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Socio-economic impact of Agromet advisory services to farmers in Koppal district of Karnataka

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Abstract

The farmer's survey was conducted during *Kharif* 2020-21 to assess the socio-economic impact of Agromet advisory services provided under Gramin Krishi Mausam Seva (GKMS) scheme, an operational scheme jointly implementing by IMD and ICAR in collaboration with other stakeholders like SAUs, State Agriculture Department etc. The survey was conducted with randomly selected 25 farmers distributed across different villages of Koppal district of Karnataka state, where one of the District Agrometeorological Units (DAMU) under GKMS has been established in the premises of Krishi Vigyan Kendra to look after data collection, preparation of bulletin and timely dissemination of the information to the farmers in the district. The questionnaire related to climate anomaly, mode and time of dissemination etc., was prepared and collected information. The analysis shows that, agro advisory messages received through WhatsApp group was most popular and easily accessible among all the modes of dissemination. About 68 percent of farmers could get information regarding weather forecast and different agricultural activities through WhatsApp. In addition, more than 75 percent of the farmers were adopted weather based different agricultural activity like., field operations, crop and variety selection, irrigation management, pest and disease management and harvest and post-harvest measures on a real basis. Further, the study revealed that, one of the farmer have adopted the Agromet advisories in their day to day operation have realized that 12.85 percent higher grain yield and net profit of Rs.77,325 ha⁻¹ as compared to non-AAS farmer of neighbouring plot. This farmers survey based study reveals that-weather forecast and agro advisory services (AAS) were formed to be helpful to the farmers in managing climate risks effectively for sustainable and profitable agricultural production.

Keywords: AAS, DAMU, weather forecast, mass media, impact

Introduction

Weather is one of the important factors which affect crop growth and production. Among different weather parameters, rainfall and temperature affect crop growth and production significantly (Fisher *et al.*, 2017). Any variability in the rainfall during the crop season, such as delay in onset of monsoon, excessive rains and prolonged dry-spells would affect the crop growth and finally the quality and quantity of the produce (Prasanna, 2014) ^[9]. Adoption of real time contingencies in crop management based on weather forecasts can minimize crop losses (Rathore and Parvinder, 2008) ^[6]. Weather forecast is normally issued at three levels *viz.*, short range, medium range and long range.

The short and medium range weather forecasts help to advice the farmers on the actual and expected weather to make decision on day to day agricultural activities such as sowing, weeding operation, time of insecticides spray, scheduling of irrigation and fertilizer application *etc.* and overall crop management. Long range weather forecasts provide guidelines for selection of crops best suited to the anticipated climatic conditions. Weather forecast and weather based agromet advisories helps to increase agriculture production, reduce losses, risks, reduce costs of inputs, improve quality of yield, increase efficiency in the use of water, labor and energy and reduce pollution with balanced use of agricultural chemicals. The emerging capacity to provide timely, skillful weather forecasts offers the potential to reduce vulnerability to vagaries of weather (Hansen, 2002) ^[11].

With the view of reducing crop losses due to variations in weather, India Meteorological Department (IMD) and Indian Council of Agriculture Research (ICAR) in collaboration with different stakeholders are implementing Gramin Krishi Mausam Seva (GKMS) scheme at block level in the country, wherein medium range weather forecast based crop and location specific agromet advisory is provided at District and block level on every Tuesday and Friday to assist farmers in taking better crop/livestock management decisions. Currently, 700 districts

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and 3155 blocks have been covered under GKMS scheme. About, 43.7 Million farmers are receiving SMS advisory on their mobile phones through mKisan portal (Anon., 2020) [2]. IMD in collaboration with ICAR has established 130 AMFUs co-located with SAUs, institutes of ICAR, Indian Institute of Technology (IIT) etc., and 196 District Agromet Units (DAMUs) in the premises of Krishi Vigyan Kendras (KVKs) to facilitate data collection, preparation and timely dissemination of advisories to farmers. Each Unit is equipped with two manpower (Subject Matter Specialist and Agromet Observer), who are responsible to keep records of diurnal variations in weather; stage and state of all the crops as well as crop-weather relationship in their respective district and blocks.

The GKMS scheme has been successful in providing crop/livestock /fishery/poultry-specific advisories to farmers through different print/visual/radio/IT-based media including short message service (SMS), whats-App messages, Meghdoot app, Interactive Voice Response Service (IVRS), kisan call centres, DD Kisan Channel, Extension system of State Agriculture Department facilitating for appropriate field level actions. Additionally, private companies are also involved under Public Private Partnership (PPP) mode for dissemination (Anon., 2020) [2]. Further, various activities being carried under GKMS at different DAMUs to improve bulletin quality based on crop/location specific data and reaching services timely to the farmers through recent tools/technology.

Socio-economic impact analysis of any operational project/scheme helps policy makers to assess its usefulness and impact and take further decision to upscale knowledge.

One of the DAMUs has been recently established at ICAR-Krishi Vigyan Kendra Gangavathi (Koppal). Further, Agro-Automatic Weather Station (AWS) including soil temperature and soil moisture sensors have been installed. Various activities have been carried out pertaining to improve quality of bulletin based on farmer's feedback and crop/location specific data.

The present study was undertaken in Koppal District of Karnataka during *Kharif* 2020-21 to assess usefulness and impact of agromet advisory services provided under GKMS scheme to improve it further and to help policy makers to take decision regarding implementing the scheme at village level based on the feedback provided by the farmers in the district.

Materials and Methods

In Koppal district, around 16 percent irrigated area (141 hectare) and more than 75 percent area under rainfed condition (272 ha) (Anon., 2020) [2]. Climatic risks generally observed in the district during 2012 and 2016.

Rainfed farming is a type of agriculture in which crops are

almost entirely irrigated by rainfall, which makes it extremely dependent on climatic conditions (Haddad *et al.*, 2020) [10]. Under this situation, weather forecast and weather based agro advisory helpful for day to today activities for taking agricultural operation especially irrigation application, fertilizer application and crop management aspects.

In Koppal district, growing *kharif* crops mainly:- sunflower, paddy, sorghum, bajra, groundnut, maize and cotton. *Rabi* crops are, sunflower, sorghum, maize and bengal gram. Crop yields are most vulnerable to adverse weather conditions, especially extreme temperatures and excess or deficit precipitation, during critical developmental stages such as seedling and reproductive development stages (Motha, 2011).

A survey was conducted during *Kharif* 2020-21 at ICAR-Krishi Vigyan Kendra Gangavathi of Koppal district under District Agro-meteorological Units (DAMU) project established at University of Agricultural Sciences, Raichur of Karnataka regarding weather forecast and agro advisory bulletins communicated to the farmers regularly on real time basis. The weather forecast including rainfall, maximum temperature, minimum temperature, wind speed, wind direction, maximum humidity and minimum humidity and cloud cover conditions are received from IMD on every Tuesday and Friday with the validity of next five days. Accordingly, a value added crop/location specific agromet advisories based on the local information regarding weather (including alerts and warnings on extreme weather events), soil, crop as well as pests and diseases and the weather-forecast is provided at District and four block level (Gangavathi, Koppal, Kushtagi and Yelburga) on every Tuesday and Friday to assist farmers in taking better crop/livestock management decisions. The agro advisories are disseminated timely to the farmers through different mass media. Weather based agricultural activities advised to farmers regarding sowing, seed treatment, proper use of irrigation, fertilizer application, time of harvest and measures to avoid/minimize losses from pest and disease incidence were informed regularly.

The present survey was done based on a feedback questionnaire from randomly selected 25 farmers of different villages of Koppal district during *Kharif* 2020-21. Feedback questionnaire regarding Climatic anomalies of different weather parameters which are largely influencing crop growth/production, different source of media, best time for dissemination, and satisfaction by the weather forecast and agro advisory service, features of AAS and economic benefit by using weather forecast and agro advisory bulletin was prepared and used for data collection.

Results and Discussion

Table 1: Source of weather forecast and most suited media for agro-advisory

Mass media	Weather forecast (%)	Field operations (%)	Crop and variety selection (%)	Disease and pest management (%)	Harvest and post-harvest measures (%)
Radio	0(0)	0(0)	0(0)	0(0)	0(0)
Television	0(0)	0(0)	0(0)	0(0)	0(0)
Newspaper	8(2)	0(0)	4(1)	4(1)	8(2)
SMS (Text message)	8(2)	32(8)	16(4)	4(1)	4(1)
Whats-app group	68(17)	60(15)	64(16)	80(20)	80(20)
Website	0(0)	0(0)	0(0)	0(0)	0(0)
Phone call	16(4)	8(2)	16(4)	8(2)	8(2)
Not aware	0(0)	0(0)	0(0)	4(1)	0(0)

Figures in the parenthesis indicate number of respondents, Sample size n-25

Source of weather forecast and most suited media for agro-advisory

The weather forecast and agro advisories disseminated to farmers through different mass media like radio, television, newspaper, SMS (short message service), whats-app group, website and phone call contact along with the farmers response is given in Table 1. Among the different mass media, nearly 68 percent of the farmers accessed the weather

forecast through whatsapp group and different agricultural activities like field operation (60%), crop and variety selection (64%), disease and pest management (80%) and harvest and post-harvest measures (80%) through whatsapp group. The rest of the farmers were accessed by phone call, SMS and news-paper. The results are in line with the findings of (Ramachandrapa *et al.*, 2018) [3] and (Dupdal *et al.*, 2020) [4]

Table 2: Best time for dissemination of weather forecast and agro-advisories

Time	No. of farmer's expressed	Percent of farmers expressed
Early morning (between 5 and 7 AM)	0	0
Morning (between 7 and 9 AM)	1	4
Noon (between 12 and 2 PM)	0	0
Afternoon (between 3 and 5 PM)	3	12
Evening (between 6 and 7 PM)	16	64
Night (between 8 and 10 PM)	5	20

Sample size n-25

Best time for dissemination of weather forecast and agro-advisories

The survey regarding best time for dissemination of weather forecast and agro-advisory with six time window along with farmer's response is presented in Table 2. The survey revealed that, among the different selected time window for dissemination, about 64 percent of the farmers were expressed evening time (between 6 and 7 pm) was more beneficial and followed by night (between 8 and 10 pm) and afternoon (between 3 and 5 pm).

Results pertaining to regularity of bi-weekly forecast and agro advisory bulletin-based on feedback from the different farmers is depicted in Fig.1. The figure clearly shows that, majority of the farmers were expressed weather forecast and agro advisory bulletin received regularly (80%), followed by somewhat regular (12%) and irregular (8%)

Table 3: Features of AAS bulletins

	Timely availability	Forecast reliability	Expected benefits	Overall usefulness
Yes	80(20)	68(17)	80(20)	88(22)
No	8(2)	16(4)	12(3)	8(2)
Not aware	12(3)	16(4)	8(2)	4(1)

Figures in the parenthesis indicate number of respondents, Sample size n-25

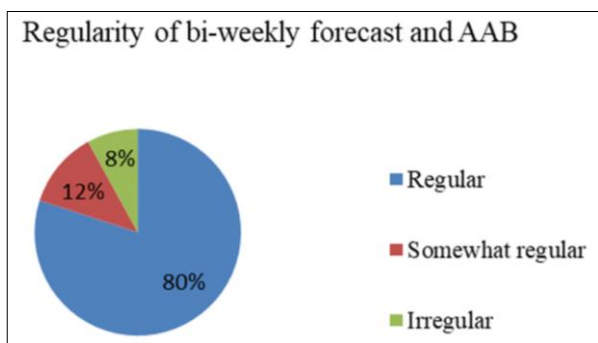


Fig 1: Regularity of weather forecast and agro advisory bulletin

Features of AAS Bulletin

The survey revealed that, majority (80%) of the farmers were expressed timely availability of AAS, forecast reliability (68%), expected benefits (80%) and overall usefulness of AAS (88%) by the farmers of different villages of Koppal district. The similar results are in line with the findings of (Ramachandrapa *et al.*, 2018) [3]

Table 4: Economic impact of weather forecast on different agricultural activities

Impact	Field operations	Crop and variety selection	Irrigation management	Fertilizer management	Disease and pest management	Harvest and post-harvest measures
Benefitted	80(20)	76(19)	88(22)	80(20)	84(21)	84(21)
Not benefitted	12(3)	8(2)	8(2)	12(3)	8(2)	4(1)
not aware	8(2)	16(4)	4(1)	8(2)	8(2)	12(3)

Figures in the parenthesis indicate number of respondents, Sample size n-25

The survey regarding economic impact of weather forecast on different agricultural activities (Table 4) revealed that, majority (88%) of the farmers perceived that AAS was essential and it helps to manage irrigation in agricultural production followed by managing pest and diseases (84%) during cropping season. More than 80 percent of the farmers opined that real time agromet advisory service was helpful in field operation since dissemination of AAS services prior to cropping season with useful weather information particularly

information on timely rainfall, temperature and humidity helps farmers to plan their farm activities particularly land preparation and crop and variety selection timely and accurately. Results obtained in the present study are also close confirmative with the findings of (Ramachandrapa, *et al.*, 2018) [3] weather forecast and weather based agromet advisories help in increasing the economic benefit to the farmers with appropriate crop management practices.

Table 5: Economic benefit due to use of agro advisory service bulletin for management of farm activity

Sl. no	Name of the farmers	Mobile No.	Village	Block	Benefit (Rs.)
1	Manjunath Pagadadinni	8618355774	Chikkadankanal	Gangavathi	11000
2	Ishwar Rao	9844774491	Sriramanagr	Gangavathi	2500
3	K. Raghav Reddy	9482766653	Sriramanagr	Gangavathi	7500
4	Shagnushi Rao	7892386908	Sriramanagr	Gangavathi	6200
5	Channappa	9535952797	Gudlanoor	Koppal	5000
6	Bheemappa Bavikatti	7353187030	Gudlanoor	Koppal	7000
7	Mahantesh Angadi	9972705982	Gudlanoor	Koppal	4000
8	Gavisiddangouda Goudar	9980578527	Hanamanatti	Koppal	8500
9	Pampapathi Kumar	9448536192	Koppal	Koppal	7500
10	Sharanappa K	9663058729	Pachinal	Kushatgi	12000
11	Chandrashakar patil	7760491833	Maddalgundi	Kushtagi	9000
12	Nirupadeppa S	9535047737	Menadal	Kushtagi	4000
13	Sharanappa G	9148771491	Menadal	Kushtagi	9500
14	Shankargouda Dodamani	6361697690	Kudarimati	Yelburga	1000
15	Rudrappa Huchnur	9916408243	Hunsihal	Yelburga	8000

Field survey data-2019-20

Survey pertaining to economic benefit due to the use of agro advisory service bulletin for management of farm activity presented in Table 5, shows that farmers chosen from different villages of Koppal district expressed that, they were

economically benefitted from the application of agromet advisory bulletin, based on current and forecasted weather for enhanced profit.

Table 6: Cost and return structure of paddy per hectare with and without agro-met advisory service in farmer field of Koppal district

Variables	Without agromet advisory services	With agromet advisory service
Yield (q/ha)	70.0	79.0
Grain Price (Rs/q)	1800	1800
GR (Rs/ha)	1,26,000	1,42,200
COC (Rs/ha)	71,250	64,875
NR (Rs/ha)	54,750	77,325
B:C	1.76	2.19
Percent increase yield	-	12.85

Note: One farmer from adopted AAS and non-adopted AAS of neighbouring plot

Grain yield, gross returns, net returns and benefit cost ratio for paddy crop grown by the AAS and non-AAS farmers during *Kharif* season are presented in Table 6. The higher grain yield (79.0 q ha⁻¹), gross returns (Rs. 1,42,200 ha⁻¹), net returns (Rs. 77,325 ha⁻¹), benefit cost ratio (2.19) and 12.85 percent higher yield in case of AAS farmer whereas lower grain yield (70.0 q ha⁻¹), gross returns (Rs. 1,26,000 ha⁻¹), net returns (Rs. 54,750 ha⁻¹) and benefit cost ratio (1.76) observed in non-AAS farmer of neighbouring plot. The higher productivity and net profit which might be due to followed recommended practices given by the experts in different aspect regularly. Similarly, Rajegowda *et al.* (2008) reported that the farmers who have adopted the agromet advisories have realized an average additional benefit of 31.4, 24.7, 16.2 and 20.6 percent in finger-millet, redgram, field bean and tomato, respectively, in eastern dry zone of Karnataka. Similar results were also observed by Kushwha *et al.*, (2010). The cost of cultivation was lower in case of AAS farmer as compared to non-AAS farmer. This might be due to managing the crop properly and regularly followed weather forecast and agro advisory service given by the experts in different management practices and which ultimately reduced cost of cultivation

Conclusion

Based on the analysis it has been found that, the majority of the farmers were expressed positive opinion on the weather forecast and agro advisory service provided under GKMS for enhancing the net profit and by reducing the cost of cultivation in Koppal region of Karnataka state. Further, effort

is being made in the scheme to provide information regarding weather forecast and agromet advisories is through recent ICT technologies.

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