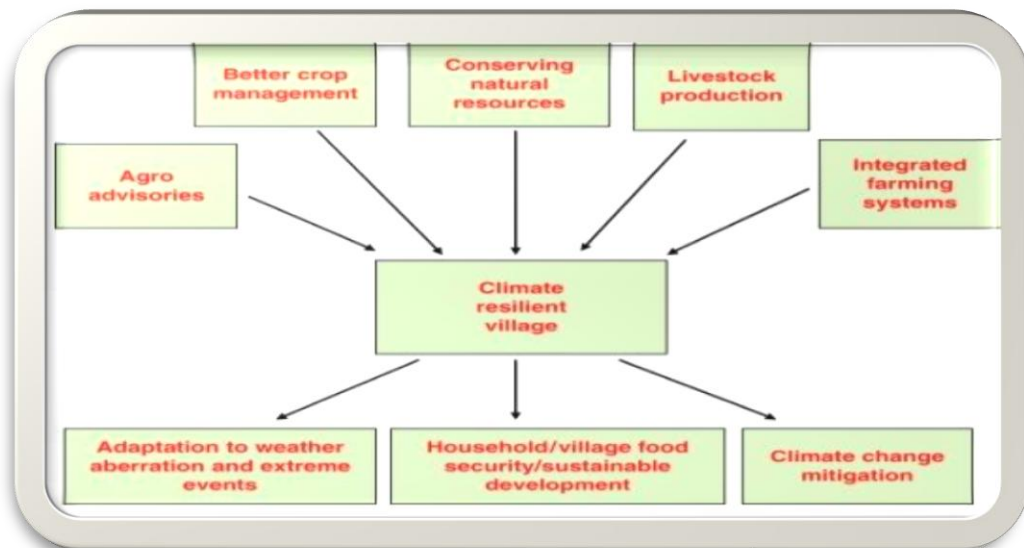
The impact of these climatic conditions are felt severely especially in developing countries with less food and water security as well as loss of livelihoods. In this situation, survival becomes a real struggle. Promoting climate resilient agriculture in the areas which are severely affected by climate change is needed to safeguard food security and also a decent income for rural communities.

In the coming decades, climate change is expected to further exacerbate the risk of disasters. The more frequent, intense storms & floods and long-lasting droughts can erode the existing community coping capacities to prepare for, respond to and recover from successive hazardous events.

Keeping and viewing all these things it seems the need of hour that farmers and agriculturalists are enabled to apply agricultural practices that make them more resilient to climate change.

Climate Resilient Practices

Different Components and Climate Resilient Practices



1. Cropping System

- ❖ The crop varieties with high heat tolerance or optimal heat range should be promoted. *e.g.* (Quinoa, pearl millet, sorghum *etc.*)
- ❖ The mechanisms should be adopted to reduce the effect of heat stress at the key phenological phases (germination & flowering) through short cycle varieties.
- ❖ Optimize crop calendars through historical climate data and seasonal forecast support for decision making.
- ❖ Use of fire breaks (rock walls, roadways, high moisture and low resin plants), windbreaks, frost protection (plant row covers, mulching, wind machines) & Agroforestry.
- ❖ Agronomic practices like weeding and defoliation reduce transpiration, cover crops reduce soil erosion, mulching with no-tillage reduces the exposure of crops to heat stress conditions.
- ❖ Drip irrigation systems, programmed irrigation, small-scale reservoirs & re-use of wastewater helps in drought management.
- ❖ Biological control like the use of natural enemies, crop rotation, use of bio-pesticides, and integrated pest management (IPM) helps in pest and disease management.

2. Livestock System

- ❖ Adapted cattle breeds with heat tolerance, switching to livestock species (camel, sheep & smaller animals) for drought and heat management.
- ❖ Rotational grazing, reduced herd size, cut and carry fodder systems are used to prevent land degradation.
- ❖ Use of manure for biogas production shorten the storage time at farms, and biological control helps in greenhouse gas minimization.

3. Forest System

- ❖ Use of forest inventory, controlled timber harvesting, veld management, payments for economic services (preserve natural resources, wild-life biodiversity) help to prevent forest degradation.
- ❖ Reforestation, regeneration & aforestation; such practices prevent land degradation and helps in greenhouse gas minimization.
- ❖ Sustainable forest management for soil and water conservation, change of species and selection of traits accordingly for the drought management.

4. Biodiversity

- ❖ Promotes ecosystem based adaptation and nature-based solutions, including ecosystem restoration and rehabilitation.
- ❖ Supports the preservation of germplasm and living genetic resources maintained for the purpose of animal and plant breeding.
- ❖ Develop applied remote sensing and modeling for biodiversity monitoring and analysis.
- ❖ Enhances forest connectivity by promoting habitat corridors and through reforestation, removing barriers for dispersal and locating reserves close to each other; mitigates other threats for *e.g.* invasive species, fragmentation and pollution *etc.*
- ❖ Initiate long term studies of species response to climate change.
- ❖ Translocate species to the most suitable environments that depends on physiological and demographic factors.

Smart Practices and Technologies for Climate Resilient Agriculture

1. Fodder cultivars to tackle fodder scarcity.
2. Integrated Farming System (IFS) modules.
3. Rainwater harvesting and recycling through temporary check dam.
4. Management practices to tackle cold stress in backyard poultry.

5. Captive rearing of fish seed as a livelihood opportunity in flood prone areas.
6. Drum seeding of rice for water saving and timely planting.
7. Direct seeded rice for promoting water use efficiency.
8. Drought tolerant paddy cultivars to tackle deficit rain fall situations.
9. Small farm mechanization through ‘Custom Hiring Centres’ for farm machinery.
10. Village level seed banks to combat seed shortages.
11. Flood tolerant varieties to impart resilience to farmers in flood-prone areas.
12. Short duration crop varieties suitable for late sowings.
13. Zero till drill wheat to escape terminal heat stress.
14. Enhancement of resilience through improvement in conveyance efficiency.

National Initiative on Climate Resilient Agriculture

ICAR launched a ‘National initiative on climate resilient agriculture’ during 2010-11. The initiative primarily enhances the resilience of Indian agriculture covering crops, livestock, and fisheries.

Objectives of NICRA

1. To promote the research for the improvement in production system and risk management to enhance the climate resilience in ‘Indian agriculture’.
2. Wide demonstration of technologies directly at farmer’s field to enable the vulnerable districts in coping with climate change.
3. Capacity building of scientists and other stakeholders in climate resilient research.

Different Components of the Project

There are basically four components of the scheme which are as follows:

- Strategic research on adaptation and mitigation.
- Technology demonstration at farmers’ field to cope-up with current climate variations.
- Capacity building of different stake holders.
- Sponsored competitive research to fill the critical gaps.

Future Prospects

- Reduction in the green house gas emissions from all agricultural and non-agricultural sources should have to be prioritised. The introduction of Neem-coated urea is one of such policy interventions.
- Structured training programs should be organized on priority basis to build-up confidence among the stake-holders and sensitise them to understand the climate change events and their impact.
- Fine tuning of the gap between current management practices and essential agro-advisories.
- Implementing Climate resilient agriculture (CRA) practices; across the country is the need of the hour.
- Collaboration between farmers, research institutions, funding agencies, governments & non-government organisations and private sectors; combine strengths to promote CRA across the nation.
- Flagship farmer-oriented programmes are required to improve the skills used in agriculture and allied sectors.

Conclusion

India is an agrarian country, and its economy is based on agriculture. Climate change has an immense impact on the agriculture sector. To cope up with changing climatic conditions, it is the need of the hour that we should go for climate resilient agriculture. Climate resilience is a fundamental concept of managing the risks of climate change and climate-resilient agriculture (CRA) is an approach which includes the sustainable use of existing natural resources through crop and livestock production systems to achieve long-term and higher productivity along with farm incomes under climate variations. The farmers and agriculturalists should be trained in such a way that they are enabled to apply agricultural practices which make them more resilient to climate change. The Govt. and non-govt. Organizations should take part and help in implementing Climate resilient agriculture (CRA) practices across the country.

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