

Short Communication

Rainfall variability over Jammu region in India

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Rainfall variability is a major factor that influences the agricultural production in any region. There are strong indications that rainfall changes are taking place on both the global and regional scales (Sahai *et al.*, 2003). The climate of Jammu and Kashmir varies from sub tropical to temperate conditions. In the state agriculture is sensitive to short-term changes in weather and to seasonal, annual and longer-term variations in climate. Rainfall is very crucial for the economic development of Jammu and Kashmir State as the rainfall is highly variable in space and time in the country (Dhar *et al.*, 1979). The climatic variability for different crop seasons have been reported for different states/regions of the country (Kingra *et al.* 2017; Sahu, 2008; Rao, *et al.* 2011). This paper examines the recent trends in the rainfall pattern and assessing the rainfall variability over Jammu region.

The daily rainfall data of six meteorological stations viz. Chatha, Rakh Dhiansar, Katra, Batote, Banihal and Bhaderwah located in different agro climatic zones were collected (Table 1) and analysed for annual as well as crop season viz; *kharif* (June to September) and *rabi* (October to March) basis.

Rainfall variability and trend

In Jammu region, the annual rainfall varies from

1143.6 mm at Samba to 2077.8 mm at Katra (Table 2), out of which *kharif* season (June to September) contributes 71 to 77 per cent in sub tropical (Jammu, Samba and Katra) regions and only 32 to 41 per cent in temperate and intermediate (Bhaderwah, Batote and Banihal) regions of Jammu. But during *Rabi* season (October to March) contributes more (60 to 68 per cent) in Bhaderwah, Batote and Banihal regions than that of Jammu, Samba and Katra (18 to 24 per cent).

The trend analysis revealed that the annual rainfall in Jammu province has the decreasing trends at all the locations except Banihal, however, it was significant at Sambha (-2.52 mm year⁻¹), Bhaderwah (-4.16 mm year⁻¹) and Batote (-4.71 mm year⁻¹). At Banihal, the annual rainfall showed the increasing trend at the rate of +1.99 mm year⁻¹ (Table 2). Among these locations the largest decrease in rainfall is found in temperate region followed by intermediate region and sub tropical region of Jammu region.

The season wise rainfall trend analysis (Table 2) for *kharif* (June to September) and *rabi* (October to March) revealed that during *kharif* season the rainfall showed the increasing trends at all the stations except at Katra where it showed non significant decreasing trend. The increasing

Table 1: Location, period of rainfall and source of data used in the Jammu region

Station	District	Latitude (°N)	Longitude (°E)	Station Altitude (m)	Period	Years	Source
Chatha	Jammu	32.60	74.80	294	1982-2015	34	Agromet Section
Batote	Ramban	33.12	75.32	1527	1977-2015	39	IMD
Banihal	Ramban	33.43	75.19	1635	1972-2015	44	IMD
Bhaderwah	Doda	32.98	75.71	1607	1978-2015	38	IMD
Katra	Reasi	32.99	74.93	867	1980-2015	36	IMD
Rakh Dhiansar	Samba	32.60	75.10	337	1987-2015	29	Rakh Dhiansar

Table 2: Annual and seasonal rainfall and trend at different locations of Jammu region

Station Name	<i>Kharif season</i>		<i>Rabi Season</i>		Annual	
	Rainfall (mm)	Trend (mm year ⁻¹)	Rainfall (mm)	Trend (mm year ⁻¹)	Rainfall (mm)	Trend (mm year ⁻¹)
Jammu	868.9	+1.95	240.6	+1.25	1173.4	-1.12
Samba	882.7	+0.38	211.5	-3.30	1143.6	-2.52*
Katra	1472.8	-0.21	503.3	-0.14	2077.8	-1.25
Bhaderwah	532.8	+2.80*	770.3	-7.25	1305.7	-4.16*
Batote	627.1	+0.12	998.4	+1.22	1624.2	-4.71*
Banihal	433.6	+0.12	910.4	+1.22	1343.6	+1.99

*Significance at 95 confidence level

trend was, however, significant only at Bhaderwah (+2.80 mm year⁻¹). But during *rabi* season the rainfall has trends increasing trend at three stations (Jammu, Banihal and Batote) and decreasing trends at other three stations (Katra, Samba and Bhaderwah).

Thus, most of locations in the Jammu region showed the decline in rainfall pattern. It emphasizes the introduction of low water requiring crops in rainfed areas of different regions of the Jammu. Due to decrease in rainfall during *rabi* season which influences the planting dates; the sowing of wheat earlier than usual can help to reduce the climate change-induced damages.

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