P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating: 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 7; Issue 2; Feb 2024; Page No. 498-502

Received: 10-11-2023
Accepted: 13-12-2023

Indexed Journal
Peer Reviewed Journal

Perception, adoption and utility of weather based agro advisory services by farmers of Mandi district of Himachal Pradesh

[1]Shivani Thakur, [2]Pankaj Sood, [3]Shakuntla Rahi, [4]DS Yadav, [5]LK Sharma, [6]Neha Chauhan, [7]Brij Vanita, [8]Kalpna Arya and [9]Kavita Sharma

[1]Subject Matter Specialist, Department of Agrometeorology, KVK Mandi at Sundernagar, Mandi, Himachal Pradesh, India

[2-9]KVK Mandi at Sundernagar, Mandi, Himachal Pradesh, India

DOI: https://doi.org/10.33545/26180723.2024.v7.i2g.371

Corresponding Author: Shivani Thakur

Abstract

The study was conducted at Mandi district of Himachal Pradesh by District Agromet Unit (DAMU) to know the farmer's perception and adoption about the weather forecast and weather based agro advisory services provided to them by DAMU unit. Total 100 farmers from 10 blocks of district were randomly selected in which two groups of farmers were there, one who follows the agro advisory advisories (50 farmers), regularly for their farm operations (AAS Farmers), and another group (50 farmers) that doesn't follows the agro advisory advisories (Non -AAS Farmers). The data was collected by using questionnaires. The results of study revealed that 52 percent of old aged registered farmers have integrated and adopted the weather based advisory services. Socio-economic survey showed that most of the farmers who have adopted agro advisories were small and marginal farmers, having farming experience of more than 25 years. About perception of agro advisories services as it provided comprehensive information on agriculture and allied sectors majority (76%) selected farmers reported their satisfaction with present system of biweekly agromet advisory bulletins. 71.80 percent of farmers preferred weather forecast before sowing/transplanting, 69.20 percent for planning harvesting and threshing operations, 59.20 percent for managing their insect and pest, 45.20 percent for timely and optimum use of fertilizer. A total of 71 percent farmers were highly satisfied, 18 percent were satisfied, 8.20 percent were partially satisfied and 2 percent were not satisfied with the advisory. The study indicated that the farmers focused more on the weather forecast related to rainfall followed by temperature.

Keywords: Weather forecast, agromet advisory services (AAS), district agromet unit, adoption, perception

Introduction

Indian agriculture is highly dependent on weather and climatic conditions. Every year a substantial amount of crop loss is because of aberrant weather. Through timely and accurate weather forecast this loss can be minimized by making adjustments with coming weather. Forecast based on weather are useful for making management decisions like crop choice, crop variety, sowing/harvesting and farm inputs management such as irrigation, fertilizers, pesticides and herbicide, *etc*. Hence, effective weather based advisory services will greatly help farmers to take advantage of benevolent weather and mitigate the impact of malevolent weather conditions. An agriculturally relevant forecast is not only useful for efficient management of farm operations but also leads to true impact assessment (Venkataraman, 2004) [17]. In India weather services for the farmers was started by India Meteorological Department (IMD) in the 1945 (Singh *et al.*, 2020) [16]. At present these advisory bulletins or weather services are divided into three levels such as National Agromet Advisory Bulletin, State Agromet Advisory Bulletin and District Agromet Advisory Bulletin. DAMU (District Agromet Unit) is a joint effort of IMD and ICAR with multi organizational collaboration to implement various components (Arpithaa *et al.*, 2022) [1] District Agro-Met Units (DAMU) was implemented in 4 districts of Himachal Pradesh in Krishi Vigyan Kendras. DAMU for Mandi district is established during 2020 at Krishi Vigyan Kendra, Mandi. The unit has been serving the farmers of the district through issuing the agromet advisory bulletin at district and block level. The major objective of the programme is to advise timely and need-based crop management practices. Weather forecast on rainfall, maximum and minimum temperature, wind speed, wind direction, cloud cover, and relative humidity are being received on every Tuesday and Friday from IMD, and value addition is done by regional RMC Shimla. Once the forecast is received, the experts' opinion from different disciplines is obtained. Based on the advice, the agro advisories are being prepared on every Tuesday and Friday in Hindi as well as in English at district and block level. These advisories are sent to IMD for preparation of national bulletins and are uploaded on the IMD website in both languages. Bulletins are regularly communicated to the farmers on real time basis through WhatsApp groups and other media. These bulletins are also circulated among ATAMA, District Agriculture office, Panchyat Pradhans etc. The bullietins have a weather forecast for the next five days along with summary of previous weeks' weather, crop management (agriculture and horticulture), which is based on weather forecast and giving warning to the farmers well in advance, regarding rainfall

variation, its amount and other weather variables including pest/disease problems. Thus, farmers can decide on crop management options, application of nutrients and strategies to overcome other problems. It also contains advisories related to animal husbandry, poultry, fisheries, bee keeping etc. From a farmer's view, the weather forecast is effective if it is capable of influencing their decisions on key farm management operations (Everingham *et al.*, 2002 [3], Gadgil *et al.*, 2002 [4]). Thus, it is essential to relate the advisories with the requirements of farmers (Hansen, 2002) [6], understand their needs and give the area specific forecast (Hammer *et al*, 2001) [5]. This ultimately helps in increasing the reliability of the forecast and in better adoption of the weather-based advisory (Nicholls, 2000) [10]. The perception, adoption and usefulness of agromet advisory bulletin and weather forecast for making farm-level decisions by farmers from different blocks have been discussed in this paper.

Materials and Methods

The present study was conducted in Mandi district of Himachal Pradesh By District Agro-Met Unit (DAMU) KVK, Mandi. Mandi is located in 31°72'N latitude and 76°92'E longitude. The climate of the district is mostly sub-tropical in lower reaches and moist temperate in upper reaches. Precipitation is perceived both in rainy and winter season. Minimum temperature goes down below 1 °C in higher reaches during winter and Maximum temperature exceeds even 40° C in low reaches during summer season. Average annual rain fall is about 1200 mm. The elevation of the district ranges from 700 meters to 4000 meters above mean sea level. District Agro-Met Unit (DAMU) KVK, Mandi, is catering AAS at district and block level for Mandi by preparing and disseminating AAS bulletins to the farmers. The unit has been conducting capacity building programmes such as farmer awareness programmes, group discussions, farmer interactions, field visits, and activities for creating awareness on weather based agro advisories. A structured questionnaire was used to collect data on Socio-economic characteristics of farmers and perception on weather based agro advisories provided to them by DAMU unit, Mandi. The questionnaire was developed in Hindi language and questions were small and simple so that the respondents can clearly understand the questions and give appropriate responses. A random sample of 100 farmers were selected which includes 10 farmers each from 10 blocks namely Balh, Chauntra, Dharampur, Drang, Gohar, Gopalpur, Karsog, Sadar, Seraj, and Sundernagar. The descriptive statistics to the frequency, percentage and tabular analysis were employed to assess the farmer´s knowledge and perception about agromet advisory services.

Results and Discussion

Table 1 revealed that that 52 percent AAS registered farmers were old aged followed by middle aged (34 percent) and young aged (14 percent) while in case of non AAS registered farmers old aged were 62 percent, middle-aged (22 percent) and young aged (16 percent), respectively. The age of farmers usually represents his skills and experience in farming and old aged farmers are expected to have high experience and knowledge about farming and associated risks involved in it. About educational status it can be said that most of the AAS registered farmers had higher secondary level that is 40 percent followed by graduation (26 percent), primary (24 percent) and about 10 percent of AAS registered farmers were illiterate. In non-ASS registered farmers about 36 percent were of higher secondary level and 14 percent were illiterate. Education level of farmers was found to be positive with their adoption measures due to climate change given by AAS. It implies that with an increase in the education level of farmers there would be increase in the adaptation measures. Education influenced the farmers to know the recent technologies which are suitable in the changed conditions of climate for their farm and consequently helped them to acquire suitable methods and technologies (Manjusha *et al.*, 2019) [9]. In both AAS registered as well as non-AAS farmers group, male participation in agricultural activities and decision making was high as compared to female participation. Majority of AAS registered farmers (50 percent) and non-registered AAS farmers (44 percent) had small family size. In case of family type, 62 percent AAS registered farmers and 52 percent non-registered AAS farmers have nuclear family. About 58 percent of AAS registered farmers have farming experience more than 25 years and 20 percent have low farming experience while in case of non-registered AAS farmers, it was 56 percent and 24 percent. Farmers are mostly dependent on rains rather than having irrigation facilities in both the cases. Social participation was high in both the categories of respondents. Under both the categories of respondents most of the farmers have small and marginal land holding (64 & 54 percent) followed by medium land holdings. Along with farming, farmers were also engaged in other off-farm employment for their alternative source of income in. In both the categories farmers have annual income of more than on lakh. Less than 50 percent of the AAS registered and non-registered AAS farmers have access to institutional credit.

Table 1: Socio-economic characteristics of farmers of Mandi district of Himachal Pradesh (n = 100)

S. No	Particulars	Category	AAS Registered farmers		AAS Non- Registered farmers	
			Frequency	Percentage	Frequency	Percentage
1	Age (Years)	Young (>35)	7	14	8	16
		Middle (36-45)	17	34	11	22
		Old (<46)	26	52	31	62
2	Education	Illiterate	5	10	7	14
		Primary	12	24	17	34
		Higher secondary	20	40	18	36
		Graduation	13	26	8	16
3	Gender	Male	40	80	35	70
		Female	10	20	15	30

4	Family Size	Small (up to 5)	25	50	22	44
		Medium (6 to 8)	19	38	19	38
		Large (>9)	6	12	9	18
5	Family type	Nuclear family	31	62	26	52
		Joint Family	19	38	24	48
6	Farming experience	Low (up to 15 years)	10	20	12	24
		Middle (16-25 years)	11	22	10	20
		High (>25 years)	29	58	28	56
7	Type of Farming	Rainfed	41	82	43	86
		Irrigated	9	18	7	14
8	Social participation	Yes	42	84	41	82
		No	8	16	9	18
9	Land Holding (ha)	Marginal & small	32	64	27	54
		Medium	13	26	10	20
		Large	5	10	3	6
10	Other occupation	yes	30	60	37	74
		No	20	40	13	26
11	Farmer's Income	Less than 50,000	7	14	10	20
		50,000-100,000	15	30	13	26
		Above 100,000	28	56	27	54
12	Institutional credit	Yes	23	46	24	48
		No	27	54	26	52

Data presented in Table 2 showed that more than 40 percent of AAS farmers rated the agro-meteorological advisory services as 'very good' on the scale of very poor to very good, 38 percent as 'good' and 6 percent as 'very poor same results were reported by Rana *et al.*, (2005) [15]. The majority of the farmers (76%) felt the necessity of the bi-weekly agromet advisory services as it help farmers to take short term decision on farming activities. About 70 percent of farmers follow weather forecast and agromet bulletins issued by DAMU unit for their farm operations like sowing/transplanting, irrigation, chemical spray and harvesting etc. In case of usefulness of weather forecast, .80 percent of farmers found it highly useful followed by partially useful (16 percent) and 4 percent as not useful at all. Ram Singh *et al.*,(2015) [13] also reported the same results According to respondents AAS is found most useful at the time of sowing stage followed by at the time of harvesting stage, results are in conformity with Kumar *et al.*,(2021) [7]. 82 percent farmers found biweekly AAS of good quality and more than half of the respondents require forecast on biweekly basis rather than daily or monthly. The preference for farmers to listen / watch weather forecast and agromet advisories varied among the respondents the best time to watch or read agromet advisories according to majority of respondents was afternoon (38 percent) followed by evening (24 percent), noon (18 percent), night (12 percent) and early morning (2 percent), respectively. Hence, most of the respondents require weather-based advisories to plan their farm operations, management of labors and other activities mostly during 3 pm to 7 pm only, similar results were reported by Dharavath *et al.*, (2022) [2].About 72 percent of farmers receiving biweekly agro advisories spread the messages to others.

Table 2: Registered Farmer's perception towards Agromet Advisory Services in Mandi district of Himachal Pradesh (n = 50)

S. No.	Farmers perception statements	Frequency	Percentage (%)
1	Perception about AAS		
	Very poor	3	6
	Poor	8	16
	Good	19	38
	Very Good	20	40
2	Do you require bi-weekly forecast Agromet Advisory Bulletin		
	Yes	38	76
	No	12	24
3	Do you follow weather forecast for your farm operation		
	Yes	35	70
	No	15	30
4	Do you follow Agromet Bulletin issued by Concerned DAMU Unit		
	Yes	35	70
	No	15	30
5	How relevant/useful is the weather forecast		
	Not useful	2	4
	Partially useful	8	16
	Highly useful	40	80
6	Perception about at what stage of crop AAS is essential		
	Sowing stage	40	80
	Flowering stage	22	44

	Harvesting stage	38	76
7.	Perception about Quality of AAS information disseminated		
	Good	41	82
	Average	6	12
	Poor	3	6
8	Perception about frequency of forecasting		
	Daily	8	16
	weekly	11	22
	Bi-weekly	29	58
	Monthly	2	4
9	What is the best time for you to listen/to watch weather and Agromet advisories		
	Early Morning (5 to 7AM)	1	2
	Morning (7 to9AM),	3	6
	Noon (12 to 2PM),	9	18
	Afternoon (3 to 5PM),	19	38
	Evening (6 to 7PM),	12	24
	Night (8 to 10PM).	6	12
10	Do you spread message to others		
	Yes	36	72
	No	14	28

The data recorded from the sampled farmers to know that which weather event was most important for farm operations, Fig. 1 showed that 72.20 percent of farmers felt that forecast related to rain was very helpful for taking prior farm management decisions like sowing, irrigation, chemical spray and harvesting operation etc. followed by 40.20 percent as temperature, 25.9 percent as thunderstorm and 20.30 percent as relative humidity. Weather events like wind, cloud cover etc. was given less importance. These results are in conformity with studies reported by Maddison (2006) [8] and Parveen *et al.*, (2022) [12].

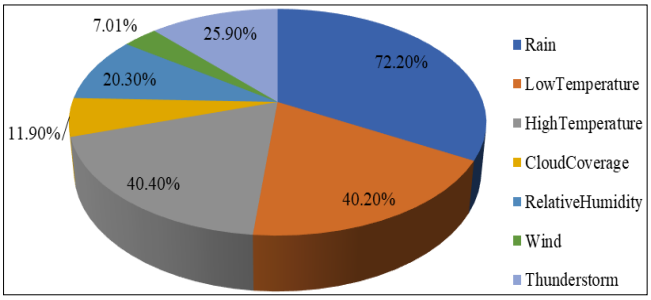

Fig 1: Weather event most important for farm activity

Majority of the farmers expressed that the intervention of AAS was helpful in making decision regarding the farm operations, Fig. 2, AAS aids farmers to reduce crop production and protection cost during cropping season by optimum and timely usage of inputs. Majority of farmers (71.80 percent) opined that real time AAS was critical at sowing/transplanting stage as information on timely rainfall helped farmers to plan their farm activities timely and accurately. About 69.20 percent of farmers found AAS useful for planning harvesting and threshing operations. 59.20 percent of farmers used AAS for managing their insect and pest, 45.20 percent found it useful for timely and optimum use of fertilizer. About 40.30 percent of farmers check weather forecast for scheduling irrigation and 39.10 percent for post harvest operations.These results are in conformity with studies reported by Prasad*et al.*,(2020) [11].

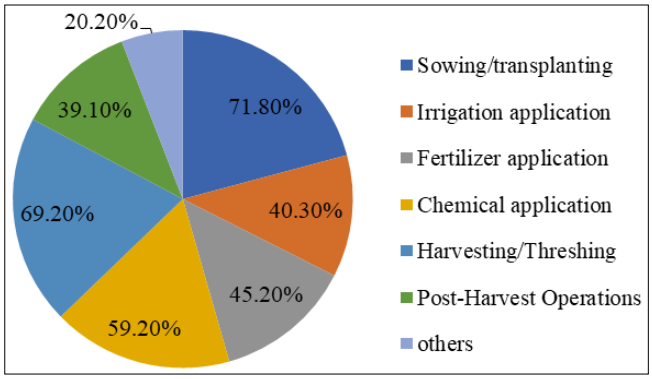

Fig 2: Farm operation for which weather forecast/ Agromet advisories are found useful

From results (Fig. 3), it is also showed that 71 percent of AAS farmers were presently highly satisfied, 18.8 percent were satisfied, 8.2 percent were partially satisfied and 2 percent farmers were not satisfied with AAS issued by the DAMU centre of Mandi district.

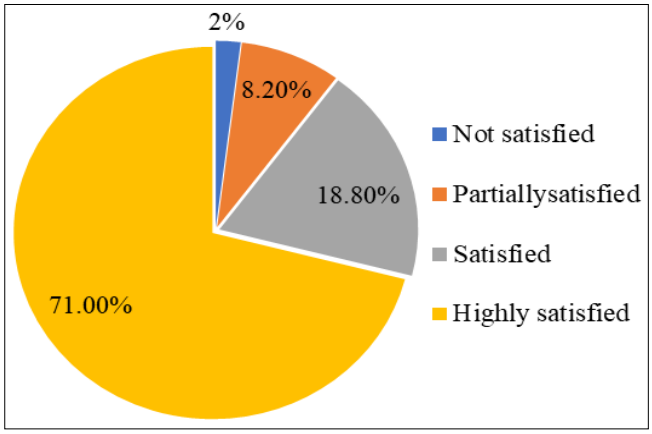

Fig 3: Farmer's satisfaction by the Agromet advisory services

The agromet advisories were disseminated to the farmers through various modes of communication like Radio,

Television, Newspapers, SMS, WhatsApp etc. The efforts were made to know the source of dissemination media for weather forecast and agromet advisory services and the data obtained was presented in the Fig. 4. The figure showed that 61 percent farmers preferred WhatsApp as a medium for receiving information followed by 14 percent through television, 12 percent through News paper, and 9 percent through radio, 4 percent through SMS, and 1 percent through website, respectively. Hence it can be said that, with the advancement of technology and vast usage of smart phones most of the farmers preferred WhatsApp for the dissemination of weather based agro advisories as compared to other mass media. Similar results reported by Ramachandrappa *et al.*, (2018) [14].

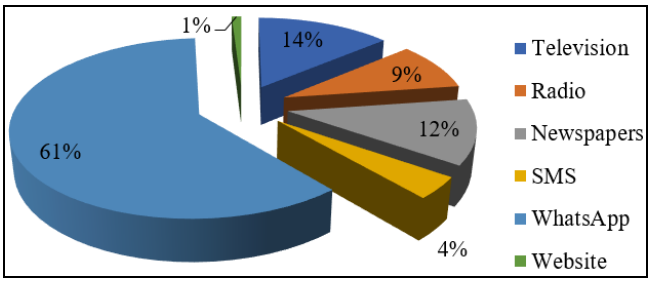

Fig 4: Preferable medium of weather advisory percentage

Conclusion

On the basis of the findings, majority of farmers have integrated weather based advisories to take or implement day to day strategic decisions for managing their farm operations and reduce risk. The higher percentage of respondent were satisfied with the quality of the biweekly advisory services and the timely and accuracy of rain forecast information are highly useful for the farmers for avoiding the aberrant weather conditions and helps in improving the socio economic status of farmers.

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