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## **Rainfall and crop diversity analysis for response farming in Annur block of Coimbatore, Tamil Nadu**

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### **Abstract**

The study has two components *viz.*, farmers survey and rainfall analysis and was taken up in Annur block of Coimbatore district, Tamil Nadu, India. Through farmers survey information on various crops grown by them under rainfed situations and techniques employed were collected from a sample of 30 farmers. For rainfall analysis, 20 years data were collected and analysed for weekly rainfall based on standard meteorological weeks. The study revealed that length of growing period (LGP) in Annur block was from 32th to 48th/49th standard week of the year and about 13 crops were raised by the farmers in rainfed situation and among them sorghum was the lead crop with maximum area under cultivation. However the latest technologies were not adopted by the farmers and also they were growing local varieties. The scientific interventions like seed hardening, PPFM spray, foliar nutrition of potash could be advised to reduce the risk of cropping and yield reduction.

**Keywords:** Farmers survey, rainfall analysis, LGP, rainfed crops, foliar sprays, KCL, PPFM

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### **1. Introduction**

Rainfed farming makes up more than half of all sown land in India, provides almost all the country's pulses and minor millets, many of its oil seeds, much of its cotton and half of its cereals, and employs many poor Indians and ethnic minorities. As a result of climate change, monsoon seasons are becoming vague and unpredictable, and the threat of drought or flooding rains make rainfed farming less viable as an occupation for many farmers. It pushes rainfed farming into a declining trend in most of South India. However, the rainfed areas produce 40% of the food grains, support two-thirds of the livestock population, and are critical to food security, equity, and sustainability. Hence, rainfed farmers often migrate to find work in nearby areas. In the meantime, farmers protect their livelihoods by adopting traditional methods and skills. The object of the present study is to analyze the rainfall over 20 years, decide the length of growing period (LPG) and diversification of crops under rainfed farming in Annur block of Coimbatore district, India

### **2. Materials and methods**

The research study was conducted in Annur block of Coimbatore district located in Western agroclimatic zone of Tamil Nadu State.

#### **2.1 Location**

Annur Block of Coimbatore District, Tamil Nadu, India is situated at latitude 11°11' N and longitude 77°01' E at an

elevation of 372 msl. It falls under tropical climate with a range of 26 - 41° C. The humidity is 80%. The wind speed ranges from 7.4 to 12.6 km/hr. It receives an annual rainfall of 546 mm, mostly benefitted from northeast monsoon period.

#### **2.2 Rainfall data collection**

As part of the study, 24-hour daily rainfall data (2000-2019) were collected from the office of the Assistant Director of Agriculture, Annur, Tamil Nadu and analyzed. The statistical analysis of weekly rainfall, determining the start of the rainfall and end of the rainy season without any break or drought period and the decision on date of sowing for rainfed cropping in this block was drawn ultimately by a drawing inference on the length of growing period (LGP).

#### **2.3 Farmers survey**

For conducting a survey among farmers to gather information on crops grown by them and details on cultivation techniques followed, the non-probability, convenience sampling method was adopted and survey was done at the convenience of the researcher. People who come across the researcher were interviewed and information gathered. The sample size was 30<sup>[5]</sup>.

### **3. Results and discussion**

Rainfall is the most important natural hydrologic event and a governing factor in the planning and operation strategies for

ropping under rainfed cultivation especially in dry regions. Rainfall variability is a major factor influencing, the agricultural production and the yield of crops under rainfed condition depends on the rainfall quantity, distribution and rainy days.

### 3.1 Rainfall analysis

The weekly rainfall is most important in the tropics for planning farm operations and activities like field preparation, time of sowing and input application and also deciding the crop performance. The studies of short-period of rainfall characteristics by the authors [3, 7] indicated the significance of daily and weekly rainfall. The analysis of weekly rainfall received in 20 years is presented as a fig. (1) which shows the fluctuations in the weekly rainfall in a calendar year. This data indicate the peak rainfall months, continuity of rainfall and end of the rainfall period. This is known as Length of growing period and it decides the kind of crops that can be grown under rainfed condition. The crop should mature before the rainfall recedes. From the rainfall data, it was inferred that length of growing period in Annur block was from 32th to 48th/49th standard week of the year, spanning four to five months. The rainfall received (~50mm) from 32nd to 35th standard week can be effectively utilized for seed bed preparation and the rainfed crop can be sown

during 35th or 36th standard week which ensures a receipt of ~300mm of rainfall. Further a minimum of 2-3 rainy days in a standard week supports crop growth besides ensuring continuous availability of soil moisture to crop growth. (fig. 2) The rainfed crop selected should be less water requiring and complete its life cycle within 120 days. Probability analysis can be used for predicting the occurrence of future events of rainfall from the available data with the help of statistical methods [4].

But upon consulting with the farmers through a survey it is learnt that farmers are growing a variety of crops like millets (sorghum, little millet, foxtail millet, finger millet, pearl millet), pulses like (black gram, cowpea, horsegram, bengalgram) and oilseed crops (groundnut, sesame) in the field. A handful of farmers having water sources also grow crops in summer season. The crop selection that farmers had been doing on their own might be productive with the limitation of resources available and more efficient use of all [1]. It was inferred that the ingenuity of traditional cropping patterns followed by the local farmers over years is good and the farmers had the ability to decide and select crops that utilize available rainfall with intermittent dry spells. While a few farmers is practicing mixed cropping and intercropping in the field.

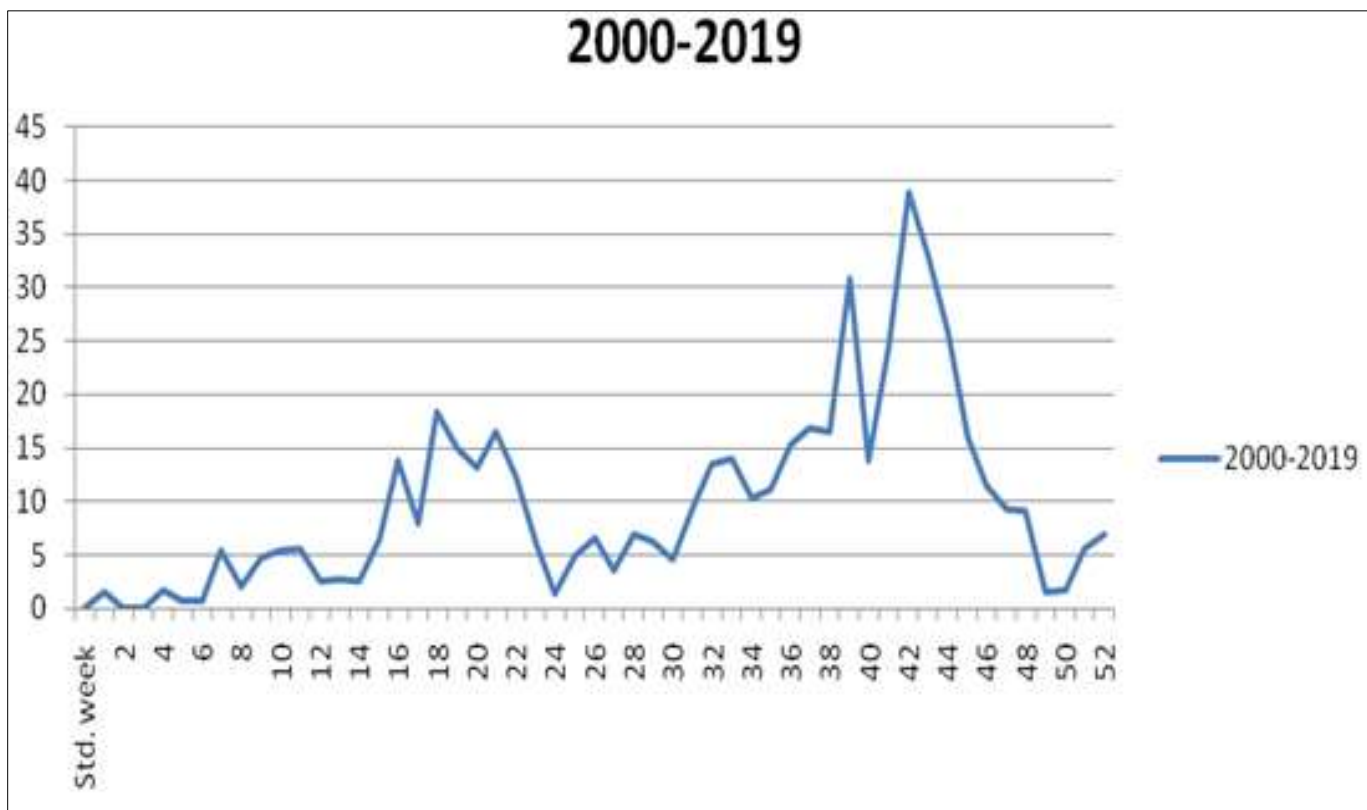


Fig 1: Weekly rainfall analysis of 20 years data collected from Annur block

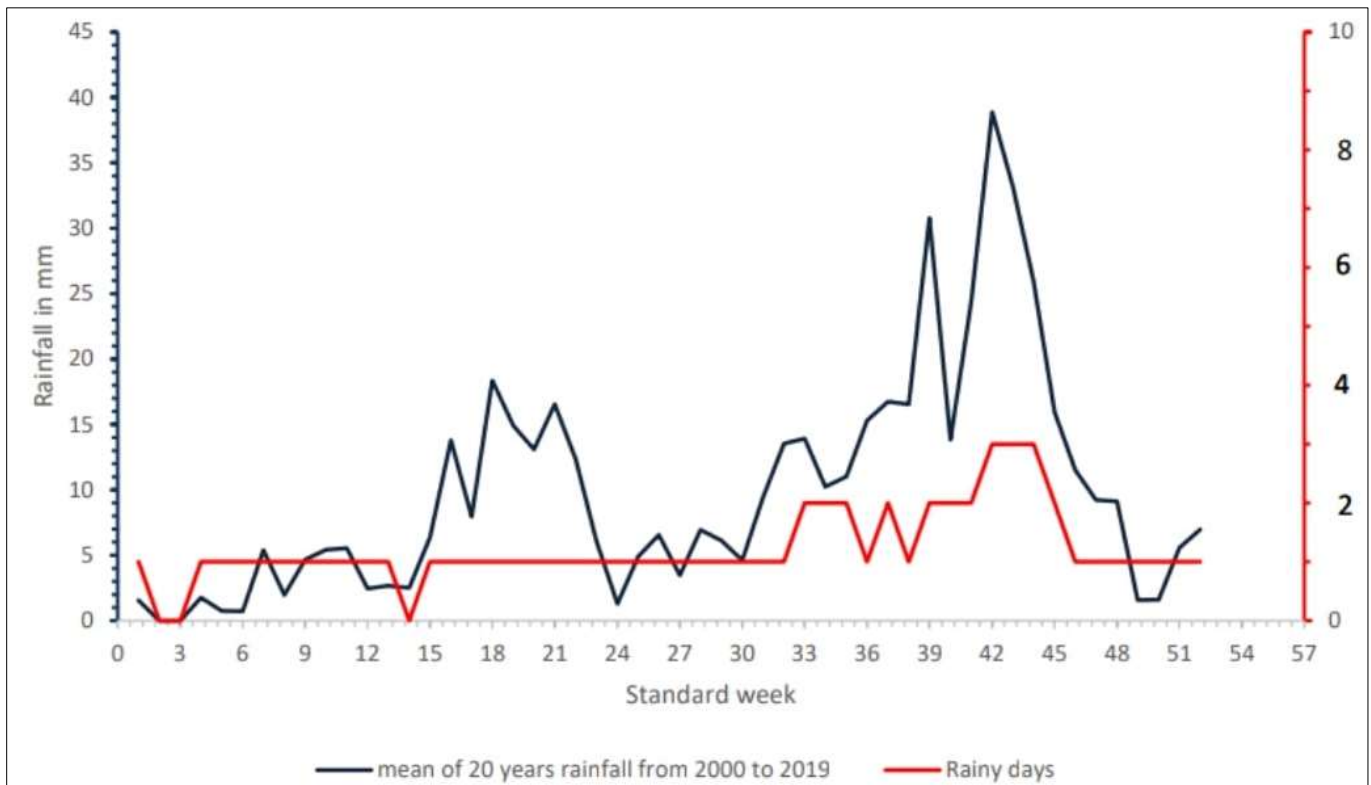


Fig 2: Mean Rainfall receipt and no. of rainy days

### 3.2 Crop diversification study

India ranks first in rainfed agriculture globally in both area (86 million ha) and the value of produce. Rainfed regions in India contribute substantially toward food grain production including 44% of rice, 87% of coarse cereals sorghum (*Sorghum bicolor*), pearl millet (*Pennisetum glaucum*), and 85% of food legumes including pulses, 72% of oilseeds, 90% of small millets like little millet (*Panicum sumatrense*), foxtail millet (*Setaria italica*) [6]. The survey brought to lime that farmers of Annur block adopt different dates of sowing for crops selected. According to the

rainfall receipt the date of sowing has been finalized and crops were sown. The sowing window spreads throughout the length of growing period. The first sowing window during mid of June-July and it extended up to November (fig. 3). Accordingly and also by considering the duration of crops and their climatic requirements the crops were chosen and sown. Ground nut crop alone was sown during June-July under rainfed condition. If the monsoon fails the sowing was shifted to next month and crop selected were millets. However a few farmers who have irrigation sources raise Ground nut in a smaller area.

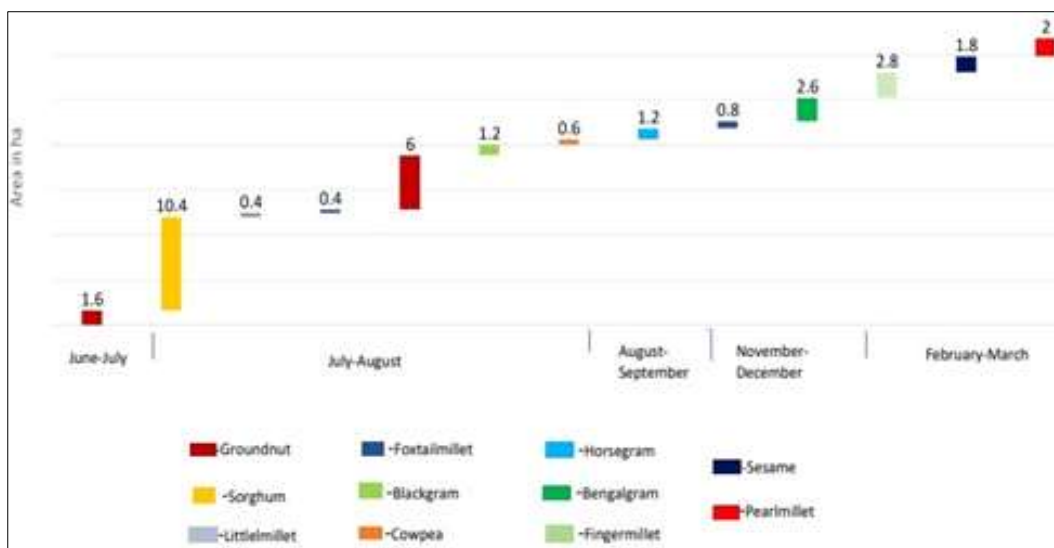


Fig 3: Seasons and crop diversity in Annur block of Coimbatore district

If we look into the diversification crops and their percent share (Table 1), it indicated that millets were the first preferred crop among the farmers under rain-dependent cultivation with a

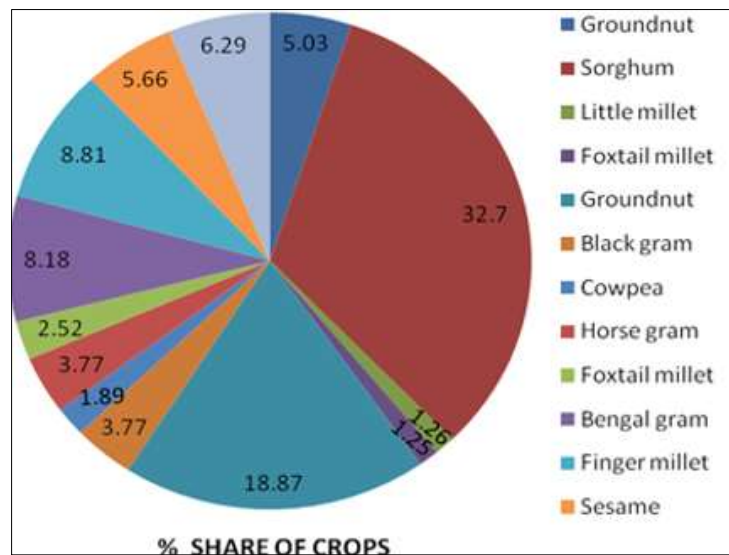
percent share of 47.5 and it was followed by oilseed crops like sesame and groundnut with a share percent of 29.9. The farmers have given least importance to pulse crops.

**Table 1:** Crop diversification percentage – category wise

Category-wise distribution of crops	Distribution (%)
Millets (Sorghum, Pearl millet, Foxtail millet, Little millet, Finger millet)	47.5
Pulses (Red gram, black gram, Horse gram, cow pea, Green gram, Bengal gram)	22.60
Oilseeds (Groundnut, sesame)	29.9

Though about 13 crops were raised by the farmers in rainfed situation (fig. 4), sorghum led the list of crop with maximum area under cultivation, occupying 32.7 percent of the total area brought under

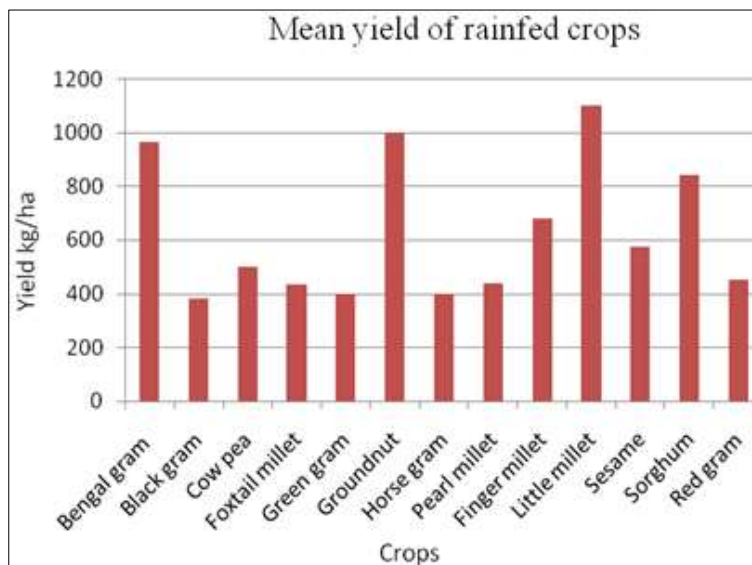
Plough and, it was followed by groundnut in with 18.8 percent. Nearly one-fourth of the area cultivated was occupied by other millet crops. Besides, less than one-fifth of the total area was under pulses.



**Fig 4:** Crop diversification percentage – crop wise

As regards the productivity of crops, farmers said that sorghum, little millet, Bengal gram and groundnut yielded more than 800kg/ha

while pulses yield on an average about 400 kg/ha (fig. 5). This yield range is certain, provided the rains fall in place without any deviation.



**Fig 5:** Average yield of rainfed crops as informed by the farmers

The information on probability of exceeding of certain quantum of rainfall during a crop growing period or in a month is not adequate for crop planning in areas where dry spell prevails. Crop planning should be done in such a way that the critical growth stage of the crop should not coincide with 2 or 3 consecutive dry spell else the yield will be reduced <sup>[8]</sup>.

### 3.3 Scientific interventions

Rainfall behavior in dry farming areas is erratic and uncertain. The deviations observed in dry areas include delayed onset, early withdrawal intermediary dry spells during rainy season. The adverse effect of these rainfall aberrations on crop growth vary with the degree of deviation and the crop growth stage at which such deviations occur. Suitable manipulations in crop management practices are needed to minimize such adverse effects of abnormal rainfall behaviour.

Before sowing the seeds maybe treated with KCl 2% or potassium hydrogen sulphate 2% for 6 hours and shade dried and sown. If the cessation of rainfall occurs at vegetative stage of the crop, the plant population may be reduced by 33-50 percent; foliar application of KCl 2% may be given to save the crop from complete failure. If the cessation of rainfall occurs at flowering stage of the crop, antitranspirant spray may be given to reduce the transpiration or else the crop may be harvested for fodder. If the crop is suitable for rationing (sorghum) it may be allowed. Spraying of PPFM (Pink-Pigmented Facultative Methyloproths), a microorganism, at 1% concentration during the dry spells keep the crop green for a minimum period of 10-14 days, besides improving the output <sup>[2]</sup>.

Further farmers were mostly growing local varieties and an awareness on high yielding variety need to be done besides educating them on using quality seeds for all crops because selection of variety and quality seeds ensure higher yield.

### 4. Conclusion

From the farmers' survey and 20 years of rainfall analysis in Annur block of Coimbatore, India, it may be it was inferred that length of growing period (LGP) in Annur block is from 32th to 48th/49th standard week of the year, spanning four to five months. The mean rainfall received (~50mm) from 32nd to 35th standard meteorological week can be effectively utilized for seed bed preparation and the rainfed crops could be sown during 35<sup>th</sup>/36th standard meteorological week which ensures a receipt of ~300mm of rainfall. Besides, adoptions of scientific interventions like seed treatment with KCl 2% or KH<sub>2</sub>PO 2% and foliar nutrition of KCl 2% during moisture stress period will ensure crop growth sustenance. And also spraying of PPFM at a concentration of 1% during dry spells; keep the crop green for a minimum period of 10-14 days, besides improving the output.

### 5. Conflict of interest

There is no conflict of interest.

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