

633 : 631.15 : 631.4 (541.2)

CROP PLANNING ON THE BASIS OF ASSURED RAINFALL IN LOW WATER HOLDING CAPACITY SOILS OF EASTERN GANGA PLAINS ECOZONE OF WEST BENGAL

1. Of all the weather elements which affect agricultural production, by far the most important in tropics is rainfall. Widely used in agricultural planning, information on rainfall is generally available in the form of long term monthly or seasonal average. However, this information is made up by a few intense spells of rain. Therefore, for agricultural planning, the use of assured weekly rainfall at different probability levels may be more useful. This study analyses assured weekly rainfall of 4 locations in eastern Ganga plains of Purulia district in West Bengal. This ecozone has alluvium derived sandy loam soils of low water holding capacity with a sub-humid climate. Soil reaction is mildly acidic (pH ranges between 6.5 and 7.0). Organic matter content is very low. The upland soils of this ecozone are highly susceptible to erosion hazards (FAI 1985). The assured weekly rainfall analysis provides useful information on the length of growing season and risks to sustainable crop production.

2. Computation of weekly assured rainfall at different probability levels requires data series length of at least 50 years (Davy *et al.* 1976). Available data of Purulia 23°20'N, 86°23'E; Raghunathpur 23°33'N, 86°40'E; Barabazar 23°02'N, 86°25'E and Jhalda 23°22'N, 85°59'E have been used to compute weekly assured rainfall.

2.1. Gamma distribution is fitted to the weekly rainfall totals to estimate weekly assured rainfall at 30, 40, 50, 60 and 70% probability levels following the method of Biswas and Khambate (1979).

3. Southwest monsoon normally sets in over the ecozone by 10 June (week 23) and withdraws by 15 October (week 42). Average annual rainfall varies from 1220 mm at Raghunathpur to 1400 mm at Jhalda. Weekly amounts of assured rainfall at different probability levels at the 4 stations are presented in Figs. 1 (a-d).

3.1. Figs. 1 (a-d) show that core rainfall period, when hazard of drought is low, lies between week 25 (18-24 June) and week 37 (10-16 September). During this period at least 20 mm per week rainfall at 70% probability level is assured. This period can be

called as moisture sufficiency period because in 7 out of every 10 years, rainfall is sufficient to meet potential evapotranspiration needs of crops. Peak rainfall in this agro-ecozone is observed in week 32 (6-12 August), when the rainfall amount may vary between 40-50 mm at 70% probability and 100-120 mm at 30% probability levels.

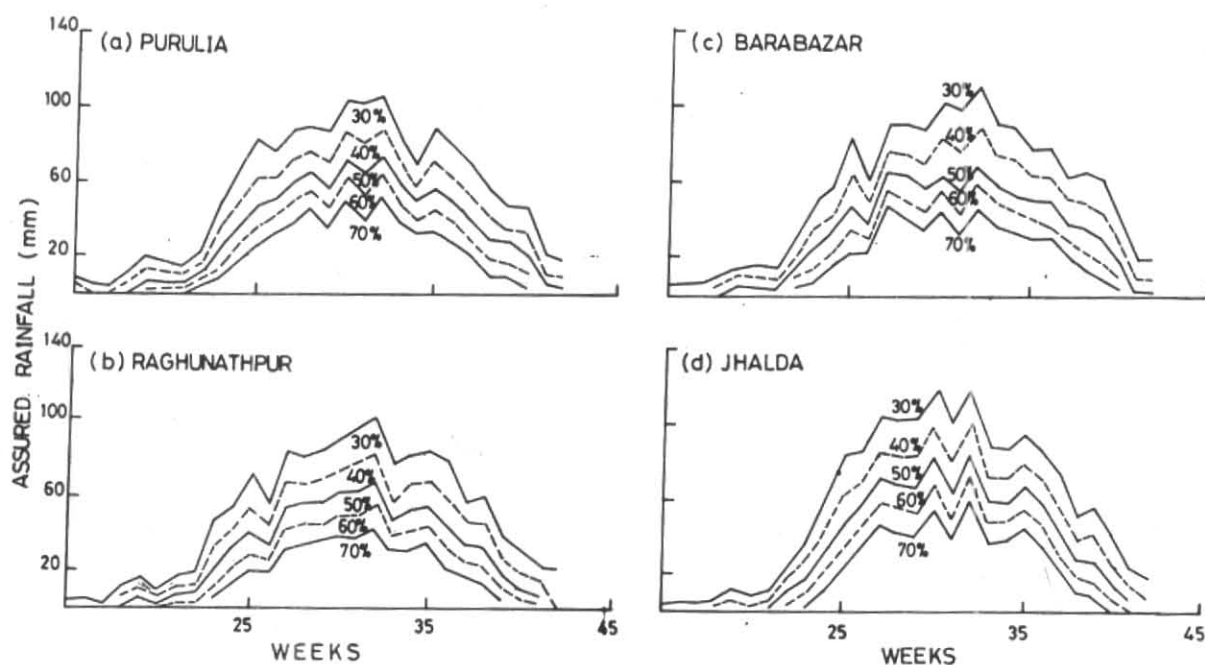
3.2. In the pre-monsoon rainy season, which occurs from March to May, rainfall exceeding 10 mm per week is expected at 30% probability level in May. Therefore, production of crops during pre-monsoon season has to entirely depend on irrigation.

3.3. The analysis of rainfall presented here shows that under rainfed condition, moisture sufficiency period is assured for 13 weeks (from week 25 to week 37) in 7 out of every 10 years. So, emphasis should be given on short duration cultivars of crops so that their growing cycle is completed in about 100-110 days and matches with the water availability period.

3.4. In irrigated uplands of this ecozone rice is grown extensively. Its productivity is very low (1300-1400 kg/ha). In this area the productivity of maize, sorghum and millets could be much higher, if water is managed well. The productivity in the uplands, during rainy season, even under rainfed conditions, could be improved appreciably through intercropping with legumes and emplacement of appropriate water management techniques.

3.5. Because of predominate occurrence of low water storage capacity soils in this eco-region, the carry-over moisture in the soil profile is low. Further, the rainfall analysis shows [Figs. 1 (a-d)] that little rain could be expected during the post-rainy cropping season. So, post-monsoon season crops cannot be raised without irrigation. Rapeseed and mustard could be sown with irrigation by mid-November. Planting at this time helps reduce damage due to aphids. Mung bean or sesamum could also be grown during post-rainy cropping season with irrigation.

3.6. In the upland, rainfed cropping systems millets, blackgram (*Vigna mungo*), horse gram (*Dolichos biflorus*) may be emphasized as these crops are more profitable and sustainable. The water requirement of these crops is much lower than that of rice. However, for rainfed low lands, where clay loam soils exist, rice or lathyrus (fodder) may be more suitable crops.



Figs. 1 (a-d). Assured rainfall at different probability levels

4. The salient features of the study are given below :

- (i) Over low water holding capacity soils of eastern Ganga plains ecozone of West Bengal the core rainy season occurs between week 25 (18-24 June) and week 37 (10-16 September). This is a favourable period for rainfed crop production because of expected moisture sufficiency in at least 7 out of every 10 years.
- (ii) The area under rice cultivation in upland in this ecozone should be progressively reduced and such crops as maize, black gram (*Vigna mungo*), millets may be selected to replace rice.
- (iii) In rainfed low lands, having clay loam soil, crops like rice and lathyrus (fodder) seem to be well adapted to the water availability.

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