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Forecast on rainfall and prediction success for Visakhapatnam district of Andhra Pradesh

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Abstract

The medium range weather forecast on rainfall for seven agricultural sub divisions of Visakhapatnam district (Plain mandals) received from National Centre for Medium Range Weather Forecasting (NCMRWF), India Meteorological Department, Pune for five days for the year 2021-22 was verified with daily observed weather data for respective days collected from Chief Planning Office, Visakhapatnam district to study the prediction success of rainfall. The analysis of the data indicated that the success of rainfall forecast ranged between 42.4% to 68.5% for rain and 74.7% to 85.3% for No rain events. Whereas, for South West monsoon period the prediction success ranged between 58.8% to 80.0% and 21.4% to 53.3% for forecast on rain and no rain respectively in the different agricultural sub divisions of Visakhapatnam district.

Keywords: Weather forecast, rainfall and prediction success

Introduction

Agriculture in India mainly depends on weather and climatic conditions. Weather is one of the most important factors that influence the crop growth, development and finally agricultural production. Among the weather factors rainfall distribution plays a vital role for reaping higher yields. The vagaries of monsoon encountered during crop season often create crisis in food production. (Mohan Singh and Bharadwaj, 2012) [4]. An accurate weather forecast not only helps in increasing agriculture production and quality of produce but also helps in efficient use of limited resources (Navaneet Kaur and Singh, 2019) [6]. Knowing the weather in advance helps in planning of agricultural operations *viz.*, sowing, scheduling irrigation, fertilizer application, spraying, harvesting etc. Therefore, providing accurate and timely forecast to the farmer will help in minimising the risk due to weather factors and to realise the sustained yield (Himanshu Das *et al.*, 2018 and Kumari *et al.*, 2021) [2, 3]. Further, there has been long demand from the user community for quantitative weather forecasts in short to medium range time scale. Considering need of farming sector, India Meteorological Department (IMD) has upgraded the Agro-Meteorological Advisory Service from agro climate zone to district level because of high spatial variability of different weather parameters at district level which have direct impact on crop growth and to generate crop and location specific advisories. As a major step, IMD started issuing quantitative district level weather forecast upto 5 days from 1st June, 2008 for seven weather parameters, *viz.*, rainfall, maximum and minimum temperatures, wind speed and direction, relative humidity and cloudiness for preparation of District Level Agromet Advisories (Chatopadhyay *et al.*, 2016) [1]. Further, IMD also initiated issuing of block level forecast for generating block level weather based agro advisories for the benefit of the farming community.

Materials and Methods

The medium range weather forecast on rainfall for seven agricultural sub divisions of Visakhapatnam district (Plain mandals) received from National Centre for Medium Range Weather Forecasting (NCMRWF), India Meteorological Department, Pune for five days for the year 2021-22 was verified with daily observed weather data for respective days collected from Chief Planning Office, Visakhapatnam district to study the prediction success of rainfall. The verification for both Rain and No rain was done for Pre monsoon season (April to May) Southwest monsoon season (June to September), Northeast monsoon season (October-December), winter season (January to February) and for entire year and expressed in percentage.

Results and Discussions

Verification of forecast for rainfall for the year 2021-22 (Table 1) indicated that the success of rainfall forecast ranged between 42.4% to 68.5% for rain and 74.7% to 85.3% for No rain events. Whereas, for South West monsoon period the prediction success ranged between 58.8% to 80.0% and 21.4% to 53.3% for rain and no rain forecast respectively in the different agricultural sub divisions of Visakhapatnam district. The highest prediction success for rain (83.7%) was noticed with Narsipatnam agricultural sub division and lowest

(61.0%) with Payakaraopeta agricultural sub division during South West monsoon period which is coincided with the major crop growth period. Season wise prediction success for rain as well as no rain events for different agricultural sub divisions was predicted in Fig. (1) to (4). Accuracy of forecast helps the farmers for planning agricultural operations viz., postponement of spraying, saving of irrigation water, fertilizer application etc. Forecast of no rain is equally important in planning the agricultural operations viz., drought mitigation sprayings, harvesting of crops, drying of crops etc.

Table 1: Mandal wise Rainfall prediction success for different Agricultural sub divisions (Plain mandals) of Visakhapatnam district.

S. No.	Agricultural sub division	Prediction success (%)									
		Pre monsoon		South west monsoon		North East monsoon		Winter period		Annual	
		Rain	No Rain	Rain	No Rain	Rain	No Rain	Rain	No Rain	Rain	No Rain
1.	Anakapalle	47.4	89.0	69.2	21.4	54.0	90.4	-	94.9	59.5	75.8
2.	Bhimili	44.4	87.8	80.0	48.4	62.5	66.7	0	100.0	65.5	76.6
3.	Chodavaram	22.2	87.8	52.8	29.6	43.6	90.6	0	98.3	42.4	78.2
4.	Narsipatnam	61.9	84.5	83.7	28.7	57.1	80.0	0	98.2	68.5	74.7
5.	Payakaraopeta	47.6	94.4	61.0	53.3	41.3	89.1	0	96.4	51.7	85.3
6.	Visakhapatnam	55.0	91.7	75.8	33.9	67.9	77.8	0	98.1	66.4	75.9
7.	Yelamanchili	37.5	92.6	74.2	53.6	56.4	78.4	0	96.3	59.3	80.9

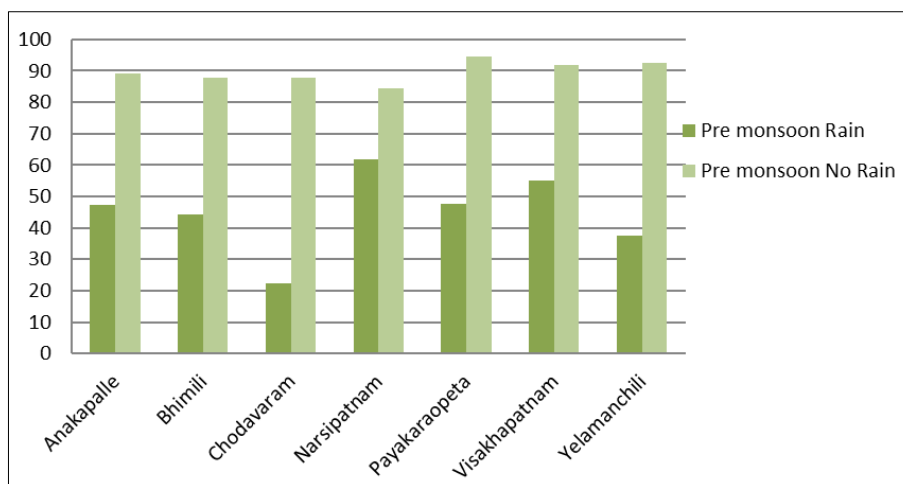


Fig 1: Prediction success (%) during pre monsoon period (March, 2021 to May, 2021)

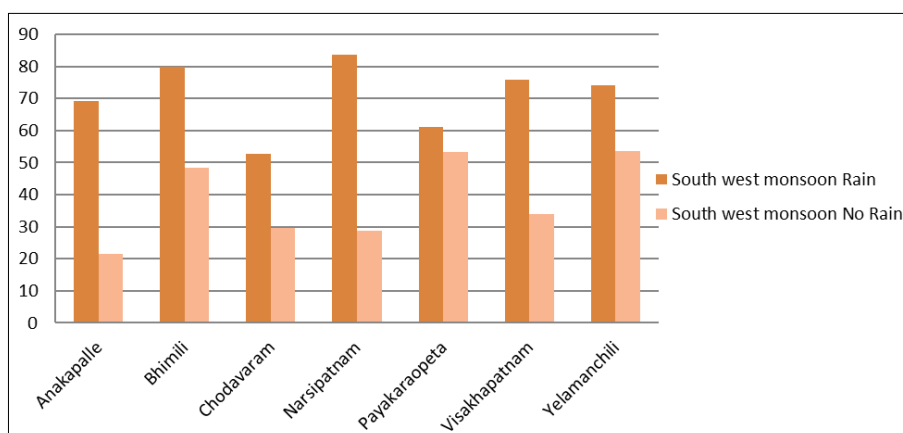


Fig 2: Prediction success (%) during South west monsoon period (June 2021 to September, 2021)

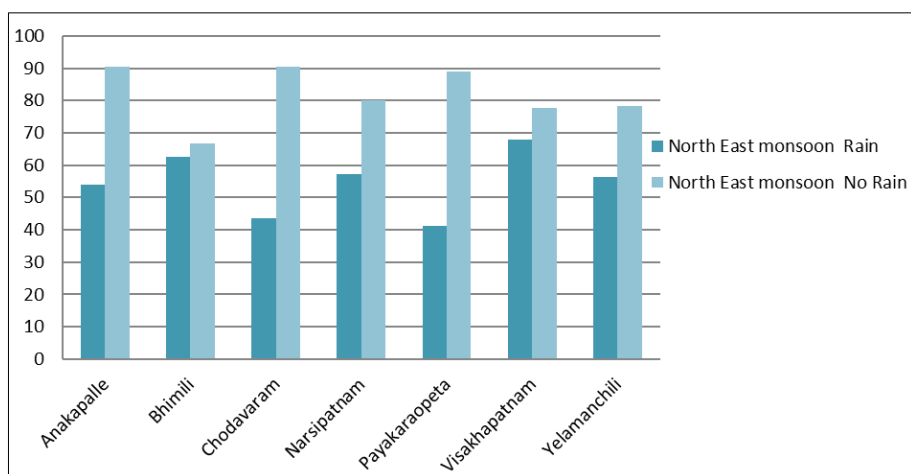


Fig 3: Prediction success during North East monsoon (October, 2021 to December, 2021)

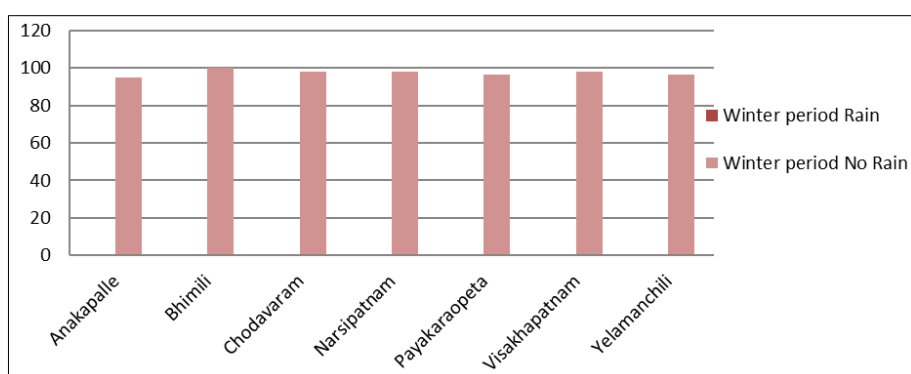


Fig 4: Prediction success (%) during Winter period (January, 2022 to February 2022)

Conclusion

Providing accurate forecast to the farmer will help in minimising the risk due to weather factors and to realise the sustained yield.

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