

## WEATHER BASED AGRO ADVISORIES FOR MANAGING THE CLIMATE RELATED CROP PRODUCTION RISKS IN SOUTHERN TELANGANA REGION OF ANDHRA PRADESH

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**KEYWORDS:** Weather Based Agro Advisories, Forecasting, Southern Telangana Zone, Economic Impact, Net Benefit.

### ABSTRACT:

Medium range weather forecast issued by NCMRWF/IMD was used to prepare weather based agro advisories. Mandal wise rain fall data for four districts of Southern Telangana Zone viz., Ranga Reddy, Medak, Mahabubnagar and Nalgonda were analyzed from 2006-2009 to test the accuracy of the forecast. The analysis revealed that in low rainfall districts like Mahabubnagar and Nalgonda, the correct and usable rain forecast was high (69 to 82%) while in medium rainfall districts i.e., Ranga Reddy and Medak it varied from 61 to 73%. The economic impact assessment of weather based agro advisories in different crops during 2006-09 for the district of Ranga Reddy showed net benefit of Rs. 2,770/-, Rs. 3706, Rs. 3930 and Rs. 4950 per acre by controlling sheath blight, stem borer, leaf folder and hispa in paddy, respectively and Rs. 2700/-, Rs. 820/- and Rs. 4320/- by controlling *Helicoverpa* in redgram, semilooper in castor and mealy bug in cotton. Thus, for sustainability, equality and stability of production, agro-advisories provides vital component of action research.

### 1. INTRODUCTION

Agromet advisory services is a vital tool which provides the valuable information about all agricultural operations starting from land preparation, sowing to harvest based on weather forecasting. The main aim of Agromet advisory services is to conserve the natural resources effectively and call for minimising the weather hazards.

The utility of weather forecast further depends upon their reliability and applicability at micro level. Agriculturally relevant forecast is not only useful for efficient management of farm inputs but also leads to precise impact assessment (Gadgil, 1989 and Anonymous, 2002).

The weather forecasting at national level and bi-weekly agro-advisory services at regional level has been critical in instrumentalising the farmers to adjust their production plans in favour of optimum production. However, a people centric group dynamic approach is still lacking (Sharma et al,2008). This article clearly shows the correct and usable rain forecast analysis for four districts of Southern Telangana Zone and also the benefit one can achieve by adopting agro advisory services than those not aware of it.

### 2. MATERIALS AND METHODS

The study area of Southern Telangana Zone spreads over 38,902 Km<sup>2</sup> and accounts for 14.1 percent area of Andhra Pradesh. It lies between 16<sup>0</sup>10' and 17<sup>0</sup>43' North latitude and 77<sup>0</sup>22' and 79<sup>0</sup>21' East longitude. Geographically, the zone comprises of Mahabubnagar, Medak, Rangareddy and Nalgonda districts. The average maximum and minimum temperatures vary between 33-

46<sup>0</sup>C and 23-25<sup>0</sup>C respectively. This zone includes 12.30 lakh hectares of cropped area and forms the major castor belt not only of the state but also of the country.

The rainfall forecast was issued every Tuesday and Friday to all the districts of Southern Telangana zone. The predicted and observed meteorological data from 2006-2009 for rainfall was analysed mandal wise for verification / reliability of forecast. Thirty seven rain gauge stations of Ranga Reddy, forty six of Medak, fifty nine of Nalgonda and sixty four rain guage stations of Mahabubnagar were included in the analysis. The correct and usable rain forecast was compared for different mandals of the districts of the zone. The economic impact analysis was carried out based on the feedback obtained from identified AAS and non AAS farmers for different pests and diseases of crops like paddy, red gram, castor and cotton.

### 3. RESULTS AND DISCUSSION

#### 3.1 Verification of Rainfall Forecast

Verification of rainfall forecast analysis was done at mandal, district and zonal level and the results are as follows:

**3.1.1 Ranga reddy district:** A close look at the error structure (%) of correct and usable rain forecast put together revealed that rain forecast was found to be least in Vikarabad, Basheerabad, Parigi, Pudur and Shamshabad (60.19 to 62.43%), less in central and western parts of the district adjoining to Karnataka (62.43 to 64.83%). Good rain forecast was obtained for the eastern part of the district adjoining to Nalgonda and southern part of the district adjoining to Mahabubnagar (65.46 to 73.37%) (Fig 1).

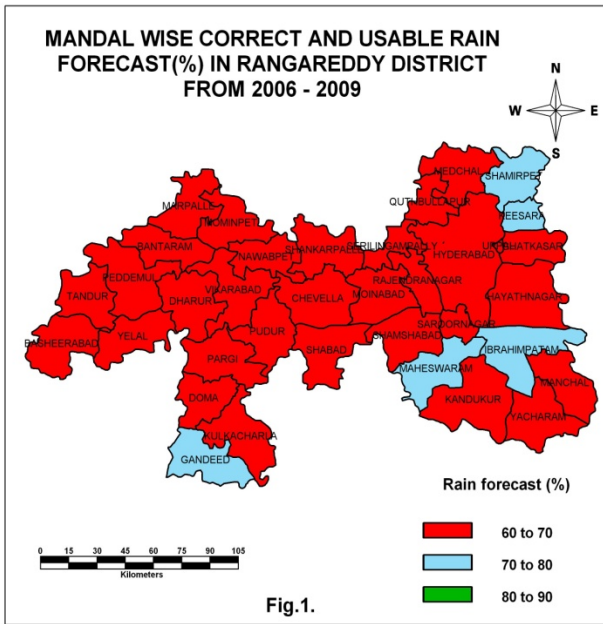


Figure 1. Mandalwise Correct and Usable Rainfall Forecast (%) in Rangareddy District

**3.1.2 Medak district:** The error structure (%) for rainfall analysis in Medak district revealed that the correct and usable rain forecast in eastern part of district adjacent to Nalgonda (70.02 to 75.07%) was found to be very good. China kodur recorded the highest value (75.07%). In central and western part of the district and three mandals of eastern part, the % of correct and usable rain forecast was found to be good (65.01 to 69.92%). The analysis indicated that the error structure was found to be higher in the mandals adjoining to low rainfall districts like Nalgonda than the other mandals of the district (Fig 2).

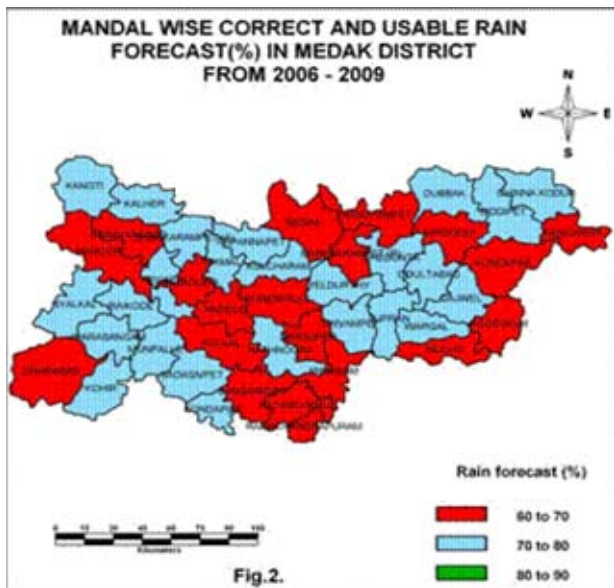


Figure 2. Mandalwise Correct and Usable Rainfall Forecast (%) in Medak District

**3.1.3 Nalgonda district:** The correct and usable forecast in Southern parts of Nalgonda was excellent. It was 82.39% in Marriguda and 82.16% in Chandampet. In central part, remaining southern parts and some eastern parts of the mandals showed very good (72.24 to 81.93%) while in northern parts adjacent to Ranga reddy and some central parts, the error structure was less (69.70 to 72.02 %), however in Bibinagar, Marpalle and Pochampalle it was found to be least (66.92 to 69.70%) (Fig 3).

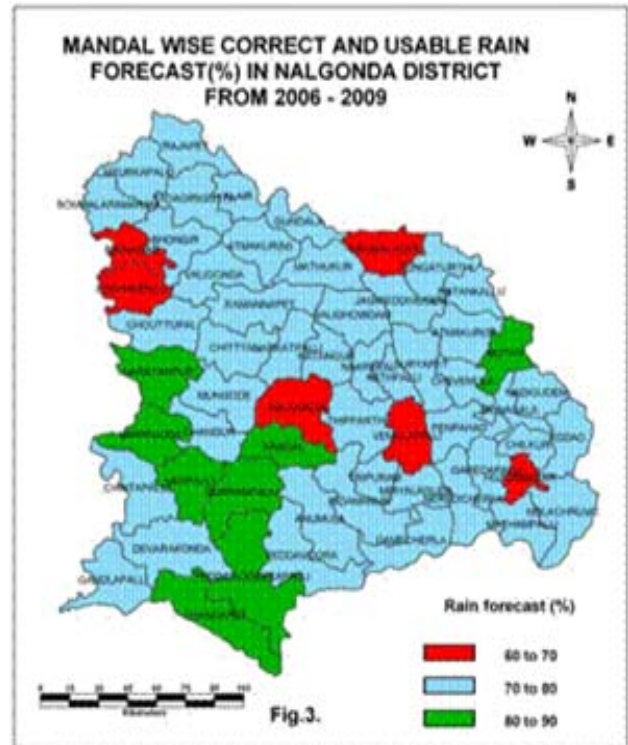


Figure 3. Mandalwise Correct and Usable Rainfall Forecast (%) in Nalgonda District

**3.1.4 Mahabubnagar district:** The error structure (%) for rainfall analysis both correct and usable rain forecast in Waddepalle, Veepangandla, Talakondapale and Alampur was found to be excellent (79.89 to 81.76 %) while in most of the southern, western and eastern parts it was very good (66.60 to 79.13 %). Good rain forecast was obtained in some mandals of northern and central parts (66.60 to 79.13 %) while least in Mahabubnagar (58.53%) (Fig 4)

**3.1.5 Southern telangana zone:** Southern Telangana zone was analyzed for error structure (%) of rainfall in all the four districts and the results revealed that out of all the districts, eastern and southern parts of the zone were found to be very good (69 to 82%) followed by northern parts of the zone where it was good (66.11 to 75.07%) while in central parts of the district it was less (62.83 to 73.37%). Thus, the analysis indicated that all over the Southern Telangana zone, the % error structure of rainfall mostly ranged from 62.83 to 82% (Fig 5)

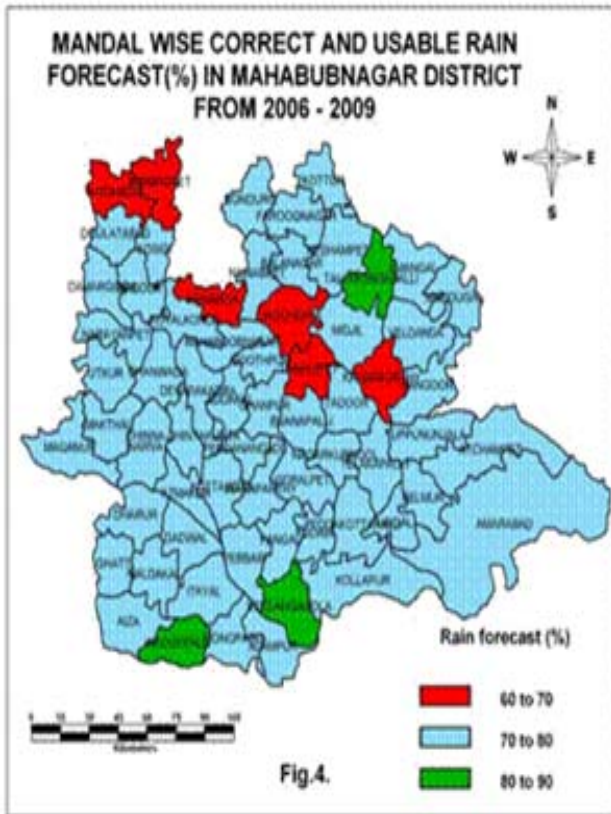


Figure 4. Mandalwise Correct and Usable Rainfall Forecast (%) in Mahabubnagar District

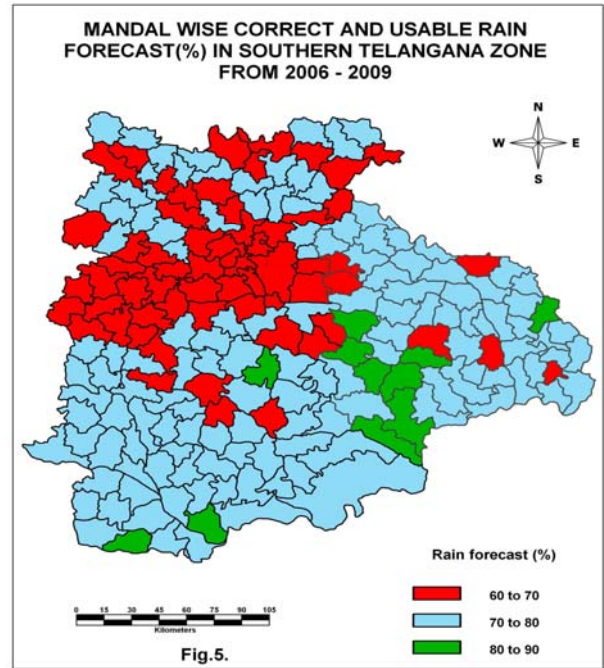


Figure 5. Mandalwise Correct and Usable Rainfall Forecast (%) in South Telangana Zone

Similar results were reported by Sanjay and Agarwal, 2008 where in the analysis of verification of rainfall forecast at Jabalpur centre showed that during South-West monsoon, usability percentage was low (23 to 50 %) whereas during post monsoon, winter and summer was between 64 to 100%, 75 to 100% and 86 to 100 % respectively.

### 3.2 Economic Impact Assessment

Name of the Crop	Weather Element	Year	Disease/Pest	Yield Kg/acre	Loss(%)	Price Rs./Kg.	Total Yield Loss (KG/acre)	Av. Crop Loss Rs/acre	Cost * Rs/acre	Net Benefit Rs/acre	District Area (ac)	Adoption of AAS (%)	Benefit Accrued
Paddy	Humidity	2006-07	Sheath blight	2100	25	6.0	525	3150.0	380.0	2770.0	49525	60	8.23
Paddy	Temperature	2008-09	Stem borer	2800	19	8	532	4256	550	3706	30463	70	7.9
Paddy	Cloudiness/ Temperature	2008-09	Leaf folder	2800	20	8	560	4480	550	3930	30463	60	7.2
Paddy	Temperature / Rainfall	2008-09	Hispa	2800	25	8	700	5600	650	4950	30463	40	6.0
Redgram	Rainfall/ Cloudiness	2006-07	Helicoverpa	350	40	21.0	140	2940.0	240.0	2700.0	7344.5	25	5.00
Castor	Temperature / Rainfall	2007-08	Semilooper	400	20	15.0	80	1200.0	380.0	820.0	16428	15	0.20
Cotton	Temperature / Rainfall	2008-09	Mealy bug	900	20	29	180	5220	900	4320	16184	80	5.5

Table 1: Economic Impact Assessment of weather based Agro Advisories (AAS) in different crops in different years during 2006-2009 for the district of Ranga Reddy

As a case study, Ranga reddy district was considered to study the impact of agromet advisories on the economic returns to the farmers. Insect pests like stem borer, leaf folder and hispa in paddy, *Helicoverpa* in redgram, semilooper in castor and mealy bug in cotton and sheath blight in rice were considered for the study.

Critical weather elements contributing to pests and diseases in various crops and finally the benefit accrued by following agro-

advisory services for the entire district has been evaluated. Economic impact assessment of weather based agro-advisories (AAS) in different crops during 2006-2009 is given in Table 1.

By considering the yield loss, total area and percent adoption under each crop in the district, monetary benefit accrued to the farmers are shown in table 1. Results revealed that, the benefit was more

with respect to staple crops like paddy and other commercial crops like cotton. The impact was clearly visible with respect to the diseases which are mainly weather driven. Net benefit of Rs.2770/- , Rs.3706/-, Rs.3930/- and Rs.4950/- per acre was obtained by controlling sheath blight, stem borer and hispa in paddy, Rs.2700/- , Rs.820/- and Rs.4320/- by controlling *Helicoverpa* in redgram , semilooper in castor and mealy bug in cotton, respectively (Table 1).

Kushwaha et al (2008) reported that AAS farmers harvested 19.4, 21.7 and 20.9 q acre<sup>-1</sup> compared to 17.5, 20.0 and 19.8 q acre<sup>-1</sup> yield of rice crop which was 10.8, 8.5 and 5.6 per cent more than Non –AAS farmers,

Similar results were reported by Prasad Rao and Manikandan, (2008). The percentage increase in yield varied from 6.3 to 19.2% depending upon the season and crop due to agromet advisory services based on weather forewarning. The benefit in terms of crop yield varied from 6.3 to 19.2%, 6.4 to 12.2% and 7.3 to 8% in rice, banana and coconut respectively.

### CONCLUSION

The correct and usable rain forecast (%) which is of immense use to the farmers to fine tune their agricultural operations still has to be improved. Further more emphasis is needed for timely dissemination of weather based agro advisories to the farming community.

Thus the issue of agro advisories to the farmers help to avoid the adverse effects of weather events like heavy rain, dry spell, high

wind speed which influences the growth of the crops. It is observed that the high benefit has been realized with the efficient management practices based on the agro advisories which contains the information mainly on weather parameters and do not depend on high input application.

### REFERENCES

Anonymous (2002). Background paper for 11<sup>th</sup> Annual review meeting of national Centre for Medium range weather forecasting (NCMRWF) New Delhi. In : Status of economic impact. pp1-3

Gadgil S (1989). Monsoon variability and its relationship with agricultural strategies. Paper presented at International symposium on climate variability and food security in developing countries . Feb 5-7 , 1987, New Delhi, India. pp 249-267

Kushwaha H.S., Phool Chand and Manisha Rani (2008). Economic impact of MRWF based agromet advisory services on farmers field of humid sub-tropics of Uttarkhand, India. Journal of Agrometeorology (Special issue – Part I): 235–239.

Prasada Rao G S L H V and Manikandan N (2008). Economic impact of agrometeorological advisory services over the Central zone of Kerala. Journal of Agrometeorology (Special issue – Part I): 230–234.

Sharma SK, Kothari AK, Sharma RK and Jain PM (2008). Capitalizing on agro-advisoty services for higher productivity in rainfed agroecosystem – A case study. Journal of Agrometeorology (Special issue- Part 1 ) : 219–224