



Research Article

VALIDATION OF AGRO-METEOROLOGICAL RAINFALL FORECAST FOR KRISHNA AGRO-CLIMATIC ZONE OF ANDHRA PRADESH

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Received: October 25, 2018; Revised: November 26, 2018; Accepted: November 27, 2018; Published: November 30, 2018

Abstract: In this article an attempt has been made to validate month wise and season wise rainfall forecast issued to Krishna agro-climatic zone (it includes Krishna, Guntur and Prakasam districts) of south coastal Andhra Pradesh for 2017-18 by using skill score analysis. The skill score averaged for South West monsoon (June-September) for Krishna, Guntur and Prakasam indicated that it was 86%, 83% and 88% respectively as a whole it was 86% for the zone, and in North East monsoon, it was 74%, 76% and 66% respectively as a whole it was 72% for the zone. Month wise and season wise percent deviation of forecasted rainfall from its normal and actual was also validated and that indicate South West monsoon (June - September) period indicated that -46 % and -35% for Krishna district, -50% and -50% for Guntur district and for Prakasam district it was -64% and -68%, during North East monsoon (October - December) period indicated that -91 % and -86% for Krishna district, -89% and -75% for Guntur district and for Prakasam district it was -89% and -64% and entire monsoon (June - December) period were -69 % and -66% for Krishna district, -67% and -61% for Guntur district and for Prakasam district it was -76% and -66%.

Keywords: Agro meteorological forecast, Monsoon, validation, Skill score

Citation: Ratnam M., *et al.*, (2018) Validation of Agro-Meteorological Rainfall Forecast for Krishna Agro-Climatic Zone of Andhra Pradesh. International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 10, Issue 22, pp.- 7491-7492.

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Academic Editor / Reviewer: Perli Monisha

Introduction

The tropical rainy climatic country like India is completely depending on monsoon rains for agricultural production and productivity by deciding the crops and cropping pattern of the particular agro-climatic region. Not only monsoon rain but also its timely onset, distribution intensity, withdrawal and spread over the country or the region are very important factors in deciding the production of agricultural crops during *kharif* and *rabi* seasons. The extreme events such as floods, and drought drastically affect the agricultural production in the region and in turn creates a distress in farmers economy. State of Andhra Pradesh receive annual rainfall of 940 mm., out of which 624 mm (66%) is contributed by South West monsoon during June-September and 224 mm (24%) through the North East monsoon during October-December. Krishna agro-climatic zone of Andhra Pradesh consisting of Krishna, Guntur and Prakasam districts and these districts receives annual rainfall of 1033.5, 853.0 and 871.5 mm respectively, out of which 663.4, 541.8 and 392.3 mm is contributed through the South West monsoon and 176.2, 196.0 and 393.5 mm through the North East monsoon, for the entire monsoon period an Among the three districts Krishna and Guntur receives normal rain but Prakasam receives below normal rainfall due to temporal and spatial variation of the climate. In this article an attempt has been made to validate month wise, season wise rainfall forecast issued to Krishna zone of South Coastal Andhra Pradesh for 2017-18 by using skill score analysis [1-3].

Material and Methods

Rainfall is most important weather parameter; we have attempted to validate the forecasted rainfall against the actual and normal rainfall. In the year 2017-18 the agro meteorological forecasts were given by National Centre for Medium Range Weather Forecast (NCMRWF), India. Meteorological Department, New Delhi through Regional Met Centre, Hyderabad and the actual rainfall was compared

with observed values collected from the different meteorological observatories located in Krishna (115), Guntur (134), and Prakasam (191) districts of Andhra Pradesh state and data pertaining to rainfall was analyzed for skill percentage and validation for forecast issued for the region under 'Gramin Krishi Mausam Sewa (GKMS) scheme'. Skill score was calculated for the forecast by comparing the actual rainfall with forecasted rainfall by using the formula given below

$$\text{Skill score (\%)} = \frac{YY + NN}{YY + YN + NY + NN}$$

Where,

YY= Rainfall Predicted /forecasted and actually observed.

YN= Rainfall Predicted/ forecasted and actually not observed.

NY= Rainfall not Predicted/ forecasted but actually observed.

NN= Rainfall not Predicted/ forecasted nor observed.

Results and Discussion

Skill score (%) was calculated by using the mathematical equation developed by Rana *et al.* (2013). For the year 2017-18, the skill score averaged for South West monsoon (June-September) for Krishna zone, Comprising of Krishna, Guntur and Prakasam districts of South Coastal Andhra Pradesh indicated that it was 86%, 83% and 88%, respectively as a whole it was 86% for the zone, and in North East monsoon, it was 74%, 76% and 66% respectively as a whole it was 72% for the zone. On an average the forecast during monsoon period for Krishna, Guntur and Prakasam for year 2017-18 were corrected by 80%, 80%, 77% accuracy respectively and the skill score for the zone for the entire monsoon period was 79% [Table-1]. Month wise and season wise percent deviation of forecasted rainfall from its normal and actual pertaining to the Krishna agro-climatic zone of south coastal Andhra Pradesh was validated and discussed in the following paragraphs. Rainfall validation was calculated in accordance with the Varshenya *et al.* (2008).

Table-1 Skill score (%) of rainfall forecasted pertaining to South West and North East monsoon during 2017-18 of Krishna zone of South Coastal Andhra Pradesh

Season/month	Krishna	Guntur	Prakasam	Mean of the zone
June	80	80	77	79
July	84	81	90	85
August	100	90	94	95
September	80	80	90	83
SW Monsoon(%)	86	83	88	86
October	87	84	77	83
November	70	63	63	66
December	65	81	58	68
NE Monsoon(%)	74	76	66	72
Monsoon period	80	80	77	79

Table-2 Validation of Quantitative rainfall (mm) forecast for South West and North East monsoon during 2017-18 of Krishna zone of South Coastal Andhra Pradesh

Season/month	Krishna					Guntur					Prakasam				
	Rainfall forecasted	Actual rainfall	Normal rainfall	Departure from actual rainfall	Departure from normal rainfall	Rainfall forecasted	Actual rainfall	Normal rainfall	Departure from actual rainfall	Departure from normal rainfall	Rainfall forecasted	Actual rainfall	Normal rainfall	Departure from actual rainfall	Departure from normal rainfall
June	289.0	167.7	106.5	-42	-63	183.0	148.2	86.3	-19	-52	262.0	81.0	58.0	-69	-78
July	183.0	206.3	210.6	13	15	157.0	126.7	142.1	-19	-9.4	181.0	61.5	89.7	-66	-50
August	259.0	179.0	182.3	-30	-29	249.0	175.0	152.0	-30	-39	262.0	177.0	107.0	-32	-60
September	476.0	98.2	164.0	-79	-65	509.0	95.7	161.4	-81	-68	537.0	116.7	137.6	-78	-74
SW Monsoon	1207.0	651.2	663.4	-46	-35	1098.0	545.6	541.8	-50	-50	1242.0	436.2	392.3	-64	-68
October	474.0	103.5	48.2	-78	-89	459.0	78.2	130.0	-82	-71	588.0	108.2	206.5	-81	-64
November	552.0	10.1	100.0	-98	-81	237.0	4.4	50.0	-98	-78	332.0	17.00	143.7	-94	-56
December	244.0	0.1	28.0	-99	-88	108.0	0	16.0	-100	-85	186.0	0.0	43.5	-100	-77
NE Monsoon	1270.0	113.7	176.2	-91	-86	804.0	82.6	196.0	-89	-75	1106.0	125.2	393.5	-89	-64
Monsoon period	2477.0	764.9	839.6	-69	-66	1902	628.2	737.8	-67	-61	2348.0	561.4	785.8	-76	-66

South West monsoon season

The percent deviation of forecasted rainfall from the normal and its actual of Krishna agro-climatic zone of South Coastal Andhra Pradesh during South West monsoon (i.e., from June - September) period indicated that -46 % and -35% for Krishna district, -50% and -50% for Guntur district and for Prakasam district it was -64% and -68% [Table-2].

North East monsoon season

The percent deviation of forecasted rainfall from the normal and its actual of Krishna agro-climatic zone of South Coastal Andhra Pradesh during North East monsoon (i.e., from October - December) period indicated that -91 % and -86% for Krishna district, -89% and -75% for Guntur district and for Prakasam district it was -89% and -64% [Table-2].

Entire monsoon period

The percent deviation of forecasted rainfall from the normal and its actual of Krishna agro-climatic zone of South Coastal Andhra Pradesh during entire monsoon (i.e., from June - December) period indicated that -69 % and -66% for Krishna district, -67% and -61% for Guntur district and for Prakasam district it was -76% and -66% [Table-2].

Application of research: Study applicable for month wise and season wise rainfall forecast issued to Krishna agro-climatic zone

Research Category: Agrometeorology

Abbreviations:

SW: South West
NE: North East

Acknowledgement / Funding: Authors are thankful to Indian Meteorological Department (IMD), Regional Met Centre, Hyderabad for providing the daily rainfall forecast and APSDPS, Govt. of Andhra Pradesh for the provision of rainfall data for Krishna agro-climatic zone of coastal Andhra Pradesh. Authors are also thankful to Grameena Krishi Mousam Sewa, Regional Agricultural Research Station, Lam, Guntur, 522034, Andhra Pradesh India

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Research project name or number: IMD and ANGRAU collaborative research project

Author Contributions: All authors equally contributed

Author statement: All authors read, reviewed, agreed and approved the final manuscript

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

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