DOI: 10.15740/HAS/AU/12.TECHSEAR(3)2017/828-831
Agriculture Update
Volume **12** | TECHSEAR-3 | 2017 | 828-831
Visit us : *www.researchjournal.co.in*

RESEARCH ARTICLE :

Rainfall characteristics and moisture availability index for crop planning in Parbhani district of Maharashtra

V.P. GANGANE, N.P. BUDDHEWAR AND R.K. SATHE

ARTICLE CHRONICLE :
Received :
13.07.2017;
Accepted :
28.07.2017

KEY WORDS :
Rainfall characteristics, Moisture availability Index, Cropping pattern, Intercropping.

Author for correspondence :

R.K. SATHE
Department of Agronomy, College of Agriculture, Vasantrao, Naik Marathwada Krishi Vidyapeeth, PARBHANI (M.S.) INDIA
Email : rajivsathe510@gmail.com

See end of the article for authors' affiliations

SUMMARY : The present investigation entitled "Rainfall Characteristics and Moisture Availability Index for Crop Planning in Parbhani District of Maharashtra." Rainfall characterization of Parbhani district of Maharashtra is studied for above mentioned aspect so as to suggest the crops and cropping systems for each taluka. The historical daily data of rainfall at each taluka of Parbhani district were collected from department of Agriculture Meteorology M.K.V., Parbhani and Collectorate office, Parbhani. The available for last 29 years which were used for further analysis and the result to that affect are presented.The statistical analysis for variability of rainfall indicated that year to year variation ranged between 27-32.2 per cent on annual basis with the standard deviation value of 252.2, 261.7, 234.5, 268, 261.7, 256.3, 224.3, 257.2, 170.1 for Parbhani, Gangakhed, Pathari, Jintur, Palam, Purna, Sailu, Sonpeth and Manwattaluka respectively. The data indicated that the highest mean annual rainfall of 965.9 mm was recorded at Jinturtaluka. The lowest mean annual rainfall was recorded in 798.8 mm Sonpethtaluka.The mean seasonal highest rainfall was recorded in Purnataluka 850.0 mm. While lowest mean seasonal rainfall in Manwattaluka 641.3 mm.The data presented in the indicated that mean highest post monsoon rainfall ranged between 82.4 to 146.3 mm in different talukas. Winter seasonal rainfall data indicated that the mean highest winter seasonal rainfall was 9.4 mm in Parbhani and lowest rainfall was recorded as 2.0 mm in Manwattaluka. In Parbhanitaluka data indicated highest rainfall recorded in month of July 214.6 mm. Standard deviation values highest in month of July 165.5 mm and co-efficient of variation highest in February Month 295.0 per cent. The highest rainfall in almost all taluka was recorded in the month of September in Jinturtaluka 261.5 mm. While in the month of July in Parbhani, Gangakhed, Pathritaluka and in the month of August in Palam, Purna, Sailu, Sonpeth and Manwattaluka. The data on mean weekly total rainfall in each taluka indicated that major rains significant from in situ management point of view. Hence the was concentrated from MW 23 to MW 42. The statistics of the weekly total rainfall indicated that the least co-efficient of variation for this period in discussion was noticed during this period indicating the concentration consistency of rainfall in this period.The weekly probability analysis dry and wet spell for occurrence of rainfall was carried out. It is observed data indicated that probability of occurrence of 20.0 mm rainfall is greater than 50 per cent from meteorological week 24th and persists upto meteorological week 34. The highest potential evapotranspration was recorded in MW 21 (55 mm) and lowest potential evapotranspration MW 52 (18.6 mm) at Parbhanidistrict.The MAI values increased from 23rd MW reached 1.0 in next week dropped in 24th and 25th MW and again increased to 1.0 in 26th MW in all the three types of soils. The MAI values remained 1.0 throughout the *Kharif* cropping period indicating moisture surplus. In Parbhani district Crops are

grow Pearl millet, Kidney bean, greengram, blackgram, horsegram, cowpea, pearl millet + cowpea or horsegram (4:2), Pearl millet + kidney bean (2:1), pearl millet + greengram or blackgram (4:2) Intercropping in light soils. Sorghum, Soybean, Greengram , Blackgram, cotton, sunflower, Pigeonpea, Seasamum, Soybean +pigeonpea (4:2), Sorghum + pigaonpea (4:2), Cotton + pigaonpea (6:1) Intercropping, Horticulture crop like ber, tamarind, Anolaetc in*Kharif* season and Sorghum, sunflower, safflower, gram, Gram, gram + safflower (2:1), Sorghum + Safflower (4:2) Intercropping *Rabi* crops grown on medium and deep soils.

How to cite this article : Gangane, V.P., Buddhewar, N.P. and Sathe, R.K. (2017). Rainfall characteristics and moisture availability index for crop planning in Parbhani district of Maharashtra. *Agric. Update,* **12**(TECHSEAR-3) : 828-831; **DOI: 10.15740/HAS/AU/12.TECHSEAR(3)2017/828-831.**

BACKGROUND AND OBJECTIVES

Weather and climate in general are the most important input for the agriculture production. Agriculture enterprises under rainfed farming system are mainly dependent on monsoon rainfall. The variation of monsoon however, keep the profitability in this prime enterprise always at take past historical data indicate that the variability at monsoon is almost regular experienced in India. It decreases remarkably from the main stream of monsoon yielding rain in major port of India in south west monsoon followed by North East monsoon oscillating during the year. About 70 per cent of the total cultivable area of the country is rainfed. However, prolonged dry periods affect the final crop production. Monsoon is an important season for Indian Agriculture. Monsoon is also important for water supplies from surface reservoirs and ground water reservoirs. Uneven distribution of rainfall, affect the agricultural production remarkably.The mean maximum and minimum temperature of Parbhani district is 42.2 ^{0}C and 13.4^0 C the mean annual rainfall of Parbhani district is 850.0 mm. Parbhani district comes under assured rainfall zones, the inter taluka variations are greater. Also, the intra seasonal behaviour of monsoon at any location warrant timely farm management for boosting sustainable crop production.Soil moisture availability at Parbhani district is found abundant during *Kharif* season. The soils moisture after withdrawal of monsoon goes an depleting fast. Hence, almost care should be taken in a planning *Rabi* crops on residual soil moisture. According to the soil and rainfall distribution crop grown in Parbhani district are sorghum, cotton, greengram, pigeonpea, soybean, safflower, wheat and gram. The accurate information of different aspect of rainfall and soil moisture of each taluka of Parbhani soil becomes helpful in suggesting agricultural planning to the farmers.

RESOURCES AND METHODS

In rainfed conditions, it is essential to study the behaviour of rainfall for crop planning in any particular district at taluka level. The important aspect include onset of monsoon, distribution of monsoon and break in monsoon Probability of occurrence of rainfall an weekly basis onset and withdrawal of monsoon length of growing period, starting and ending of rainfall periods etc. Rainfall characterization of Parbhani district of Maharashtra is studied for above mentioned aspect so as to suggest the crops and cropping systems for each taluka.The historical daily data of rainfall at each taluka of Parbhani district were collected from department of Agriculture Meteorology M.K.V., Parbhani and Collectorate office Parbhani.The daily data collected for each taluka were summed up on meteorological weekly basis monthly basis, seasonal basis and annual basis for calculation of weekly basis the year was partitioned as per meteorological calendar, starting from 1st January of each year and ending on 31st December of the same year. Calendar month wise data was processed and tabulated for further analysis.The crop growth period will be considered the period during which the MAI was more than 0.5 at the time of sowing and active vegetative growth period and more than 0.3 at the time of maturity. All periods during active vegetative growth for which MAI is less than 0.5 will be considered as stress periods. The probable earliest data of sowing of *Kharif* crops was assumed to the day when rainfall received along with stored soil moisture meet half the PET during the moist period following a sub – humid period and the probable data of sowing of *Rabi* crops will be assumed to the day when the soil moisture storage was sufficient of the climate, Based on

these assumptions, the moisture availability periods (number of days in the moist period and the following sub – humid period) was worked out for crop planning. These assumptions were similar to that of (Mandal, 1991).

OBSERVATIONS AND ANALYSIS

The statistical analysis for variability are indicated that year to year variation ranged between 27.0 - 32.2 per cent on annual basis with the standard deviation value of 252.2, 261.7, 234.5, 268, 261.7, 256.3, 224.3, 257.2, 170.1 for Parbhani, Gangakhed, Pathari, Jintur, Palam, Purna, Sailu, Sonpeth and Manwattaluka respectively. The data indicated Table 1 and 2 the highest mean annual rainfall of (965.9 mm) was recorded at Jinturtaluka. The lowest mean annual rainfall was recorded in (798.8 mm) Sonpethtaluka. Year wise variation recorded that the highest annual rainfall in Parbhani 1408.0 mm (2005), Gangakhed 1616.9 mm (1998), Pathari 1333.3 mm (1996), Jintur 1443.4 mm (1983), Palam 1101.5 mm (1999), Purna 1333.4 mm (2005), Sailu 1233.3 mm (1998), Sonpeth 1277.2 mm (1998) and Manwat 1185.5 mm (1998). While the lowest rainfall recorded in those taluka were 575.7 mm (1997), 538.6 mm (1982), 496.5 mm (1982), 529.6 mm (1991), 295.0 mm (2004), 371.1 mm (2004), 380.0 mm (2004), 594.8 mm (2008), and 505.0 mm (2004) respectively (Table 1).The taluka to taluka in Parbhani district variation in rainfall for the same year is very high. Similarly, the highest and lowest rainfall years were also different Hence, the rainfall pattern is observed similar but trend is found different. Similarly resulted (Gare *et al*., 2000). In Manwattaluka data indicated

Table 1: Hot weather seasonal rainfall (March to May) recorded in Parbhani district at taluka level.Database (1998-2009)

Year	Palam	Purna	Sailu	Sonpeth	Manwat
1998	44.7	0.0	44.7	17.2	0.0
1999	0.0	0.0	0.0	0.0	0.0
2000	0.0	0.0	0.0	0.0	0.0
2001	0.0	0.0	0.0	0.0	0.0
2002	0.0	0.0	0.0	0.0	0.0
2003	25.6	7.4	10.2	25.6	19.0
2004	27.8	53.3	10.0	24.5	68.6
2005	12.6	90.6	30.0	5.1	72.2
2006	21.0	20.6	4.4	53.6	42.0
2007	0.0	0.0	0.0	0.0	41.0
2008	0.0	0.0	0.0	0.0	48.0
2009	34.0	21.0	69.0	34.0	79.0
Mean	13.8	16.3	16.7	12.5	30.8
S.D.	16.2	28.3	23.4	15.8	160.4
C.V.	175.5	174.0	140.4	126.7	220.8

Table 2 : Season wise per cent distribution of rainfall at each taluka of Parbhani district

Name of Taluka	Mean annual rainfall (mm)	Season wise percentage of rainfall			
		S – W Season	N - E Season	Winter Season	Summer Season
Parbhani	872.9	84.4	12.2	1.1	2.1
Gangakhed	839.5	85.0	13.0	0.7	1.1
Pathari	915.0	84.4	13.3	0.5	1.6
Jintur	965.9	86.2	10.6	0.9	2.0
Palam	844.6	89.3	8.3	0.7	1.6
Purna	950.6	89.4	8.4	0.3	1.7
Sailu	804.9	87.9	9.4	0.4	2.0
Sonpeth	798.8	89.5	9.0	0.3	1.2
Manwat	812.0	89.9	8.4	0.3	1.4
Mean	867.1	87.3	10.2	0.5	1.6

highest rainfall recorded in month of Aug. (242.4 mm). Standard deviation values highest in month of Aug. (148.0 mm) and co-efficient of variation highest in Feb. Month 334.3 per cent (Jadhav *et al*., 1977), similarly studied rainfall analysis for planning in scarcity zone of Maharashtra.In relation to meteorological week rainfall, standard deviation, co-efficient of variation valued changed in 23 MW to 42 MW since rainfall is higher in that period. Standard deviation ranged from 33.7 mm to 36.3 mm. Co-efficient of variation was 133.3 per cent to 214.0 per cent. Whereas, after 43 MW rainfall decreased fastly and highest rainfall occurred in 44 MW (3.6 mm). Maniyar *et al*. (2008) also classified Marathwada region districts under assured rainfall agro climatic zone. As the total quantum of weekly rainfall increases the probability of occurrences decreases gradually. Chakraborty and Chakraborty (1990) found similar results, who reported the rainfall and its impact on cropping pattern.These soil types are given by Jadhav *et al.* (1977) and he has explained soil moisture tension relationship and available water capacities of few Marathwada soils. This note includes information on soil moisture characteristics of this soil. The weekly MAI suggests the possibility of growing of some suitable *Kharif* crops of short duration without affecting the later *Rabi* crop yield on light soils in Parbhani district.The crops identified for aberrant weather situation are pearl millet, greengram, blackgram, horsegram on light soil and sunflower, pigeonpea sorghum, soybean on medium and deep soils of Parbhani district. The intercropping of soybean + Pigeonpea, sorghum + pigeonpea may be under taken to avoid risk of failure of monsoon crop.Weekly MAI analysis suggests that sorghum, soybean, cotton greengram sunflower, pigeonpea and their intercropping could be remunerative on medium and deep soils of Parbhani district during *Kharif* season.*Kharif* crop, *viz*., Sorghum, maize, pigeonpea, greengram, blackgram, cotton, sunflower, sesamum and soybean should be predominantly cultivated in Parbhani district.There is also some scope to grow fruit crops like tamrind, anola, drumstick mango, ber etc., crops under protective irrigation. Cultivation of improved and high yielding varieties of fruit crops like mango be grown which improve farm income.Floriculture crops like rose, marigold can also be grown in Pathri and ManwatTaluka.

Authors' affiliations :

V.P. GANGANE AND N.P. BUDDHEWAR, Department of Agronomy, College of Agriculture, Vasantrao, Naik Marathwada Krishi Vidyapeeth, PARBHANI (M.S.) INDIA

REFERENCES

Chakraborty, P. K. and Chakraborty, A.K. (1990). Climatic water balance approach and rainfall analysis for crop planning in Murshidabad district of West Bengal. *J. Environ. & Ecol.,* **8** (18): 401 – 405.

Gare, B. N., More, S.M., Jadhav, A.S. and Mokashi, D.D. (2000). Rainfall variability analysis at Gadhinglaj, Kolhapur. *J. Maharashtra Agric. Univ*., **25** (2) : 198 – 201.

Jadhav, G.S., Ingle, V.N., Varade, S.B. and Pawar, K.R. (1977). Soil moisture properties of soils in Marathwada. *J. Indian Soil Sci.,* **25** : 441.

Maniyar, V.G., Jadhav, M.G., Lomate, D.M. and More, G.R. (2008). Crop and cropping pattern on the basis of rainfall for Marthwada region of Maharashtra state. Paper presented at International symposium on Agro meteorology and food security (INSAFS), held at CRIDA, Hyderabad during 18 – 21 February 2008. 183. (Abstract).