Weather based crop advisories for climate resilience

Crop management advisories through mobile phones yield positive results for groundnut farmers in Kurnool, Andhra Pradesh

Dr. AVR Kesava Rao and Dr. Sreenath Dixit I Patancheru, Telangana

Global warming is likely to reach 1.5°C between 2030 and 2052, if it continues to increase at the current rate, as per the report released in October 2018 by the Intergovernmental Panel on Climate Change. Climate related risks for natural and human systems are higher for global warming of 1.5°C than at present. Global atmospheric concentration of CO_2 has increased from preindustrial level of 280 parts per million (ppm) to 409 ppm in December 2018. Studies show that climate change in India is real and it is one of the major challenges faced by Indian agriculture, more so in the semi-arid tropics (SAT) of the country. ICRISAT under the National Initiative on Climate Resilient Agriculture (NICRA) project, quantified the changes in areas under different climates in India and their study indicated increase in the semi-arid areas in the country.

Devanakonda mandal in Kurnool district, Andhra Pradesh receives about 548 mm of annual rainfall in around 34 rainy days and falls under the hot dry semi-arid type of climate; rainfed groundnut is the major crop of Devanakonda. Red soils are predominant and length of the rainfed crop-growing period is about 100-130 days. Most of the farmers are small and marginal farmers with low land holding and with increasing variability in the rainfall distribution, they are facing high risks for establishing the crops. Sowing at the right time as such is very critical to ensure that farmers harvest a good crop. And if it fails, it results in loss as a lot of costs are incurred for seeds, as well as the fertiliser applications. Farmers having access to climate and weather information are more likely to sow at the optimum time and take better crop management actions for achieving higher yields. ICRISAT and Microsoft have jointly taken up a pilot under the Andhra Pradesh government's "Rythu Kosam" Project for disseminating sowing and other crop-management advisories to rainfed groundnut farmers of Devanakonda based on near real-time observed rainfall and forecasted rainfall for the next five days.

Groundnut farmers attending a farmers group meeting on the benefits of the ICRISAT crop advisories in Kurnool, Andhra Pradesh.
Photo: ICRISAT

Soil samples were collected following the farmer-participatory randomised soil sampling methodology. Soil nutrient analysis indicated that soils are deficient in zinc (83%), sulfur (68%), boron (59%), and calcium (50%). Soil health card containing information on the current status of soil health and fertilizer recommendations for various crops in different seasons were prepared and provided to the farmers. Dual-purpose raingauges were installed and farmers were given training on rainfall measurement, data recording, displaying and sharing of rainfall data. A team from ICRISAT and Microsoft have visited Devanakonda and nearby five villages (Bhiravanikonda, Kukatikonda, K. Venkatapuram, Nelathalamarri and Singapuram) in Devanakonda Mandal and Farmers' Group Meetings were organized in the villages and farmers were informed about the proposed sowing advisory dissemination activity. Farmers were very enthusiastic and about 175 farmers registered their mobile phone numbers for receiving the sowing advisories without any cost.

Historic climate data for 30-years (1986-2015) were used to understand the rainfed growing season characteristics and optimum sowing window was identified using PNUTGRO crop-growth simulation model. In collaboration with ICRISAT, Microsoft has developed a water balance based AI-Sowing App powered by Microsoft Cortana Intelligence Suite including Machine Learning and Power BI. Beginning of groundnut crop growing period for the year 2016 was identified based on the present Moisture Availability Index computed from the daily rainfall recorded and rainfall forecasted for Devanakonda area for the next five days.

Advisories were prepared both in Telugu (local language) and in English and were disseminated to the registered farmers as SMS during the groundnut crop-growing period of 2016. Advisories included recommendations on land preparation, FYM and soil-test based fertilizer application, seed treatment, sowing, optimum sowing depth, preventive weed management, maintaining proper plant density, observing Boron and Zinc deficiency in field and applying nutrients if needed, harvesting, shade drying of harvested pods and storage.

Farmers accessing advisories
Photo: ICRISAT

In 2016, some farmers took up sowing in the first week of June itself. But, registered farmers, based on the advice received, sowed groundnut in the last week of June and first week of July 2016. During the 31-day period starting from 10 August 2016, Devanakonda received meagre rainfall of about 8 mm and the groundnut crop sown in the first week of June was badly affected by lack of soil moisture. Early sown crop dried up in many fields and rains received later did not improve the situation. On the other hand, crops sown during last week of June and first week of July were able to recover from the moisture stress after receiving rains from 11 September onwards. Weather advisories brought climate awareness among groundnut farmers and encouraged them to initiate sowing at the optimum time. Registered farmers followed weather-based agro advisories for proper crop management and obtained better yields and not the losses that suffered by farmers who have sown earlier. Crop cutting experiments conducted at selected farmers' plots indicated

Young woman farmer measuring rainfall
Photo: ICRISAT

that registered farmers who have sown as per the advisory have obtained 30% increase in yields compared to some of the non-registered farmers, who had sown in the first week of June 2016. This activity was taken up under the Andhra Pradesh Primary Sector Mission

(Rythu Kosam Project) along with the state government, ICRISAT, Microsoft India (R&D) Pvt. Ltd and Chaitanya Youth Association were partners.

G. Chinnavenkateswarlu, a farmer with three acres (1.21 ha) said, "I sowed groundnut on 25 June based on the sowing recommendations provided. My crops were harvested on 28 October and the yield was about 1.35 tons per hectare. Advisories provided for land preparation, sowing, and need based plant protection proved to be very useful to me."

In the year 2017, sowing and other management advisories for crops like rice, maize, finger millet, groundnut, cowpea and cotton were disseminated to about 3,000 farmers in Andhra Pradesh and Karnataka and results indicated an overall increase in the yield of between 10% and 30%. Such initiatives highlight the need for strengthening extension services through AI-powered agriculture initiatives for helping rainfed farmers in semi-arid parts of India for better crop management.

The authors acknowledge the support received from all the partners and particularly the farmers who are now showing interest in climate smart agriculture options and to register their mobile phone numbers for receiving weather-based sowing and crop management advisories.
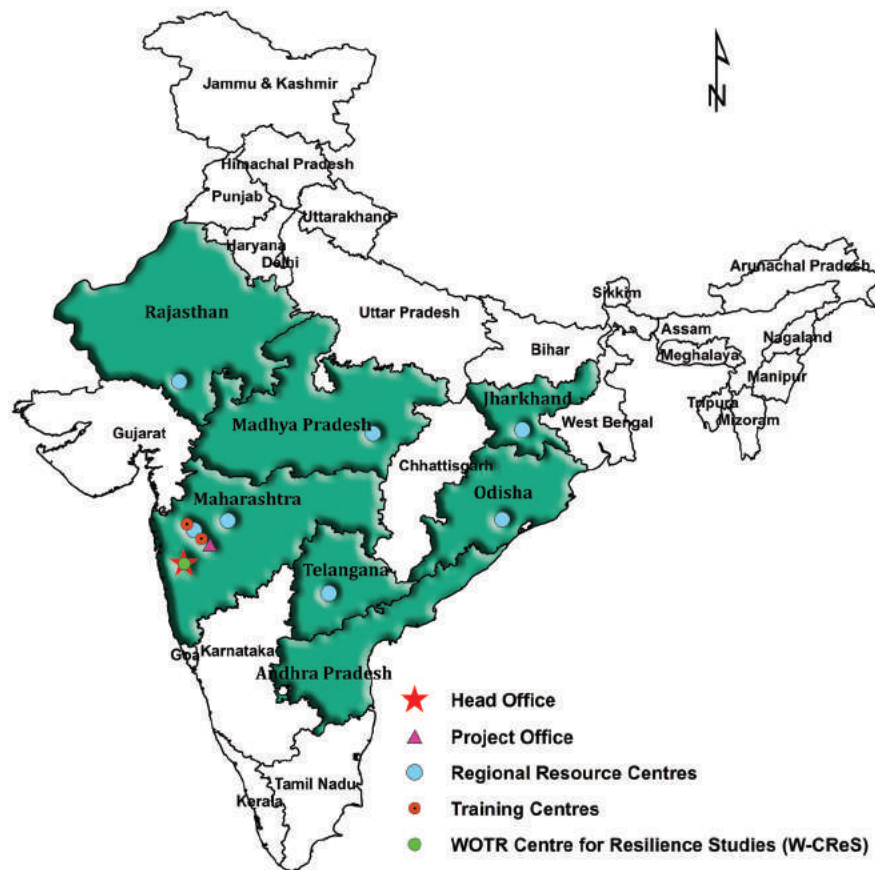
Author Profiles

Dr. Sreenath Dixit is currently with ICRISAT as Principal Scientist & Head of ICRISAT Development Center (IDC), located at Patancheru, Telangana. Until recently he was heading ICAR-Agril. Technology Application Research Institute (ATARI), Bengaluru as its Director.

Dr. AVR Kesava Rao is currently with ICRISAT as Honorary Fellow in the ICRISAT Development Center (IDC), located at Patancheru, Telangana. He has expertise in database management, agroclimatic characterization, climate change impact assessment, remote sensing and GIS techniques.

WOTR's Areas of Operation

Legend:
- ★ Head Office
- ▲ Project Office
- ● Regional Resource Centres
- ● Training Centres
- ● WOTR Centre for Resilience Studies (W-CReS)

Watershed Organisation Trust (WOTR) is a globally recognized organisation dedicated to transforming the lives of millions across India through participatory watershed development and ecosystems restoration, adaptive sustainable agriculture, integrated and efficient water management and climate change adaptation, with a special emphasis on building the resilience of vulnerable communities, farmers and women. It was established in 1993 and is headquartered in Pune, Maharashtra India. WOTR's mandate is to reduce poverty through community mobilization for sustainable watershed development and integrated rural development. At present, it carries out rural development works in 4,827 villages in 7 states of the country, directly and indirectly benefiting 3.7 million people.

WATERSHED ORGANISATION TRUST

'The Forum', 2nd Floor, S.No. 63/2B, Padmavati Corner,
Pune Satara Road, Pune- 411009.
Phone: +9120 24226211; Fax: +91 20 24213530
Email: info@wotr.org | Web: www.wotr.org

Follow us at: