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Economic Impact Analysis of Agrometeorological Advisory Services Issued Through Agromet Advisory Services Project For Farmers of Southern Zone of Andhra Pradesh

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ABSTRACT

Weather based agro advisories play a vital role in agricultural production. Bi-weekly agrometeorological advisory bulletins based on medium range weather forecasting were effectively disseminated to assess the economic impact involving 20 AAS farmers and 20 non-AAS farmers. The study comprises of 2 panchayats. The weekly agromet advisory bulletin contains information on past weather, weather forecast for 3-5 days ahead, stage of the crops and advisory to be followed on crop management, technology adoption and crop protection measures based on weather forecast. Economic impact analysis of Agro advisories for adoptability among farming communities was also carried out by field surveys and regular monitoring during 2006-2010. Factors affecting crop production such as drought, excess rains, and pest disease under unfavourable weather conditions were evaluated. By employing the Agrometeorological advisory services, farmer can increase his farm productivity and reduce the crop loss. Analysis of medium range forecast of rainfall for 9 years (2001-2002 to 2009-2010) realized to extent of 51% during Kharif and 60% during Rabi and the forecast were found to be encouraging. Results on economic impact of weather based agromet advisories in rice, groundnut and redgram growing areas revealed that adoption of improved practices such as introducing redgram as intercrop in 7:1 ratio in groundnut, under normal and unfavourable weather conditions, by taking up timely plant protection measures improved the income of the farmer. Our analysis indicated an additional benefit of Rs.3500 to 15000/- per hectare can be achieved by duly following weather based agro advisories with respect to adoption of technology, pests and diseases for the crops under study.

Key words : Agromet Advisory Services, Medium range weather forecasting.

Weather condition during cropping period plays a major role in success or failure of crop production. Weather forecasts can help in the development of sustainable and economical viable agricultural production systems, reducing losses and risks and improving production and quality of yields. Weather forecasting can help to minimize the farm losses by following timely agricultural operations, pest and disease management etc. Though complete avoidance of all farm losses due to unfavourable weather events such as drought, excess rains is not possible, it can be minimized to a considerable extent by making adjustment based on timely and accurate weather information.

The forecast on weather elements and weather based agro advisories play a vital role in agricultural production. In many cases, when weather occurrence is not sudden, availability of judicious use of agrometeorological information is advantageous for farm management (Jager *et al* 1998). It helps in enhancing economic gains by following suitable production technology and other activities according to the prevailing weather condition. Therefore, agrometeorological advisories based on current and forecasted weather is a time need to the agricultural operations, hence the economic impact analysis was carried out based on the fields visits, field demonstrations and feedback obtained from the identified AAS and non-AAS farmers.

MATERIALS AND METHODS

The National centre for medium range weather forecast by National Centre for Medium Range Weather Forecasting (NCMRWF) and India meteorological department, Hyderabad, have generated 3-5 days weather forecast bi-weekly on Tuesday and Friday. Based on the weather forecast AAS unit of Regional Agricultural Research Station, Tirupati, Acharya N.G. Ranga Agricultural

University provided Agromet – Advisory Services (AAS) at Agro-climatic zone to the farming community of southern agroclimatic zone of Andhra Pradesh. Rice, groundnut, redgram and other crops were monitored as per the advisories at the farmer's field in 2 panchayats near the research station by frequent field visits; field demonstrations and farmers field feedback. Forty farmers were selected for dissemination of agromet advisory service bulletin each week. The regular feedback from the farmers for the groundnut, rice, redgram and contingent crops were collected. From the feedback data collected from forty farmers (20 AAS and 20 Non-AAS) on utilization of weather forecast and agro advisories given, the benefit of agro advisories were evaluated and the economic impact was worked out for these crops. Required data was collected through the questionnaire and assessment of economic impact of agromet advisory service (AAS) at the farmer's field of selected villages was made. The ratio score (%), H.K score (%) values were calculated for *Kharif* and *Rabi* using the standard methods as laid down by NCMRWF.

RESULTS AND DISCUSSION

The analysis of ratio score (%) and H.K. score (%) for rainfall on yes and no basis was done based on the standard method (Anonymous, 2012) for both *Kharif*, Rabi seasons and entire year. The results of this analysis thus obtained are given in table 1. The forecast of rainfall was realized to an extent of 51 to 59 percent during *kharif* and 50-82 percent during *rabi* as compared to 60-86 percent for the whole year. The mean values of ratio score during *kharif* (June to September) and Rabi (October to December) seasons for nine years (2001-2010) was 51 and 60.44 percent respectively. The mean Hansessen and Kuipers (H.K) scores ranged from 24.22 during *kharif* to 35.33 during *rabi*. The forecasts (Rainfall and temperatures) were found to be encouraging during *rabi* compared to *kharif* indicating the improvement in use of rainfall forecast during *kharif* season in southern Agroclimatic zone of Andhra Pradesh.

Though good amount of rainfall receives both during Kharif and Rabi the amount of rainfall received during Kharif through south west monsoon season is the most important as most of the area is under rainfed crops, hence its accuracy should be maintained further at higher level.

Economic impact assessment

Economics of the following four cases were examined separately under adoption and non – adoption of Agro advisories *viz.,* adopting redgram as intercrop in groundnut under drought /normal as well as excess rainfall situation and adopting pest management operations in groundnut and paddy.

The weather during the year 2007 and 2008 was quite different where season for groundnut is quite normal with moderate stress during 2007 and with excess rainfall during pod filling stage in 2008. In both the situations the agro advisory given on raising of redgram as intercrop in groundnut helped the farmers to achieve good yields. From Table 2 (A) it is obvious that the farmer gained additional income of Rs.5475 ha^{-1} by raising redgram in 7:1 ratio in groundnut, where no adoption of advisory caused the loss of Rs.5475 ha^{-1} . Similarly, during 2008 Table 2 (B) the groundnut crop experienced excess rains during pod filling stage, hence, the crops suffered with excess rain resulting only 600 kg ha-^{1}. In the same situation the farmers who followed the advisory of raising redgram as intercrop received 400 kg ha^{-1} of groundnut yield in addition to 800 kg ha^{-1} of redgram yield. Hence, in both the situations adoption of technology (growing redgram as intercrop with groundnut in 7:1 ratio) during *Kharif*, the farmers benefited an additional income of Rs.3712 to Rs.5475 ha^{-1}.

During *kharif* 2009, the groundnut crop experienced severe dry spells during the crop period. Due to continuous dry period the crop was affected with severe sucking pest incidence and advisory was given to take up immediate spraying with Monocrotophos @1.6 ml/lt (or) dimethoate 2ml/ lt) for thrips in groundnut.

From table 3 (A) it is evident that the treatment of pest management i.e., spraying of monocrotophos @1.6 ml/lit (or) dimethoate 2 ml/lit to control thrips made the farmers in getting higher yield of 900 kg ha^{-1} compared to the farmer who have not followed the agro advisory. Therefore from the above economic analysis it is observed that the farmers who followed the agro advisory benefitted by getting an additional income of Rs.2004 ha^{-1}.

From table 3 (B) in 2008, the weather prevailed for paddy during panicle initiation to booting stage was very much conductive for BPH incidence, hence repeated agro advisory was given to follow the package (Alley farming, Alternate

Table 1. Ratio score (%) and H.K score (%) analysis for rainfall on yes (Y) and No (N) basis for *Kharif*, *Rabi* seasons and whole year during 2001-2010 at AAS unit, Tirupati.

S.No.	Crop season	Ratio score (%)			H.K score (%)		
		Kharif	Rabi	Year	Kharif	Rabi	Year
1	2001-2002	51	50	71	65	41	34
2	2002-2003	57	77	76	20	43	54
3	2003-2004	53	72	86	24	22	43
4	2004-2005	42	72	71	16	47	33
5	2005-2006	44	63	63	10	14	17
6	2006-2007	43	63	60	12	18	39
7	2007-2008	59	51	65	30	44	32
8	2008-2009	54	64	68	24	48	19
9	2009-2010	55	82	67	17	41	19
	Average	51	60.44	69.66	24.22	35.33	32.22

Table 2. Economic impact assessment on adoption / Non adoption of raising redgram as intercrop.

Sl.No.	Agro Advisory given	A. Case study-I Groundnut + Redgram (7:1) 2007		B. Case study-II Groundnut + Redgram (7:1) 2008	
		Non Adopted	Adopted	Non Adopted	Adopted
1	Cost of cultivations ha^{-1}	12,000/-	11,200/-	12,000	11,200
2	Cost of Adopting AAS (Rs./ha^{-1}) (Redgram seed cost + Spraying cost)	—-	1,125/-	—-	3,088
	Max. Yield obtained (kg/ha^{-1})				
	Groundnut	1100	900	600	400
	Redgram	——	700	—	800
3	Gross in come ha^{-1} Groundnut @ 15 / kg, Red gram13/kg	17,500	23,300	9,000	18,000
4	Net Income ha^{-1} obtained (Rs. ha^{-1})	17,500 – 12,000 = 5,500	23,300 – 11,200 + 1,125 = 10,975	-Ve	3,712
5	Additional income through AAB (Rs. ha^{-1})	—-	10,975 – 5,500 = 5,475	—	3,712

wetting and drying and spraying with monocrotophos @2.2 ml + DDVP 1ml/lit). Therefore the farmer who adopted as per weather based agro advisory achieved 3000 kg ha^{-1}, where the farmers who have not adopted agro advisory experienced a great loss of 2000 kg ha^{-1} due to crop loss with BPH incidence. Economic analysis of this case study revealed an additional income of Rs.13950 ha^{1} by following regular advisories based on the prevailing weather situation. Hence, timely advisory is much more important for economic point of view not only to save the crop from pests and diseases but also in getting additional benefit in existing situation.

CONCLUSIONS

It may be concluded that use of agro advisory for following appropriate technologies as well as timely pest management cause an additional benefit of Rs.2004 to 13950 ha^{-1}. Hence, following weather based advisory is economical even in existing situation as well as worst situation with existing accuracy of forecasts. But a systemic and

Table 3. Economic impact assessment on pest management operations.

Sl.No.	Agro Advisory given	A. Case study-3 (2009)		B. Case study-4 (2008)	
		Groundnut		Paddy	
		Non Adopted	Adopted	Non Adopted	Adopted
1	Average yield kg/ha $^{-1}$	740	900	1,000	3,000
2	Gross income ha^{-1} @ Rs 16/kg	11840	14400	7850	23,550
3	Expenditure on adaptation of AAS (Spraying with Monocrotophos @1.6 ml/lt (or) dimethoate 2ml/lt) for thrips in groundnut	—-	556		1,750
4	Net Income (Rs. ha^{-1})	11840	13844	—-	21,800
5	Additional income obtained (Rs. ha^{-1})	—-	2004	—	13,950

depth study is required for other crops and other situations not only to assess the benefit cost ratio under prevailing forecasted weather but also to create the awareness of usability and utility of the scientific agro advisory to the farming community. Similar findings were also reported by Patel *et.al* (1998), Ranbir Singh *et.al* (2005) and Ravindra Babu *et.al* (2007) and Sudhir et al., (2016).

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