

Sustaining rice farming in reducing water-table

Dear Readers!

THE water-table is reducing day-by-day forcing to adapt innovative strategies on water that is critical for future rice production. The increasing regional variations in rainfall and temperature is causing uncertainty in the field of agriculture. Our scientists are finding new ways to grow rice (*Oryza sativa*), the main staple of some river-basins, using less water. Over 25% of all rice production in just one of the river basins in India, the Godavari Basin, could be lost due to climate change affecting food security of millions of people. It is necessary to adapt strategies in three of India's river basins- the Krishna, the Godavari and the Cauvery.

If adaptation strategies are not opted at this time, the climate change could prove havoc to small- farmers many of whom subsist on rainfed agriculture. Prof. M.S. Swaminathan, a noted agriculturist, reiterated the need for joint efforts among researchers and farmers: 'Climate change needs interdisciplinary research to develop appropriate adaptation mechanisms'. Dr Swaminathan focused on 'Skill-India' mentioning education of farmers and development of a cadre of climate risk managers, who can adopt these practices to tackle climate change. There is a need to overview impacts of climate change and take into consideration the socio-economic vulnerability along with climate variables such as rainfall and temperature at a river basin level. This makes them more relevant than the earlier models that were limited to the national or state level. The multi-goal linear programming model used with adaptation strategies help in both maximizing gross income and minimizing the water use. Innovative practices can help grow rice, the main crop in these river-basins, using less water. Direct seeding of rice, modified system of rice intensification and alternate wetting and drying are some of the methods.

Direct seeding of rice was practised during early 1950s when rainfall was more uniform across crop seasons. This method lost its popularity due to advent of new canal systems which provided assured water supply. But now with climatic variability, this technique is on its way back along with a few supplemental irrigation methods. This approach has reduced production costs by ` 4,000 (US\$65) per acre (0.404 ha). Less labour is needed and water use can be reduced by up to 30%. For instance, in 2012, the drought hit Krishna River Basin saw a massive increase in the area under direct seeding rice from 200 ha to 35,000 ha.

Modified system of rice intensification with machine transplantation is another approach that reduces labour demand due to improved mechanization. It also improves water utilization by about 10-15%. However, leveling of fields is required with some additional cost and timely sowing. But the cost is insignificant considering the additional yield and income.

Alternate wetting and drying in rice to reduce water use and improve efficiency increases aeration to the plant roots and improves nutrient supply. There is no one-method-suits-all solution to the challenges thrown up by the climate change.

Alternative *Boro* paddy cultivation method has been developed for bleak situation. This dry method requires only half the water needed by the traditional clay method. This method reduces the amount of water used by around 50%. The researchers have dubbed the new method 'dry direct seeded Boro rice production technology'. The paddy requires water in the field for 30 days between panicle situation, just after the stem stops growing in length, and the grain filling stages. In the dry process, the seed needs to be planted directly at the end of January and takes around 105 to 115 days to be harvested, while the clay method takes 95 days after sowing the seedlings. Although the tests have been largely successful the new method does have its problems.

The methods highlighted here are among several adaptation strategies. The bigger focus should be on scaling up adaptation strategies through community groups or farmers' organizations. Farmers, agriculturalists and irrigation experts need to coordinate better to ensure sustainable success at a large-scale following cluster approach. Developing public-private partnership will also ensure successful scaling out. India needs to better target its interventions to ensure that incentives are established now to secure food production for the future. The *Indian Farming* has brought out articles on this issue time-to-time.