NICRA News

Newsletter on Climate Resilient Agriculture

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National Initiative on Climate Resilient Agriculture

Climate change is of great concern to India in view of food and nutritional security of its growing population. The impacts of climate change are global, but countries like India are more vulnerable due to dependence of its large population on agriculture. India has accorded high priority on research and development to cope with climate change in agriculture sector. The Prime Minister's National Action Plan on Climate Change has identified agriculture as one of the eight national missions.

In this backdrop, ICAR has launched a major project entitled National Initiative on Climate Resilient Agriculture (NICRA) during 2010-11 with an outlay of Rs.350 crores for the XI Plan. The objectives of this initiative are:

- To enhance the resilience of Indian agriculture covering crops, livestock and fisheries to climatic variability and climate change through development and application of improved production and risk management technologies
- To demonstrate site specific technology packages on farmers' fields for adapting to current climate risks
- To enhance the capacity building of scientists and other stakeholders in climate resilient agricultural research and its application.

The project is comprised of four components viz.Strategic research on adaptation and mitigation; Technology demonstration on farmers' fields to cope with current climate variability; Sponsored and competitive research grants to fill critical research gaps and Capacity building of different stake holders.

Leading institutes of ICAR conduct strategic research in a network mode covering crops, horticulture, livestock, natural resource management and fisheries sectors. Initially, the project is focusing on crops like wheat, rice, maize, pigeonpea, groundnut, tomato, mango and banana; cattle, buffalo and small ruminants among livestock and both marine and freshwater fish species of economic importance. The major research themes are:

- **Vulnerability assessment of major production zones**
- **Linking weather based agro-advisories to contingency planning**
- **Assessing the impacts and developing genotypes/varieties tolerant to key climatic stresses (drought, heat, frost, flooding, etc.) in major food and horticulture crops**
- **Continuous monitoring of greenhouse gases in open field conditions in major production systems**
- **Evolving adaptation and mitigation strategies through enhancing water and nutrient use efficiency and conservation agriculture**
- **Studying changes in pest dynamics, pest/pathogen-crop relationships and emergence of new pests and pathogens under changing climate**

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- **Adaptation strategies in livestock through nutritional and environmental manipulations**
- **Harnessing the beneficial effects of temperature in inland and marine fisheries through better understanding of the spawning behaviour.**

Sponsored and competitive grants component deals with issues such as germplasm collection from climate hot spots, climate change impact on plant pollinators, fisheries in esturian habitats, hail storm management, hill and mountain eco-system and socio-economic aspects of climate change etc. are being addressed.

Research was initiated during 2011-12 in all the above themes. Major emphasis during the year was on building state of art research infrastructure like high throughput phenotyping platforms, free air temperature elevation systems in open fields, network of 100 automatic weather stations, environmental growth chambers with CO_2 and temperature controls and special calorimetric system to study livestock response to heat stress. These are some of the unique facilities being set up for the first time in Asia. In all the target crops like rice, wheat, maize, pigeonpea, tomato and mango, core sets of genetic resources were assembled and field phenotyped at different institutions with a view to identifying sources of tolerance to climatic stresses and related genes and traits. Country wide studies have been initiated to understand the impact of temperature on flowering behavior in mango. A nationwide pest surveillance and monitoring system has been put in place for all the target crops for major pests and diseases wherein real time incidence is being monitored along with weather parameters to build pest warning models. Methods for measurement of greenhouse gas emissions in the marine ecosystem have been standardized. Carbon sequestration potential through agroforestry systems across the country is being quantified. Experiments on conservation agriculture in different production systems are being monitored to assess the adaptation and mitigation potential of CA practices. The vulnerability of about 540 rural districts in the country has been quantified in terms of exposure, sensitivity and adaptive capacity in order to prepare a vulnerability atlas.

The technology demonstration component of National Initiative on Climate Resilient Agriculture deals with demonstrating an integrated package of proven technologies for adaptation of the crop and livestock production systems to climate variability. This component is implemented in selected vulnerable districts of the country by implementing location specific interventions through Krishi Vigyan Kendras in a participatory mode. The project is implemented in 130 districts involving over one lakh farm families across the country.

Following is the breakup of the 130 project locations.

1. **KVKs in eight zones -100**
2. **Cooperating centres of AICRP on Dryland Agriculture - 23**
3. **Technology Transfer Divisions of Core ICAR Institutes – 7**

Criteria for selection of districts under TDC:

- **Drought-proneness based on 30 years rainfall data (Source: IMD)**
- **Cyclone-proneness based on data on frequency as recorded by IMD and in consultation with State Disaster Management Departments.**
- **Flood-proneness based on IMD data and National Disaster Management Authority (NDMA) maps.**
- **Vulnerability to heat wave and cold wave based on grid data (IMD) on temperatures**
- **Actual incidence of floods and droughts as recorded by AICRPAM centers**

Bora bandi revives rabi cropping

Of late, farmers in Gunia village, Ghaghara block in Gumla, Jharkhand were not able to cultivate rabi crops due to non availability of water source though a rivulet *Masharia* flows by the village. Earlier, villagers say, that the rivulet was supporting considerable area with irrigation for a post-rainy season crop. However, over the past decade, the rivulet does not stay alive long enough to serve as source of irrigation. This, villagers considered, is due to increased variability in the rainfall pattern. Villagers discussed this problem with the KVK staff when a PRA was conducted during the beginning of the project. The KVK, after engaging with the community to evolve a possible solution, suggested to arrest the flow of the rivulet during the end of monsoon so that water would be available for longer period and the same could be used for irrigation during post-rainy season. Enthused by this idea, the villagers agreed to contribute their labour through *shramdaan* and build a sand bag check dam to partially arrest the flow of the rivulet.

Nearly 150 persons participated in the two-day *shramdaan* and constructed sand bag check dam across the rivulet. The KVK facilitated purchase of empty cement bags in which sand was filled by the villagers and the bags were placed in rows one over the above. Over 550 bags were used to build the check dam and the cost of each bag ranged between Rs two to three. Community lunch was organized on both the days. In all around Rs 13000 (Rupees thirteen thousand only) was spent in mobilizing the community *shramdaan*. As a result of this, a large quantity of water was impounded and the villagers could cultivate a range of rabi crops using the impounded water. Within a short period, the villagers observed that the water levels in their wells had risen considerably. Apart from this, this spot has become a place of attraction for the people of many neighboring villages from they are visiting to see this sand bag check dam. In short, it has become a symbol of self help to address local problems.

Impact of Bora bandi

- Water table enhanced by 44%.
- Area expansion under off season vegetable cultivation in 10ha.
- Summer paddy cultivation in 10ha.
- Wheat cultivation in 50 ha.

Crops grown under *Bora bandi*

Community nursery helps adapt to delayed onset of monsoon

The farmers generally sow the seeds of paddy in the nursery and transplant them when the monsoon sets in. However, farmers in Saran, Bihar observe that during the past few years, the onset of monsoon is delayed by one week to ten days. As a result of this, farmers are forced to transplant over aged seedlings (40-45 day old). Transplanting of aged seedlings leads to low tillering resulting in poor crop yield. In order to address this problem, KVK, Saran encouraged farmers of Affaur village to go in for community nurseries with staggered dates of sowing. This enabled farmers to access seedlings as and when needed by them and as per the progress of monsoon. This helped farmers to cope up with delayed monsoon without compromising on the tillering ability and yield. Besides this, farmers were also facilitated with seeds of short duration paddy varieties like Prabhat, Rajendra Bhagwati, Sahbhagi were introduced that escaped dry spell very efficiently. These interventions have helped farmers to limit losses due to climate variability to a considerable extent and ensured that every farmer in the village is able to take up paddy cultivation irrespective of raising the nursery of his own.





Happy New Year


National Initiative on Climate Resilient Agriculture
Central Research Institute for Dryland Agriculture, Hyderabad-500 059
Tele fax: 040-24535336; e-mail: nicra2@crida.in; nicra2.crida@gmail.com