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A STUDY ON 'PEAK RAINFALL PERIOD' AND ITS AGRICULTURAL IMPLICATIONS ON CROPS GROWN IN DRY FARMING REGION OF INDIA

1. Dry farming region (DFR) of India is defined as the region receiving annual average rainfall between 400-1000 mm. Unlike other parts of the country rainfall during monsoon season is not uniformly and evenly spread over DFR (Soman and Kumar, 1990). Das and Kore (2003) showed that the seasonal rainfall variability over most parts of DFR is quite high, nearly 40%. The uneven distribution of rainfall leads to situations in which, crop suffer from deficient rainfall on some occasions and excess rainfall at other occasions during the season. Under these circumstances, it becomes a very difficult task to effectively utilize the rainfall for maximum crop production. Many authors have studied water requirement, water availability periods and peak requirement of water for particular crops grown in this region (Das *et al*., 1993; Das and Ballal, 1994). In this paper, an attempt is being made to identify 'peak rainfall periods' in different parts of DFR, the average amount of rainfall received during the period and its agricultural implications on various crops have been discussed.

2. Weekly rainfall data for the monsoon season for 56 well distributed stations in dry farming region (DFR) from 1901-1980 has been utilized in the present study. The States covered in DFR region are Punjab, Haryana, Rajasthan, Gujarat, Madhya Pradesh, Maharashtra, Karnataka, Tamilnadu and Andhra Pradesh. Over the entire monsoon season the period of three consecutive weeks, for each station have been identified when it receives highest amount of cumulative rainfall. This period of three consecutive weeks for each station is taken as 'peak rainfall period' of the monsoon season. The period of three consecutive weeks has been considered for its relevance to water requirement at different phenophases of majority of crops grown in DFR. The information on growth stages and water requirement of crops, during the 'peak rainfall period' has been collected from 'Crop weather calendars' (IMD, 1993; IMD, 1999; IMD 2002; IMD 2003; ICAR 1997). Different zones indicating similar 'peak rainfall period' have been delineated on map. Average rainfall during the 'peak rainfall period' was also computed. The areas receiving similar range of average rainfall, as categorized below, have been plotted on the map and its agricultural implications on various crops have been discussed.

Region I	75 to 125 mm	– moderately high
Region II	> 125 to 175 mm	– high
Region III	>175 mm	– very high

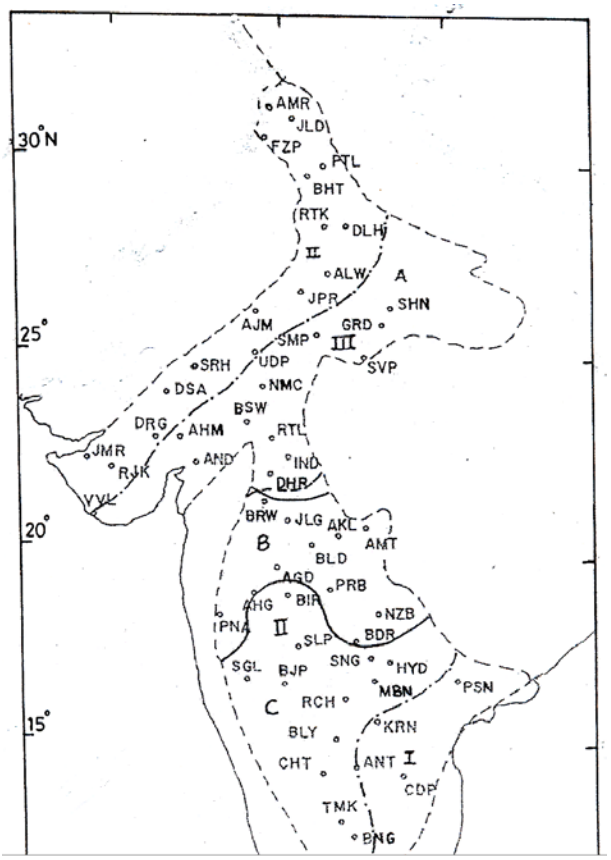

Fig. 1. Delineation of zones (A, B, C, D) of similar peak rainfall period and areas (I, II, III) of average rainfall received during the period

3.1. On the basis of similarity in 'peak rainfall period', the entire DFR has been divided into four zones *viz*., A, B, C, and D (Fig. 1). Zone 'A' consists of 27 stations of northern region between latitude 22° N to 30° N. The three consecutive weeks of 'peak rainfall period' in zone 'A' are standard week numbers 29, 30 and 31 (*i.e*., 16th July to 5th August). Zone 'B' covers middle part of DFR lying between latitude 18° N - 22° N and consists of 8 stations in north Maharashtra and Andhra Pradesh. The three consecutive weeks of 'peak rainfall period' in zone 'B' are standard week numbers 26, 27 and 28 (*i.e*., 16th June to 15th July). Zone 'C' covers almost entire peninsular part of DFR lying between latitude 12° N - 18° N and consists of 17 stations in southern Maharashtra, interior Karnataka and west Andhra Pradesh. The three consecutive weeks of 'peak rainfall period' in

zone 'C' are standard week numbers 37, 38 and 39 (*i.e.*, 10th September to 30th October). Zone 'D' covers extreme southern part of DFR between lattitude 8° N - 12° N and consists of only 4 stations. The three consecutive weeks of 'peak rainfall period' in zone 'D' are standard week numbers 40, 41 and 42 (*i.e.*, 1st October to 21st October).

3.2. Average rainfall during the 'peak rainfall period', for all the stations in DFR was computed. The areas receiving similar range of average rainfall, as categorized above, have also been plotted on the map (Fig. 1). It brings out the following salient features;

(*i*) In zone 'A', northwestern parts received average rainfall in the high range and other parts covering NE Madhya Pradesh and east Gujarat received average rainfall in the very high range.

(*ii*) In zone 'B', parts of NW Andhra Pradesh, Vidarbha, Marathwada and parts of Madhya Maharashtra, received average rainfall in the high range.

(*iii*) In zone 'C', a large area of western peninsula from Ahmednagar to Bangalore received average rainfall in the high range.

(*iv*) In zone 'D', eastern and extreme south peninsula received average rainfall in the moderately high range.

3.3. The major crops grown in different zones of DFR are shown in Fig. 2.

(*i*) Major crops grown in zone 'A' are paddy, maize, cotton, groundnut, bajra and soybean. The average rainfall varied from high to very high category. Water requirement of all crops, except paddy (200-215 mm), during the 'peak rainfall period' varied in the range 70-170 mm. In this zone all crops, except paddy, are likely to receive either adequate or excess rainfall than actual water requirement.

(*ii*) Major crops grown in zone 'B' are cotton and soybean. The average rainfall is in high category. Water requirement of crops during the 'peak rainfall period' varied in the range 70-110 mm. In this zone, all crops are likely to receive excess rainfall than actual water requirement.

(*iii*) Major crops grown in zone 'C' are sorghum, bajra, paddy, cotton, groundnut, sunflower and maize. The average rainfall varied from moderately high to high category. Water requirement of crops during the 'peak rainfall period' varied in the range 75-140 mm In this zone, paddy and maize, are likely to receive adequate rainfall and all other crops are likely to receive excess rainfall than actual water requirement.

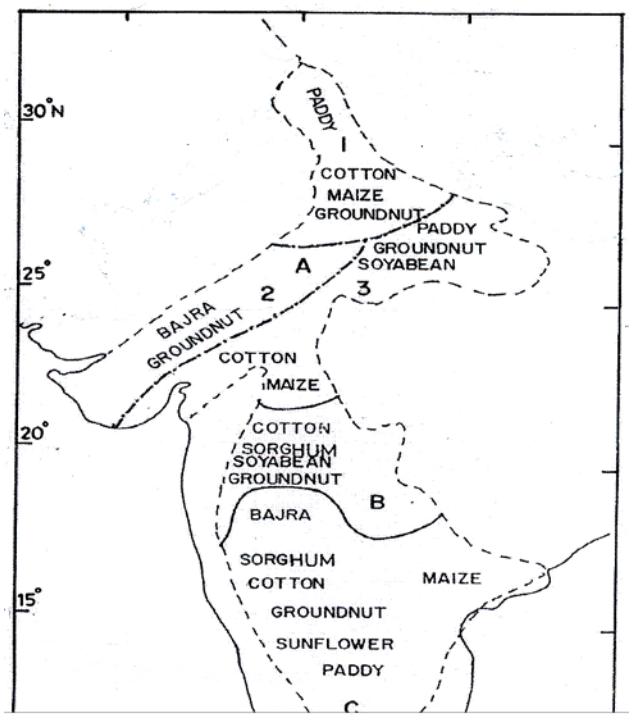

Fig. 2. Crops grown in different zones of dry farming tract

(*iv*) Major crops grown in zone 'D' are paddy and cotton. The average rainfall is in moderately high category. Water requirement of crops during the 'peak rainfall period' varied in the range 80-110 mm. In this zone, all crops are likely to receive adequate rainfall than actual water requirement.

4. (*i*) 'Peak rainfall periods', during monsoon have been identified and on the basis of similarity in 'peak rainfall period', the entire DFR has been divided into four zones *viz.*, A, B, C and D. These zones have been plotted on the map.

(*ii*) Average rainfall, during the 'peak rainfall period', for all the stations in DFR was computed. The areas receiving similar range of average rainfall, in three different ranges (75 to 125 mm, > 125 to 175 mm, > 175 mm) have been plotted on the map.

(*iii*) During the 'peak rainfall period' most of the crops, in different zones of DFR and at different growth stages, are likely to receive adequate or excess rainfall than actual water requirement. This rainfall may be effectively utilized for obtaining optimum crop yields.

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