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Short Comminucation

Rainfall study of Dhubri district of Assam

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Rainfall is one of the important factors for crop planning under rainfed condition. Understanding of rainfall patterns of a region is of utmost importance for successful planning of crops in a profitable farming mode. The rainfall pattern decides the cultivation of crops, their varieties, adoption of cultural operations and harvesting of excess rainwater of any region (Kar, 2002). Generally cropping pattern is suggested considering the rainfall probability at different levels (Mahale and Dhane, 2003). Gupta *et al*. (1975) suggested that the rainfall at 80% probability could safely be taken as assured rainfall, while 50% probability is the medium limit for taking risk. Dhubri district is situated in the extreme western end of Assam. Monsoon usually starts from the month of June and continue up to early September. Paddy, wheat, other cereals, jute, mustard, pulses, vegetables etc. are the main crops of the district. As dependency of 70% population of the district is on agriculture and rainfall is deciding factor for success of rainfed agriculture, an attempt was made to understand the rainfall climatology by analyzing temporal and spatial rainfall distribution and its probability of occurrence of dry and wet spell and their distribution by analyzing rainfall data. Rainfall probability pattern has been studied by many scientists in India (Singh, *et al.,* 2009; Ravindrababu *et al*., 2010).

For the present study, daily rainfall data recorded at the meteorological observatory of Rupsi airport, Dhubri (Latitude 26.8, Longitude 89.5 and altitude 131ft) for a period of 24 years were used. Markov chain method was used to analyse dry and wet spell of rainfall for the district. Rainfall of 20mm per week is adequate for all the growth stages of all the crops grown. Thus, if in a given week the rainfall received is less than 20mm that week is dry week and vice versa. On this basis each week was categorized as dry and wet week and respective probabilities calculated. The incomplete gamma distribution was used to derive expected weekly rainfall at different probability levels (Lamba *et al*., 1990 and Jat *et al*., 2010). The data analysis was done by using Weathercock v 3.1 software developed by Central Research Institute for Dry Land Agriculture (CRIDA).

Analysis of weekly data of 24 years (1988-2012) indicated that both pre and post monsoon starts effectively from 13th standard meteorological week (SMW) (Mar. 26-Apr.1) and remains active upto 42nd SMW (Oct 22-Oct 28) in Dhubri district. Therefore, mean length of rainy season was 30 weeks (210 days).

The mean annual rainfall of Dhubri was found to be 2309 mm and it varied from lowest of 1376mm and highest of 3941mm with SD of 747mm and CV% of 32.4.The probability of dry week, P(D) was found to be 85% during most of the rainy season period (Fig.1).The initial dry spell results revealed that Dhubri district experiences dry spell during early and more during middle stages as compared to later stages. Similar trend were observed with consecutive dry spells also *i.e*., with probability of two consecutive dry weeks, P(2D), three dry weeks, P(3D) and four consecutive dry weeks, 4(D). The probability of occurrence of higher number of dry spell revealed that there is an importance of in situ moisture conservation measures and there may be need of supplementary irrigation during early and more during middle stages of rainy season. Thus it is an early warning to the farmers from early season drought. The probability of wet week were observed to be 96% in 22nd SMW during rainy season which indicates potential rainwater harvesting which may be utilized during dry spell. The consecutive wet weeks *i.e* P(2W), P(3W) and P(4W) revealed that there may be probability of getting rainwater for harvesting during rainy season. From the overall dry and wet spell analysis it was suggested that the sowing of dryland crops can be initiated during 15th and 16th SMW as 15th was found to be mean week of onset of rainy season.

The incomplete gamma distribution analysis for weekly rainfall at Dhubri region is given in the Fig.2. The results revealed that the expected weekly rainfall at 90%

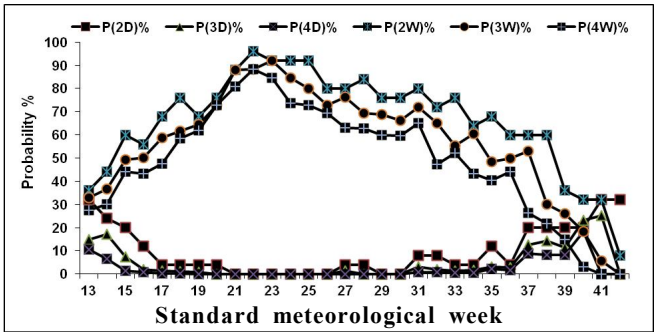

Fig.1: The consecutive dry and wet week probabilities

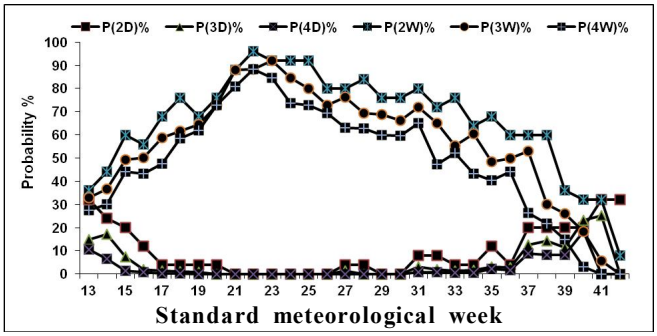

Fig.2: Weekly rainfall (mm) at different probabilities

probability ranged from 0.3 mm (42nd SMW) to 28.5mm (25th SMW). At 10% probability it varied from 65mm (42nd week) to 315.6mm (25th SMW). However, at 75% probability levels the range of rainfall values were 2.1mm to 59.9mm which is an indication of deficient rainfall during rainy season which indicates high risk of growing dryland crops which are likely to suffer by frequent dryspells. Mean and expected weekly rainfall at different probability level showed that the 25th week has the highest rain of 149.6mm and 12th week recorded the lowest rain of 16.1 mm. At 50% chances rainfall was assured in 12th week. A rainfall more than 50mm per week occurred from 20th SMW to 29th week at 50% probability level.

Crop planning

Paddy, wheat, other cereals, jute, mustard, pulses, vegetables etc. are the main crops of the district. From the analysis it can be revealed that at 50% probability level, minimum rainfall is received in every meteorological week .Field preparation and tillage operations could be initiated during 23rd and 24th week for better germination otherwise germination may be difficult. Transplanting should be completed in July last. 31st SMW (July 30-Aug 5) should be for tillering, 34th SMW (Aug 20-Aug2) for panicle initiation and 40th SMW (Oct1-Oct7) should be for maturity. Harvesting should be done in October. Short duration pulses like greengram, blackgram and oilseed crop is possible immediately after harvest of first crop. Hence, successful dependable rainfed cropping of cereals/pulses can be taken up during South West monsoon. The irrigation to the plantation crops like arecanut and coconut may be skipped to save water. All kinds of rainfed vegetable crops namely carrot, beans, turnip, radish can be grown as there is no long dry spell occurring at 50% probability level where every meteorological week receives minimum amount of rainfall. Higher probability value of P(W) and P(W/W) in this period indicate there are higher chance of week being wet.

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