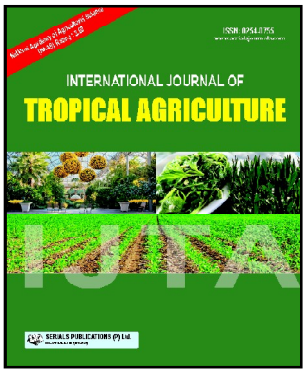

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Importance of Weather based Agromet Advisories for Farmers under Changing Climate Scenario

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Abstract: Weather is one of the most important factors determining success or failure of agricultural production. It effects on every phase of growth and development of plant. Any variability in the weather during the crop season, such as delay in the monsoon, excessive rains, flood, droughts, spells of too-high or too-low temperatures would affect the crop growth and finally the quality and quantity of the yield. Weather varies with space and time, hence, its forecast can help to minimize the farm losses through proper management of agricultural operations. The complete avoidance of all farm losses due to weather factor is not possible but it can be minimized to some extent by making adjustments through timely and accurate information of weather forecast. Weather forecast and weather based agromet advisories help in increasing the production and income of the farmers by suggesting them the suitable management practices according to the weather conditions. A study was, therefore, undertaken for analyzing the impact of weather based agromet advisory for different crops during *Kharif* 2014 and *Rabi* 2014-15 season. For assessing the impacts of weather based agromet advisory, users of weather based agromet advisories and non-users of agromet advisories were selected from different villages of NCR. Results showed that the farmers, who followed the agromet advisories, are able to reduce the input cost and increases in the net profit as compared to the farmers who does not followed the agromet advisories. This profit was due to the crop management done by the farmers according to weather based advisories. The losses in crop can be reduced by doing proper crop management in time by timely and accurate weather forecasts. Weather forecast also provides guidelines for selection of crops best suited to the anticipated climatic conditions. The objective of the weather forecasting is to advice the farmers on the actual and expected weather and its impact on day-to-day farming operations i. e. sowing, weeding, time of pesticides spray, irrigation scheduling, fertilizer application etc. and overall crop management. Weather forecast helps to increase agriculture production, increase efficiency in the use of water, reduce costs of inputs, labor and energy, reduce losses, risks, reduce pollution and improve quality of yield with judicious

use of agricultural chemicals.Thus, the application of agromet advisory bulletin, based on current and forecast weather is a useful tool for enhancing the production and income.

Key words: Weather forecast, Agromet advisories, crop management

INTRODUCTION

Weather forecast and weather based agromet advisories play essential role in agricultural production. It helps in increasing the benefit to the farmers. Net profit can be due to either reducing input cost of farm management or through increasing production by minimizing losses. Agriculture is exposed to various extreme events of weather which cause considerable damage to agricultural production as well as the economy of farmers.

Agriculture in India depends on the monsoon. Under such circumstances, the farmers are unaware of the future behavior of monsoon for making decisions in their day to day agricultural operations. Farming community needs to be advised in time by producing custom-tailored weather forecasts to initiate suitable measures to increase the production and to minirnize the impact of unfavorable weather on agriculture. Rathore et al (2001) discussed the weather forecasting scheme operational at National Centre for Medium Range Weather Forecast for issuing location specific weather forecast five days in advance. Damrath et al. (2001) reported that the statistical interpretation methods are used to increase the reliability of the precipitation forecast. The major objective of AAS is to help the farmers in capitalizing prevailing weather conditions in order to optimize the resource use and to minimize the loss due to harsh / aberrant weather conditions (Venkataraman, 2004). Agro met Advisories is a vital tool which provides the valuable information about all agricultural operations from land preparation sowing to harvest based on weather forecasting. In this, weather is a key element which controls the success or failure of agricultural crop productivity. The main aim of Agro met Advisories is to conserve the natural resources effectively and call for minimizing the weather hazards. Accurate and timely forecast of rainfall patterns and other weather variables continued to be a major challenge for scientific community. The emerging ability to provide timely, skillful weather forecasts offers the potential to reduce human vulnerability to weather vagaries (Hansen, 2002). Therefore, any forecast on weather would have tremendous benefits in terms of ex-ante management of the negative impacts of vagaries of weather. Vashisth et al 2013 repoted that the weather based agromet advisory reduced the input cost and enhanced the net profit of farmers. Weather forecast and weather based agromet advisories help in increasing the benefit to the farmers by suggesting them the suitable management practices according to the weather conditions. The benefit by the farmers using agromet advisories and weather forecast for making farmlevel decisions during *Kharif* 2014 and *Rabi* 2014-15 have been discussed in this paper.

MATERIALS AND METHODS

Weather forecast on rainfall, maximum and minimum temperature, wind speed, wind direction, cloud cover, maximum and minimum humidity was received on every Tuesday and Friday from IMD, New Delhi. Once the forecast was received, the expert's opinion from different disciplines was obtained and based on their advice, the agromet advisories were prepared on every Tuesday and Friday in Hindi as well as in English language. These advisories were sent to IMD for preparation of national bulletin and uploaded on the IMD web sites *www.imdagrimet.gov.in* and farmer portal (*http://farmer.gov.in/*) in both Hindi and English. The bulletin is passed on to the farmers

through telephone / E-mail /SMS. Agro-met advisory bulletin is send by E-mail to local Hindi newspaper for publication and uploaded at IARI website *www.iari.res.in* in both Hindi and English. SMS were sent to the farmers through m Kisan portal (*http://mkisan.gov.in/*). The bulletins were also sent by E-mail to ATIC, KVK Shikohpur, KVK Ujawa, IKSL, NGO, ATMA, State Agriculture, e-choupal, Krishi Darsan, All India Radio, DD Kisan channel and Hindi magazine for wider dissimination of end users.

The weather forecast based agromet advisory bulletin contains, Summary of previous week's weather, Value added medium range weather forecast information (for the next 5 days), weather based crop management advisories consisting of weather based standard agronomic management practices under normal weather conditions, Suitably modified weather based agronomic management advisories under forecast of transient weather conditions, Any other crop related information beneficial to the farmers as and when required. The agromet advisory bulletin contains crop management which is based on weather forecast and giving warning to farmers much in advance regarding rainfall variation, its amount and other weather variables including pest/ disease problems etc. so that farmers can decide about crop management, application of nutrients, strategy to overcome other problems.

रेश में दवा का छिड़काव न करें किसान : वैज्ञानिक

रखें ध्यान

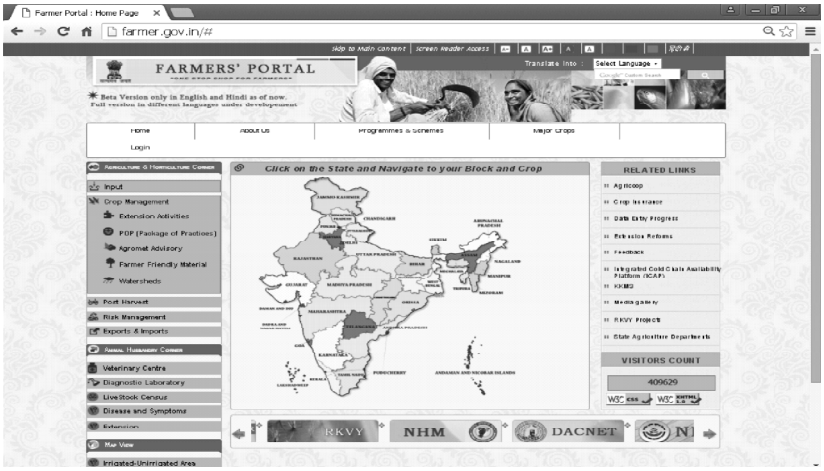
धान के पौधों का रंग पीला हो तो लें वैज्ञानिकों की सलाह

जानकारी

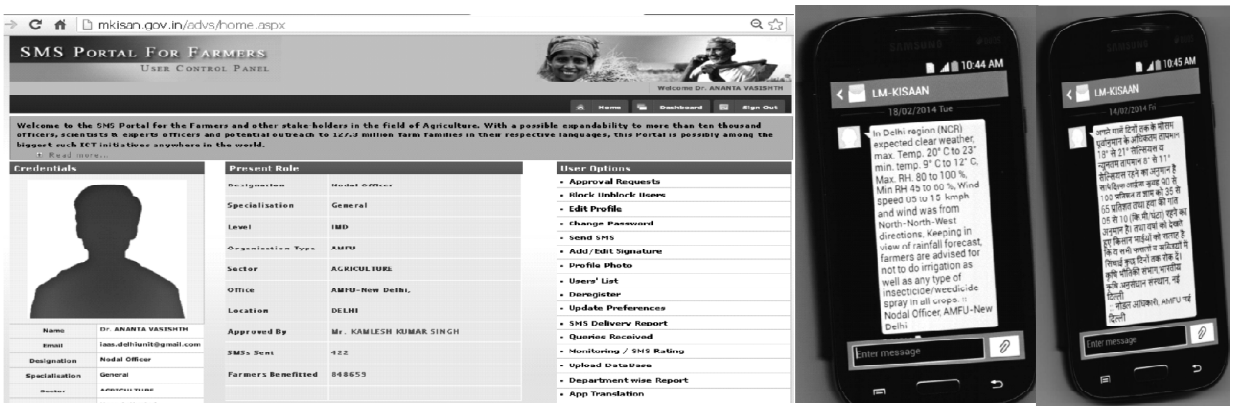
कम मानसून की संभावना को लेकर पूसा कृषि वैज्ञानिकों की किसानों को स

खेत में ही सचित करें बारिश का पा

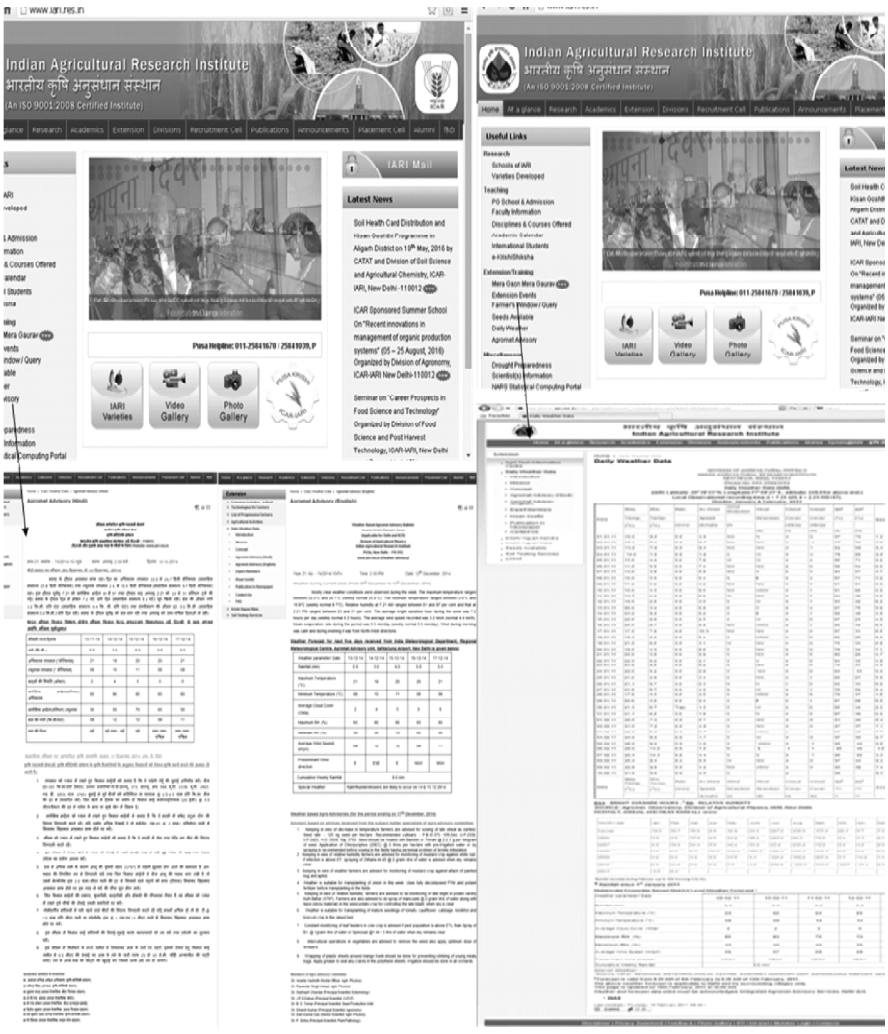
Agromet advisory in Hindi News paper



Agromet advisory at farmer's portal (*http://farmer.gov.in/*)



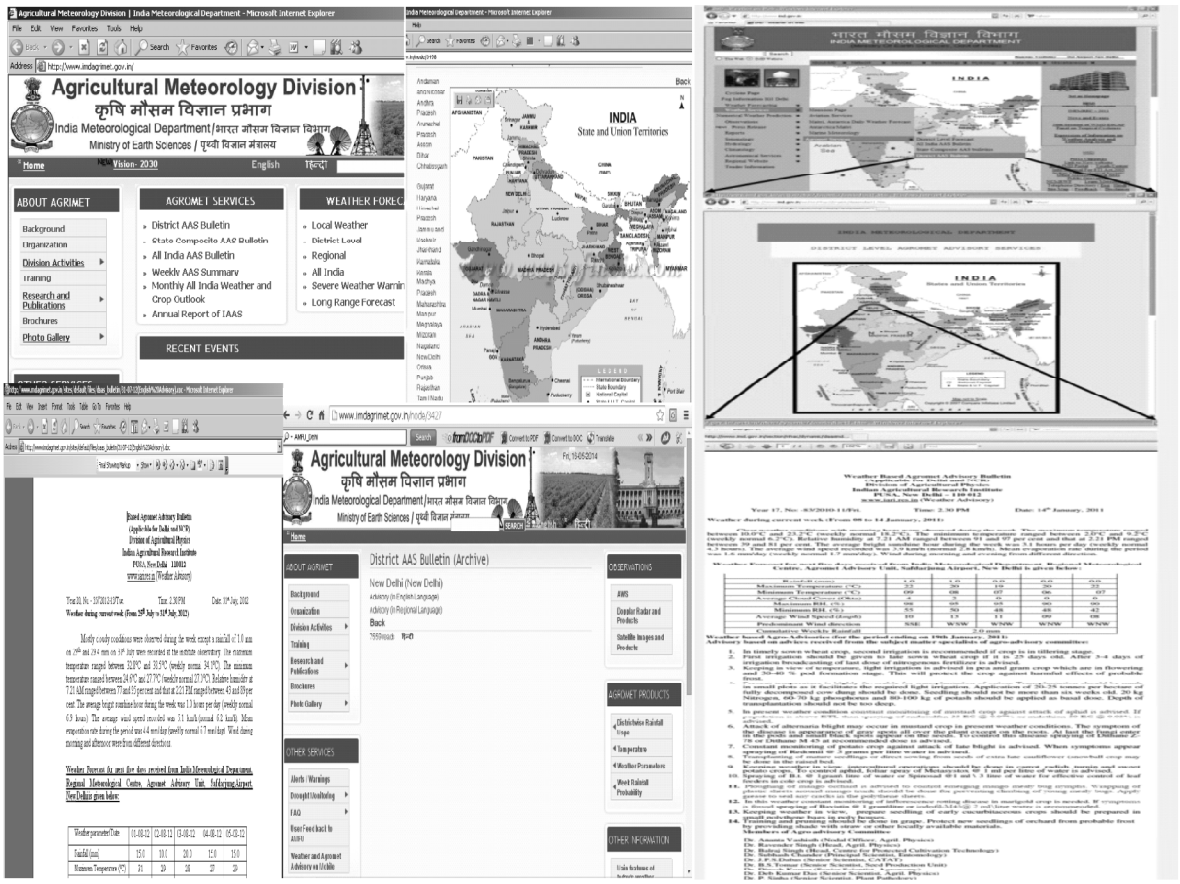
Dissemination of Agromet advisory to the farmers through SMS



Agromet advisory (English & Hindi) and daily weather data alongwith medium range weather forecast at IARI web page

(http://www.iari.res.in/index.php?option=com_content&view=article&id=407&Itemid=1054)
(http://www.iari.res.in/index.php?option=com_content&view=article&id=406&Itemid=1053)
(http://www.iari.res.in/index.php?option=com_content&view=article&id=402&Itemid=1033)

For assessing the impacts of agromet advisory services, users of agromet advisory services (AAS) and non-users of agromet advisory services (non AAS) were selected for rice during *kharif*, 2014 and wheat and carrot during *rabi* 2014-15. The study area lays around different villages 100 km range from IARI, New Delhi. Expenditure incurred by the farmers from land preparation till the harvest at every stage has been worked out and crop growth and yields were monitored regularly in the farmer's field belonging to both the groups.



Agromet advisory at IMD web page page (*www.imd.gov.in, www.imdagrimet.gov.in*)

RESULTS AND DISCUSSION

The benefit obtained by farmers following the weather based agro met advisories has been evaluated for Rice in *Kharif* 2014 season and for wheat and carrot in *Rabi* 2014-15 seasons. Total cost of cultivation, crop yield and net returns for Rice, wheat and carrot grown by the AAS and non AAS farmers during *Kharif* 2014 and *Rabi* 2014-15 seasons are presented in Table 1, 2 and 3. The total cost of cultivation was found to be lower in the case of AAS farmers who have effectively adopted the weather based agomet advisory compared to non AAS farmers. Results showed that the farmers who followed the agromet advisories are able to reduce the input cost upto 3.6% in rice, 3.4% in wheat, and 6.3% in carrot and increases the net profit by 0.6, 4.5 and 8.7% in rice (Table 1), wheat (Table 2) and carrot (Table 3) respectively as compared to the non AAS farmers, who did not follow the weather based information. AAS farmers were able to reduce the input cost up to Rs. 961/acre in rice, Rs. 470/acre in wheat, and 2401/acre in carrot. Increases in the net

profit were Rs. 1207/acre in rice, Rs. 1025/acre in wheat and Rs 4847/ acre in carrot compared to the non AAS farmers. More net returns of AAS farmers over non-AAS farmers can be due to low input cost, following weather based management practices and timely management of pests and diseases. This profit was due to the crop management done by the farmers such as optimum time for land preparation and sowing, adoption of recommended seed rate and suitable varieties, proper time for weeding, proper time of harvesting, amount and time of irrigation and pesticides according to agromet advisories.

Table 1
Economic impact of AAS on Rice (Rs./acre) during *Kharif* 2014

Farmer using	*Land Preparation/ Sowing*	*Seed*	*Fertilizers & Manure*	*Pesticides/ Insecticide/ Herbicide*	*Irrigation*	*Harvesting/ Threshing*	*Input Benefit*	*Yield (q/Acre)*	*Rs.*	*Net Benefit*
AAS	6939	495.8	5382	5272	3280	4160	25529	19.74	38475	
Non- AAS	6931	501.2	5358.8	5559	4090	4050	26490	19.93	38229	
Benefit	-8	5.4	44.4	287	810	-110	961.2	0.19	246	1207.1

Table 2
Economic impact of AAS on wheat (Rs./acre) during *Rabi* 2014-15

Farmer using	*Land Preparation/ Sowing*	*Seed*	*Fertilizers & Manure*	*Weeding*	*Pesticides/ Insecticide/ Herbicide*	*Irrigation*	*Harvesting/ Threshing*	*Input Benefit*	*Yield (q/Acre)*	*Rs.*	*Net Benefit*
AAS	2243	1060	2499	2011	921	1606	3195	13534	18.04	12925.4	
Not AAS	2299	1101	2689	1763	961	1645	3545	14004	18.02	12370.6	
Benefit	56	41	190	-248	40	39	400	470	0.02	554.8	1024.8

Table 3
Economic impact of AAS on carrot (Rs./acre) during *Rabi* 2014-15

Farmer using	*Land Preparation/ Sowing*	*Seed*	*Fertilizers & Manure*	*Weeding/ thinning*	*Pesticides/ Insecticide/ Herbicide*	*Irrigation*	*Harvesting/ Threshing*	*Input Benefit*	*Yield (q/ Acre)*	*Rs.*	*Net Benefit*
AAS	3013	2287	2933	930	739	3087	16565	29954	80.4	30696	
Not AAS	3091	2500	3548	1248	963	3257	17348	31955	86.9	28249	
Benefit	78	213	615	318	224	170	783	2401	-6.91	2446	4847

Weather forecast and weather based agromet advisories helps in increasing the benefit to the farmers by doing suitable management practices according to the weather conditions. The farmers feel it to be useful since they receive advices on appropriate field operations and management practices depending on suitability of weather conditions.

Even here also the yield and other returns were lower in case of non-AAS farmers compared to the

AAS farmers. This may be due to the advisories issued for the AAS units contain advises on the basis of past weather, weather forecast and real time weather condtions for crop production strategies like ploughing, sowing, pest and disease management, harvesting, threshing and post harvest procedures to derive maximum benefit of the benevolent weather and to mitigate the impact of malevolent weather for enhanced productivity of all crops. Bi-weekly forecast given to the AAS farmers helped to avoid the adverse effects of weather events like heavy rain, dry spell, high wind speed which influence the growth of the crops. The benefit to the Farmers by weather based agromet advisories during *Rabi* 2014-15are given in Table 4. Besides economic benefit there is saving in natural resources such as irrigation water, pecticides, seed, fertilizers, fuel etc.

Table 4
Benefit to the Farmers by weather based agromet advisories during *Rabi* 2014-15

Weather and other information	*Agricultural practices based on Agro-advisory*	*Profit/loss*
	During *Rabi* 2014-15	
Based on rainfall forecast farmers were advised for not to do irrigation and all type of sprays in all vegetables and crops on 20th January-2015.	Advised in 20.02.2015 bulletin for not to do irrigation and all type of sprays in all vegetables and crops.	Saved Rs.1600/ acre.
Based on rainfall forecast farmers were advised for not to do irrigation and all type of sprays in all vegetables and crops on 27th February-2015.	Advised in 27.01.2015 bulletin for not to do irrigation and all type of sprays in all vegetables and rops.	Lodging in wheat due to heavy rainfall with high wind velocity 10-15 % crop was damaged. In Vegetables and nurseries crops were rotted and died the new born plants it cause heavy loss to vegetable growers.
Based on rainfall forecast farmers were advised for not to do irrigation and all type of sprays in all vegetables and crops on 8th March-2015.	Advised in 05.03.2015 bulletin for not to do irrigation and all type of sprays in all vegetables and crops.	Farmers Saved one irrigation in wheat and vegetables so they saved around Rs. 900/acre

Thus the application of agromet advisory bulletin based on current and weather forecast is useful tool for enhancing the production and income by reducing the farm input cost. Similar observations were also reported by Vashisth *et al.* (2013), Singh *et al.* (2004) and Venkataraman (2004). According to them the need for Agromet advisories and input requirements for Agromet advice on field operations, crop prospects and avoidance of pest and disease under adverse environment condition is essential. The economic benefit of the advisories for different Agromet field units that ranged between Rs. 330/ and 3750/- and 1410 to 1885/- per hectare for maize, wheat and rice crop, respectively (Rana *et al.,* 2005). Similarly, Ravindrababu *et al.,* 2007, reported that the forecasts were found to be encouraging and of benefit to the AAS farmers compared to non AAS farmers sampled.

CONCLUSION

The above points concluded that benefit depends on efficient management practices based on the AAS bulletin which contains the information mainly on weather parameters and not depend on high input application. This helped the day-to-day agricultural operation so AAS farmers got higher benefit than

non AAS farmers. This article clearly shows that enhance livelihood of rural farmers who were adopting agro advisory services than the not aware of Agromet advisory services. Application of agromet advisory bulletin by web page and SMS, based on current and forecasted weather is a useful tool for enhancing the production and income. Farmers received weather forecast based agro-advisories, including optimum use of inputs for different farm operations. Due to judicious and timely utilization of inputs, production cost for cultivating the crop reduced. The increased yield level and reduced cost of cultivation led to increased net returns.

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