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Short Comminucation

Dryspell analysis in Marathwada region of Maharashtra State

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Marathwada region of Maharashtra State comprises districts of Hingoli, Nanded, Latur, Parbhani, Jalna, Beed, Aurangabad and Osmanabad. The area in the region mostly falls under assured rainfall zone though 15 to 20 per cent, each fall under scarcity and moderately high rainfall zone. The average annual rainfall of Maharashtra is 120 cm, whereas that of Marathwada region is 81 cm and it is sufficient to support double cropping on medium and deep black soils with adoption of efficient moisture utilization, crops and tillage management practices (Talekar and Parghane, 2002). Cotton, soybean, sorghum, pearl millet, pigeon pea, green gram and black gram are traditional dominant crops of the region. However during recent years, cotton, soybean and pigeon pea have become major cash crops under dryland agriculture. The rainfall during the monsoon season is always uncertain and its distribution within growing season is uneven. A break in rainfall continues from a few days to several weeks. Under such varied and aberrant weather situation, crop planning and management must be based on the probability of rainfall computed rather than any other approach. Wet and dry spell analysis also helps to identify the duration of surplus water and water stress period (Biswas & Maske, 1981). Considering the facts given, the proposed study was under taken.

The daily rainfall and evaporation data of eight rainguage stations (Hingoli, Nanded, Latur, Parbhani, Jalna, Beed, Aurangabad and Osmanabad) for the period from 1981 to 2010 were collected from the India Meteorological Department, Pune and also from Department of Agricultural Meteorology, VNMKV, Parbhani respectively.

Effective monsoon is the amount of rainfall with the onset of monsoon season, which leaves enough moisture to support agricultural operations Ashok Raj (1979). The rainfall amount equivalent to seven days evaporation demand + is designated as the effective monsoon and the criteria for this approach to be followed is as follows;.

- The first day's rain in seven days spell should be more than the average daily evaporation 'e' of the place.
- The total rain during 7- days spell should not be less than (5'e'+10) mm.
- At least four out of these seven days should be rainy days with not less than 2.5 mm of rain each day.

By using this methodology, the dates of onset of effective monsoon for each year of the study period was computed in respect of eight stations separately and mean arrived for each station.

The interval between two wet spells is dry spell. If the duration of intervening dry spells exceeds a certain critical period depending on the crop-soil complex of the region, the dry spell is called the critical dry spell (CDS) (Ashok Raj, 1979). Duration of 10-days is considered as critical value for classifying dryspell as critical dry spell for soils and climate of Marathwada region (Taksale, 1992 & Dani, 1999). The first day coinciding with the terminal dry spell towards the end of monsoon season, is considered as the date of withdrawal of monsoon.

Mean values of annual rainfall, seasonal (June-December) rainfall, number of rainy days and duration of effective monsoon for Hingoli, Nanded, Latur, Parbhani, Jalna, Beed, Aurangabad and Osmanabad are presented in Table 1.

Characteristics of monsoon rainfall in Marathwada region

Annual rainfall ranged from minimum of 730 mm at Beed to maximum of 987 mm at Hingoli with an average of 807 mm in the region. Mean annual rainy days varied from minimum of 39 days at Beed to maximum of 46 days at Hingoli with an average of 43 days in the region.

Onset and withdrawal of effective monsoon

Mean dates of onset of effective monsoon, critical

Table 1: Annual rainfall and number of rainy days during 1981-2010 in Marathwada region.

Location	Annual rainfall, mm	Rainy Days
Hingoli	987	46
Nanded	812	43
Latur	791	44
Parbhani	897	42
Jalna	779	42
Beed	730	39
Aurangabad	733	42
Osmanabad	728	42
Mean	807	43

dry spells and withdrawal of effective monsoon during the period from 1981 to 2010 for eight locations are presented in Table 2. The earliest onset of effective monsoon in Marathwada region was observed on 17th June at Hingoli, followed by on 20th June at Parbhani & Beed and on 21st, June at Jalna. The latest onset of effective monsoon was observed on 26th June at Latur. However, the earliest withdrawal of monsoon was observed on 10th October at Osmanabad, whereas the latest withdrawal of monsoon was observed on 16th October at Nanded. Thus, total duration of effective monsoon ranged from minimum of 109 days at Latur & Osmanabad, to maximum of 120 days at Hingoli with an average of 113 days in the region (Table 2).

Critical dry spells (CDS)

In Marathwada region, after the onset of effective monsoon, the earliest first critical dry spell of 24 days was

Table 2 : Mean dates of onset of effective monsoon (OEM), withdrawal and critical dryspells (CDS) in Marathwada region.

Location	OEM	Withdrawal	I CDS		II CDS		III CDS		IV CDS	
			Date	Duration (day)	Date	Duration (day)	Date	Duration (day)	Date	Duration (day)
Hingoli	17 Jun (13)	14 Oct (20)	04 July (23)	19 (10)	16 Aug (26)	18 (07)	10 Sept (25)	22 (09)	14, Sept (10)	18 (10)
Nanded	25 Jun (15)	16 Oct (28)	15 July (30)	21 (09)	13 Aug (24)	28 (19)	19 Sept (21)	26 (11)	2, Oct (21)	21 (11)
Latur	26 Jun (18)	14 Oct (15)	18 July (26)	21 (9)	21 Aug (26)	21 (10)	10 Sept (21)	17 (07)	19, Sept (17)	21 (6)
Parbhani	20 Jun (17)	13 Oct (21)	07 July (17)	23 (08)	17 Aug (22)	24 (13)	5 Sept (16)	24 (10)	–	–
Jalna	21 Jun (18)	12 Oct (17)	08 July (26)	20 (08)	12 Aug (25)	19 (09)	7 Aug (20)	24 (15)	29, Sept (14)	19 (09)
Beed	20 Jun (16)	14 Oct (16)	04 July (16)	21 (11)	09 Aug (27)	29 (20)	9 Sept (22)	22 (09)	29, Sept (10)	32 (29)
Aurangabad	24 Jun (16)	11 Oct (20)	12 July (29)	21 (11)	11 Aug (26)	17 (06)	3 Aug (24)	22 (08)	25, Sept (16)	16 (06)
Osmanabad	23 Jun (17)	10 Oct (17)	03 July (19)	24 (12)	07 Aug (28)	21 (09)	29 Aug (20)	28 (22)	12, Sept, (13)	19 (05)

* Fig. in parenthesis indicates standard deviation (days).

observed on 3rd July at Osmanabad, followed by on 4th July at Hingoli and Beed. The latest first critical dry spell of 21 days was observed on 18th July at Latur. After onset of effective monsoon during 25th MW at these three locations, the critical dry spell follows, during which soil moisture storage is limited (up to 20 cm root zone) & most of the crops are in seedling stage. Depending upon moisture holding capacity, crop in this stage particularly soybean and kharif sorghum, on light soils shows symptoms of moisture stress. It is therefore, advisable to complete the sowing of short duration crops such as soybean, green gram, kharif sorghum, etc. as early as possible after OEM on medium and deep

soils, to avoid growing such crops on light soils unless provision of protective irrigation is made. For moisture stress management on medium and deep soils, practices of intercultural operations should be adopted to preserve and conserve soil moisture. The earliest second critical dry spell of 21 days was observed on 7th August at Osmanabad, whereas the latest second critical dry spell of 21 days was observed on 21st August at Latur. The earliest third critical dry spell of 22 days was observed on 3rd August at Aurangabad, whereas the latest third critical dry spell of 26 days was observed on 19th September at Nanded. Similarly, the earliest fourth critical dry spell of 19 days was observed on 12th September at Osmanabad, whereas the latest fourth critical dry spell of 21 days was observed on 2nd October at Nanded. The third and fourth critical dryspell coincides with flowering/pod filling or maturity stage of different dryland crops of the region. Adoption of appropriate crop based management practices such as hoeing, opening of furrows and soil mulching will reduce adverse effect of moisture stress on grain development and consequently control reduction in production to some extent.

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