

Editorial

The Monsoon and Indian agriculture

The Indian rainfed Agriculture is mostly dependent on onset of southwest monsoon and its behavior across the country from June to September during the *Kharif* crop season. The monsoon sets on 1st June across the Kerala coast and covers the whole country by 15th July (Western Rajasthan). The monsoon directory since last 151 (1870-2020) years indicates that the normal onset of monsoon is on 1st June with +/- 7 days, indicating that it varies from 25th May to 8th June in majority of the years. The earliest monsoon was recorded on 11th May in 1918 while belated monsoon on 18th June in 1972. The trend analysis since 1870 also indicated that the onset of monsoon is stable and it tends to be around 1st June with expected inter-annual variations within one standard deviation. It is also understood that the monsoon set may be early (before 25th May) or late (after 8th June) occasionally during which the monsoon rainfall is likely to be below normal or normal, indicating that the chances of excess rainfall in such years (early or late monsoon years) are likely to be less. Such information on onset of southwest monsoon and its relationship with monsoon rainfall need to be generated state-wise jointly from AICRPAM centers of ICAR and Agrometeorological Field Units (AMFUs) of IMD spread across the country based on the historical data to develop major crop calendars for the benefit of farmers under the Agromet Advisory Services. In this direction, one needs to examine whether the definition of monsoon holds well and the relevance of forecasting the monsoon onset with reference to all the meteorological subdivisions spread across the country. Unlike southwest monsoon, the onset of northeast monsoon (winter monsoon) and its behavior on which crop season depends in Tamil Nadu, some divisions of Andhra Pradesh, Karnataka and Kerala need to be studied further since the monsoon cousins (southwest and northeast monsoons) play predominant role in sustenance of Indian Agriculture and the rural livelihoods. These states experience rains mostly due to cyclones.

The monsoon rainfall deficit was 32.8 per cent in June and experienced near normal Rainfall in July and August, 2019. Many states in South, North and North East in the country experienced unprecedented flood and crop damage was severe in both field and horticultural crops. Probably for the first time, crop damage was considerably high due to floods across the Country and the cropped area was relatively less in Kharif 2019 when compared to that of Kharif 2018. Unlike the West Coast of India where heavy rainfall is noticed during the southwest monsoon season, the East Coast of India is prone to cyclones during the northeast monsoon and food grains production is adversely affected including horticultural crops depending on the severity of wind and rains and thereby threat to Agriculture due to aberrations in both the monsoons.

The Indian economy is mostly agrarian based and depends on onset of monsoon and its further behavior. The year 2002 was a classical example to show how Indian food grains production depends on rainfall of July. The year 2002 was declared as all India drought, as the rainfall deficiency was 19% against the long period average of the Country and 29% of area was affected due to drought. The *kharif* food grains production was adversely affected by a whopping fall of 19% due to all-India drought during monsoon 2002. The All India drought is defined as the drought year when the rainfall deficiency for the country as a whole is more than 10 per cent of normal and more than 20 per cent of the country's area is affected by drought conditions. The all India drought could be attributed to the monsoon breaks / failure during the *khairf* season. As the area under cultivation during the first crop season is mostly rainfed across the country, the distribution of monsoon rainfall during July play a predominant role for crop spread. The Indian food grains production increased from 50 million tonnes in 1950-51 to more than 300 million tonnes (estimated) in 2020-21 due to technological interventions despite weather aberrations. Good monsoon (9 per cent excess rainfall

against the Long Period Average) and its better distribution in many States across the country is one of the factors for record Indian food grains in 2020-21. Though increase in food grains production was more than six folds, the inter-annual/intra-seasonal variations were not uncommon due to the occurrence of floods, droughts, heat and cold waves. The inter-annual dips in the production of food grains are mostly due to the failure of monsoon and consequent droughts. Consecutive droughts were seen across the country in 1965 & 1966; and 2014 & 2015. The years 1979, 1987, 2002, 2009, 2012, 2014 and 2015 were declared as the drought years during which the monsoon rainfall was deficit and the country's food grains production was adversely affected to a considerable extent. The effect of drought during the monsoon season on Indian food grains production is felt much more when compared to that of floods as large areas under cultivation is adversely affected due to drought. In contrast, it is the occurrence of floods and water logging which determines the adverse affect on rice production across the state of Kerala. Therefore, identification of location specific weather extremes during both the monsoons and their effects on crop production is very important to minimize crop losses through contingent crop planning. Hence, pro-active measures are need of the hour to increase the Indian food grains production across the country against the ill effects of monsoon aberrations for which location/region/crop specific technologies are to be evolved as part of sustenance agriculture and betterment of rural livelihoods.

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