

**DURATION OF DEPENDABLE PRECIPITATION IN DRYLAND AREAS OF NORTHWEST INDIA, MAHARASHTRA AND KARNATAKA**

Hargreaves (1971) had suggested the use of the 'Moisture Availability Index (MAI)', defined as the ratio of monthly dependable precipitation

75 per cent probability to monthly potential evapotranspiration, as a climatological tool. Based on the monthly moisture availability indices exceeding or not exceeding a value of 0.33, Hargreaves (1971) has also suggested a broad system for classification of dryland climates.

The system of Hargreaves (1971) seems to require improvements in three directions, *viz.*,

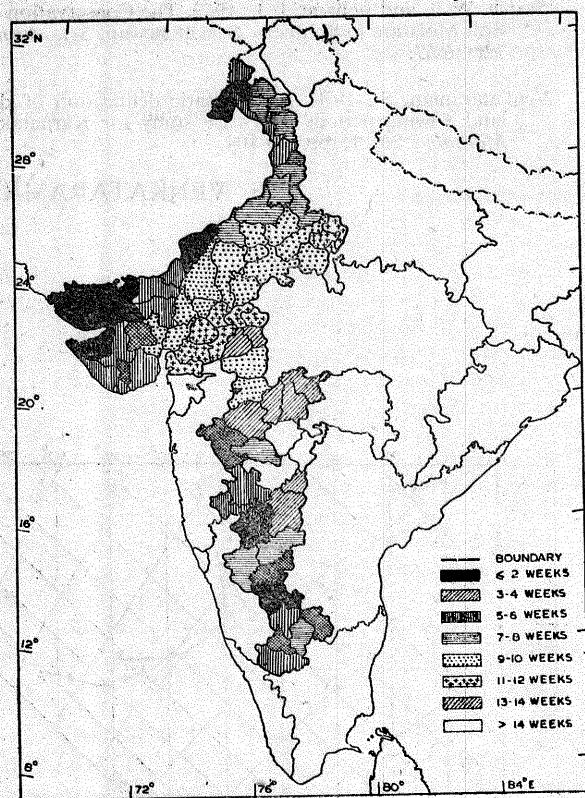


Fig. 1. Duration of dependable precipitation in dry land areas of NW India, Maharashtra & Karnataka

the level of consideration of probability, the period used and choice of criteria. A 75 per cent probability would be too high and an unrealistic level of expectancy. A level of probability of 50 per cent would be more appropriate. Use of values of Dependable Precipitation (DP) on a short period, say weekly, basis is a must. Again, adoption of the limits suggested by Hargreaves (1971) on a monthly basis is not, a priori, justified for the weekly periods, as it can be shown that in the dry farming tract, cropping season can start only when weekly rainfall exceeds potential evapotranspiration (Venkataraman 1979).

2. Rao *et al.* (1971) have published monthly estimates of potential evapotranspiration (PET) for about 300 stations in India. Based on the fitting of incomplete gamma distribution to weekly rainfall totals, Dependable Precipitation (DP) values at various probability levels have been published by Sarker *et al.* (1978), Biswas and Khambete (1978) and Biswas and Basarkar (1978). These data have been utilised in this study.

A perusal of the data of Rao *et al.* (1971) shows that in the rainy season potential evapotranspiration is of the order of 4 mm/day and hardly exceeds 5 mm/day. Therefore, one would

be justified in taking the average weekly PET as 30 mm/week during the rainy season. Since DP represents the lowest assured amount, a DP of 20 mm/week can be deemed sufficient to meet the PET needs. Incidentally, the evaporative zone capacity of various types of soils would be about 20 mm (Staple and Lehane 1944, 1952). The above level of DP can, therefore, meet weekly evaporative demand early in the season and the weekly crop moisture needs later in the season and contribute to soil moisture storage. It was, therefore, decided to work out the number of weeks in which DP at 50 per cent probability level equalled or exceeded 20 mm at district level stations in the dryland areas of Punjab, Haryana, Rajasthan, Gujarat, Maharashtra and Karnataka. In the analysis some consideration was given for the occurrence without breaks of weeks of DP of 19 mm also.

3. Fig. 1 gives the results of the above analysis. It is seen that in the area, the maximum length of DP did not exceed 15 weeks and that while areal demarcation of broader zones of DP is feasible, such a demarcation need not be geographically continuous.

As crops have to enter the reproductive phase after the cessation of rains and as even short duration varieties of crops have durations of at least 14 weeks, mixed cropping will not be feasible even on deep soils in areas where the DP period is less than 10 weeks. Similarly mixed cropping can be practised on deep soils and only in areas that have a DP duration of 13 weeks or more. Since PET is of the order of 4 mm/day in semi-arid tropics (Cocheme and Franquin 1967) working out of duration of DP of 2 cm at 50 per cent probability can be a suitable criteria for preliminary rough delineation of non-homogenous stations/areas in semi-arid tropics.

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