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RESEARCH PAPER

Rainfall based crop planning of Srikakulam district of A.P. under DAMU project

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Abstract : The District Agromet Unit (DAMU) under Gramin Krishi Mausam Sewa (GKMS) is the flagship programme of Govt. of India for weather related services to the farmers aiding in decision making on day-to-day agricultural operations. This scheme is extended to block level to address weather needs of farmers at micro-level. This is a joint effort of India Meteorological Department (IMD) and Indian Council of Agricultural Research (ICAR) with multi-organisational collaboration to implement various components and issuing crop and location specific weather based agro advisories for the benefit of farming community on every Tuesday and Friday and occurrence of extreme weather. The aim of the present study is to analyze the mandal wise rainfall data and the mandals were grouped based on the distribution of rainfall. Out of 38 plain mandals, 27 mandals received normal rainfall and 5 mandals received excess rainfall during South west monsoon period. Similarly, 7 agency mandals received normal rainfall and 4 agency mandal received excess rainfall during South West monsoon period as a whole. Month wise data showed that the distribution was either deficit or excess during the months of South West monsoon period *i.e.*, June, July, August and September.

Key Words : Sunhemp, Black gram, Rice fallow situation, OFTs, Yield

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INTRODUCTION

Among all the weather parameters, rainfall is primary source of water and is the main consideration for raising the crops particularly in rainfed condition. Understanding of the time and spatial variability of rainfall is essential for improved crop production. Occurrence of continuous dry spell in monsoon is common phenomenon. It is well known that the crop development is affected if the dry spells coincide with the sensitive phenological stages of the crop. Although several factors are responsible for causing drought situation, the key role is played by rainfall, its distribution and its variation over an area. It is, therefore, very necessary to analyse these characteristics of rainfall in order to know various causes responsible for drought situations in a mandal or state (Conrad *et al.,* 2018). Srikakulam district of North Coastal Andhra Pradesh is comprised of 38 mandals, out of which 32 are plain mandals and 6 are agency mandals.

The annual rainfall of Srikakulam district is 1161 mm and 57 % cultivated area is under rainfed conditions. Though the annual rainfall is fairly high, the distribution of rainfall plays major role in getting good yields. In Srikakulam district, there are eight farming situations.

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Rainfall distribution and farming situations in each and every mandal are to be studied for micro level crop planning as some of the mandals receive deficit rainfall during the cropping season though the entire seasons rainfall is normal. Although several factors are responsible for causing drought situation, the key role is played by rainfall, its distribution and its variation over an area. It is, therefore, very necessary to analyse these characteristics of rainfall in order to know various causes responsible for drought situations in a mandal or state stated by Subbarao and Reddy (2018). The variation of monsoonal and annual rainfall in space and time are well known and this inter annual variability of monsoonal rainfall has considerable impact on agricultural production. Terminal drought is a recurring feature in Srikakulam. Intermittent dry spells make the crop operations delayed as 70 per cent of the area in this region is under rainfed conditions. The agro ecology of the district is very much vulnerable as the agricultural operations depend upon the moisture availability due to rainfall pattern, amount, intensity and its uses for crop production (Deka and Nath, 2000). DAMU–District Agromet Unit scheme is extended weather based ago advisories to to block level to address weather needs of farmers at micro-level. This is a joint effort of India Meteorological Department (IMD) and Indian Council of Agricultural Research (ICAR) with multi-organisational collaboration to implement various components and issuing crop and location specific weather based agro advisories for the benefit of farming community on every Tuesday and Friday and occurrence of extreme weather. Hence, present study has been undertaken to suggest the cropping plan for Srikakulam district of AP considering the rainfall amount at mandal level including three seasons.

Material and Methods

In the present study mandal wise daily rainfall of Srikakulam district was collected from CPO, Srikakulam, Andhra Pradesh for the year, 2021. Monthly rainfall, season wise rainfall and annual rainfall was calculated based on the daily rainfall. The mandals were grouped based on the distribution of rainfall in to 5 categories according to IMD specifications *viz*., large excess (60 % or more over normal), excess (20 % to 59 % more over normal), normal (-19 % to + 19 % over normal), Deficit (-59% to -20% over normal) and large deficit (-99% to -60 % over normal). The grouping was done for all the months, winter period (Jan-Feb), summer period (March-May) South West monsoon period (June-September), North East monsoon period (October-December) and for the entire annual rainfall.

Results and Discussion

Mandal wise rainfall analysis revealed that out of 32 plain mandals, 27 mandals received normal rainfall, 3 mandals received deficit rainfall and 2 mandal received excess rainfall during South west monsoon period. Similarly, 3 agency mandals received normal rainfall, 1 mandal received large excess, 1 mandal received excess and 1 mandal received deficit rainfall for the year 2021 and 4 agency mandal received excess rainfall during South West monsoon period as a whole. Similarly, Upadhaya and Singh (1998) stated that it is possible to predict rainfall fairly accurately using various probability

Table 1 : Rainfall distribution of Srikakulam district

Season	Srikakulam district	Mandals with large excess rainfall (60 % or more over normal)	Mandals with excess rainfall (20 % to 59 % more over normal)	Mandals with normal rainfall (-19 % to + 19 %over normal)	Mandals with deficit rainfall (-59% to -20% over normal)	Mandals with large deficit rainfall (-99% to -60 %over normal)
Winter	Agency mandals	-	1	1	2	2
	Plain mandals	-	-	-	-	-
Summer	Agency mandals	-	1	1	2	1
	Plain mandals	-	1		1	1
S-W monsoon	Agency mandals	2	-	2	2	2
	Plain mandals	2	2	2	3	1
N-E monsoon	Agency mandals	1	1	-	-	-
	Plain mandals	1	1	1	1	2
Annual	Agency mandals	4	3	3	3	4
	Plain mandals	3	4	2	4	2

distributions for certain returns periods. To optimize agricultural productivity, there is need to quantify rainfall variability at local and regional level to combating extreme effect of persistent dry spells or drought. Mandal *et al*. (2015) also reported that rainfed agriculture will continue to play a dominant role in providing food and livelihoods for an increasing world population and rainfall analysis is helpful for proper crop planning under changing environment in any region.

Month wise data revealed that 19 plain mandals and 6 agency mandals received deficit rainfall during the month of June, 16 plain mandals and 2 agency mandals received deficit rainfall which led the rainfed crops to moisture stress conditions. Similar observation was also noticed with August month also. But during September 15 plain mandals and 8 agency mandals received large excess rainfall, 17 plain mandals and 3 agency mandals received excess rainfall Table 1. The rainfall distribution of different plain mandals of Srikakulam district for all the months of South West monsoon period and also for entire South West monsoon period is shown in Fig. 1. During the period of south west monsoon period 27 mandals (82 %) received normal rainfall and 5 mandals (18 %) received excess rainfall. Therefore, analysis of rainfall and determination of annual maximum daily rainfall would enhance the management of water resources applications as well as the effective utilization of water resources (Singh *et al*., 2008).

In Srikakulam district sowing of rainfed crops *viz*.,

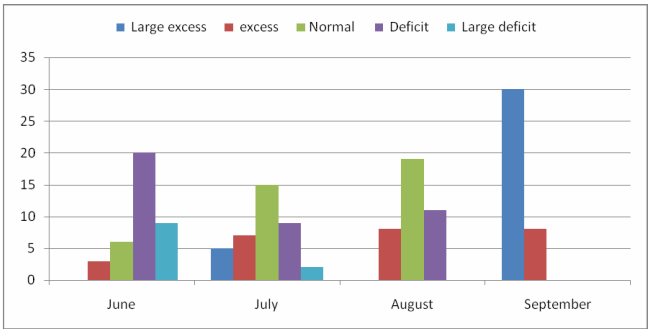

Fig. 1: Rainfall distribution of Srikakulam district during S-W monsoon

groundnut, maize, ragi, *Kharif* pulses etc., will be taken up during the month of June. In the present study 25 mandals received deficit rainfall during the month of June. Similarly, 16 mandals in July and 16 mandals in August also received deficit rainfall. During the month of September 15 plain mandals received large excess rainfall and 17 plain mandals received excess rainfall Fig. 2. Though the south west monsoon period rainfall for entire district is normal, majority of the madals were in deficit rainfall category from June to August. Similar observations were noticed with agency mandals also.

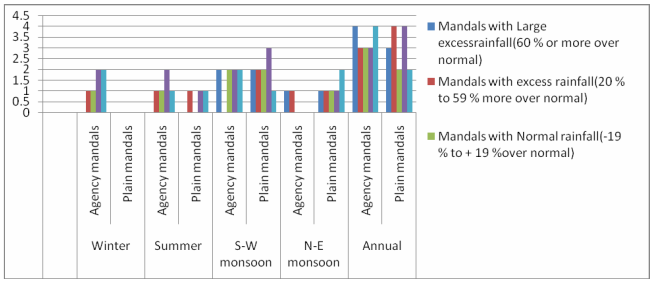

Fig. 2 : Seasonal rainfall distribution of Srikakulam district

Conclusion :

Hence, there is utmost need to advise the farmer at micro level for mitigatingextreme event *viz*., moisture stress and water logged conditions for reducing the crop loss. In conclusion monsoon starts effectively from 24 SMW in Srikakulam district and remain active upto 41-42 SMW. Therefore, we expected good monsoon shower for about 18 weeks (24 to 42 SMW) which contributes 1216 mm monsoon rainfall in the region so medium and mid-late duration paddy (120/145 days) should be grown to avoid moisture stress during late reproductive stages. The long duration paddy varieties must be avoided as it may cause a heavy risk during drought or dry spell or cyclones during 1st-2nd week of October. However supplementary irrigation and moisture conservation need to be available if the crop is of long duration. The rainfall before 24 SMW should be utilized for land preparation and after 41 SMW the residual moisture should be utilized for pulses (green gram, black gram), oilseeds (Ground nut, sesame) and various vegetables. The post monsoon rainfall is sufficient for rainfed *Rabi* crops. Rain water need to be stored in water harvesting structures for efficient utilization during water stress condition in critical stages of crop growth. Farmers should go for zero tillage practice for efficient use of soil moisture and save time for land preparation for pulses, ragi, maize and sunhemp.

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