



RESEARCH ARTICLE

Farmers' Perception Towards District AgroMet Unit (DAMU) Agro Advisory Services in Agriculture and Allied sectors in Tamil Nadu

A. Kanimolzhi¹, Noorjehan A K A Hanif^{2*}, N. Sriram³, N K. Sathyamoorthy⁴ and R. Gangai Selvi⁵

¹ Department of Agricultural Extension and Rural Sociology, Tamil Nadu Agricultural University, Coimbatore - 641003, Tamil Nadu, India.

^{2*} Department of Basic Engineering and Applied Sciences, Agricultural College & Research Institute, Kumulur - 621 712, Tiruchirappalli district, Tamil Nadu Agricultural University, Tamil Nadu, India.

³ Directorate of Research, Tamil Nadu Agricultural University, Coimbatore-641003, Tamil Nadu, India.

⁴ Agro Climatic Research Center, Tamil Nadu Agricultural University, Coimbatore- 641003, Tamil Nadu, India.

⁵ Department of Physical Sciences and Information Technology, Tamil Nadu Agricultural University, Coimbatore- 641003, Tamil Nadu, India.

ABSTRACT

A study was undertaken between 2022 and 2023 to assess farmers' perceptions of District Agro Meteorological Unit (DAMU) Services in Cuddalore, Ramnad, and Aruppukottai districts of Tamil Nadu. DAMU offers specialized weather information to support local agricultural activities. Employing an ex post facto research design, a random sample of 180 registered farmers was selected. Data was collected using a standardized questionnaire. Results revealed that Short-Range Forecasts (1-3 days) were most preferred (51.11%) followed by Medium-Range Forecast (4-7 days) with 31.11 per cent offering valuable insights to plan their activities for the upcoming week in making decisions related to crop protection, disease management and resource allocation of weather predictions. About three fourth (72.28 %) of farmers held a moderate perception of DAMU's agromet services followed by high perception (15 per cent). The first ranked Perception Index (PI: 91.11) statement was that "weather-based advice assists in timing of sowing and transplanting" then "Information provided under DAMU is clearly understandable" (PI: 89.44); "advisory services in the form of video link are understandable, useful & effective" (PI: 86.11) and least agreement for judicious application of fertilizers (PI: 66.29) and temperature forecasts (PI: 64.62) aid in safeguarding crops from cold, frost, and heat damage.

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INTRODUCTION

Weather forecasting in agriculture is of utmost importance for India, as majority of its population is engaged in agriculture. The success and productivity of crops heavily rely on meteorological factors such as temperature, rainfall, wind speed, relative humidity and hail. Seasons and weather conditions significantly impact farming and the cultivation of agricultural and horticultural crops. Unlike many other economic sectors, the output of agriculture is closely tied to weather. The India Meteorological Department (IMD) has been providing weather services for farmers in the country since 1945 at different levels (National,

State, and District Agromet Advisory Bulletin) to help farmers make informed decisions for their daily agricultural activities. The flagship program, Gramin Krishi Mausam Sewa (GKMS), offers weather-related services to assist farmers in decision making. The District Agromet Unit (DAMU) program, expanded to the block level, addresses the specific micro weather needs of farmers. The research conducted by Patil et al., 2022 has emphasized the favourable influence of agricultural advisory services like Krishi Vigyan Kendra

(KVK) guidance and mobile advisories for farmers. These resources have been warmly embraced by farmers and effectively integrated into their daily agricultural operations, enhancing their practices. Agro-DSS (Decision Support System) software has been using 329 district units (130 Agromet Field Units and 199 District Agromet Units) established by IMD across the country for preparation and dissemination of daily block level weather to all the blocks agromet advisory to all the districts and 3100 blocks twice a week.

The implementation of District AgroMet Units (DAMU) in nine districts of Tamil Nadu is a commendable initiative to provide block level advisory to farmers. The advisory bulletins prepared by Krishi Vigyan Kendra for major crops in the district every Tuesday and Friday are a valuable source of information for the farmers. Using the DSS, along with the expertise of Subject Matter Specialists and KVK scientists, ensures that the advisory bulletins are accurate and up-to-date. The inclusion of both English and regional languages in the bulletin makes it accessible to a wider audience of farmers. The dissemination of the advisory bulletins through various channels such as WhatsApp, M-Kissan, Newspaper, Short message service (SMS), NGOs, E-mail, State Agriculture Department, Research Stations, Gramin Krishi Mausam Sewa (GKMS), and Web portals are highly beneficial. This multi-channel approach ensures that farmers receive the information through platforms they are familiar with and have easy access to. Additionally, NGOs' involvement helps reach remote areas where internet connectivity might be limited. Overall, the DAMU implementation and the dissemination of advisory bulletins are valuable steps towards improving agricultural practices and enhancing farmers' livelihoods in Tamil Nadu. Continued support and improvement in these initiatives will contribute significantly to the growth and sustainability of the agricultural sector in the region.

This study was undertaken through a field survey to evaluate the perceptions and viewpoints of farmers regarding the District Agromet Unit (DAMU) in Tamil Nadu. The primary objective was to gain a comprehensive understanding of how farmers perceive and interact with the DAMU, which serves as a vital resource for agricultural activities in the district. By directly engaging with farmers, their valuable insights, experiences, and feedback were collected, enabling a thorough assessment of the DAMU's effectiveness and impact on their farming

practices. The study encompasses the perspectives of 180 farmers, analysing their opinions on weather-based advisory services (AAS) within various forecast timeframes. Ultimately, this research aims to contribute towards enhancing the DAMUs' role in supporting and empowering farmers in Tamil Nadu.

MATERIALS AND METHODS

The present study was conducted in 2023 in Tamil Nadu and focused on the purposeful selection of three districts based on their land types: Cuddalore (Wetland), Ramnad (Coastal area) and Aruppukottai (Dryland). Nine blocks, including Vridhachalam, Kammapuram and Melbhuvanagiri from Cuddalore district; Thiruvadanai, Pogalur and Mandabam from Ramnad district; and Aruppukottai, Rajapalayam and Karaipatti from Virudhunagar district were purposefully chosen for the study based on the highest number of registered farmers with the DAMU out of all 46 blocks across the three districts. From each selected block, two villages were chosen based on the maximum number of farmers covered under DAMU, ensuring a diverse representation of agricultural practices and challenges in different land types within the specified regions. The study utilized an ex post-facto research design and employed a random sampling technique to select a sample of 180 registered farmers. Data on farmers' perceptions of various topics were collected using a standardized questionnaire. To assess their opinions towards Agromet Advisory Services (ASS), a structured interview schedule was designed with relevant statements and the farmers' perception towards DAMU was evaluated. The data was presented in frequency and percentage formats to understand the level of farmer's perception about DAMU services involving the viewpoints of 180 farmers on weather-based advisory services (AAS) across different forecast periods. The interview schedule focused on gathering farmers' perceptions of the usefulness of weather forecasts in managing daily farm operations, the general usefulness of the services, and their impact on managing farm inputs, reducing input costs, increasing production and productivity, and understanding the services, among other aspects. The farmers' responses were measured on a three-point continuum, consisting of fully agree, agree, and not agree. The participants were requested to rank the statements based on their perspectives. The Perception Index was subsequently

computed using the provided formula. (International Food Policy Research Institute (IFPRI), 2000)

$$P. I = \frac{\text{Summation of obtained perception score}}{\text{Maximum possible obtained perception score}} \times 100$$

Descriptive statistics, including frequency, percentage, and tabular analysis, were used to evaluate the views of farmers regarding the services provided by the District Agromet Unit (DAMU).

RESULTS AND DISCUSSION

The study analysed the farmers' overall perception of the information provided by the District Agromet Unit (DAMU). The findings, presented in figure 1, demonstrate the distribution of farmers based on their perception levels. It was observed that 72.28 per cent of the farmers held a medium perception towards the agromet services disseminated by DAMU, with 131 participants falling into this category. Additionally, 15 per cent of the farmers showed a high perception, comprising 27 participants, while 12.22 per cent had a low perception with 22 participants, towards DAMU services. Over 85 per cent of farmers utilizing micro-level Agricultural Advisory Services (AAS) expressed satisfaction, as reported by Dupdal et al. 2020.

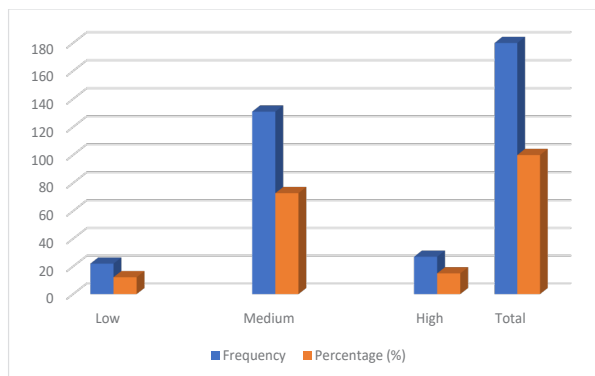


Figure 1: Distribution of respondents according to their overall perception of DAMU services (n-180)

The results highlight that a significant majority of farmers had a moderate perception, while smaller proportions held high or low levels of perception towards DAMU services. Reason behind these findings is that they are moderately satisfied with the overall quality and effectiveness of the DAMU services and could be related to moderate usage of the different channels provided by DAMU, such as weather advisories, SMS alerts, KVK trainings, contacting extension officials and using weather-related portals and applications.

The respondents might use these services to some extent but may not fully maximize their potential. In a study by Mehta et al. 2016, most participants believed that weather forecasting advisory services support farmers in making informed choices. These services would be even more beneficial if they are clear, timely, and explain the economic advantages of following the advice in a straightforward manner and that these advisory services play a crucial role in decreasing farm losses.

From table 1, the data reflected the responses of farmers regarding the effectiveness and usefulness of weather-based advisory services (AAS) in improving crop management practices. The majority of farmers agreed on the effectiveness of weather-based advisory services (AAS) in improving crop management practices. The data showed that a significant percentage of farmers fully agree with the effectiveness of certain weather-based advisory services (AAS) viz., 76.67 per cent of farmers fully agree that AAS helps in scheduling the sowing/transplanting time, 73.33 per cent of farmers are fully agree with the information presented through DAMU is easily comprehensible, 64.44 per cent find advisory services in the form of a video link understandable, useful, & effective, 63.33 per cent of farmers are strongly considering adjusting their farm operations based on weather forecast, 62.78 per cent of farmers fully agree with using weather-based Automated Irrigation Systems (AAS) for scheduling irrigation is highly effective, and 62.22 per cent of farmers fully agreed with the information supplied by DAMU service demonstrates a reasonable level of adaptability to field conditions.

More than half (51.11%) of farmers agree that DAMU offers time-based information, 48.33% of the farmers agree that the weather-based AAS facilitates timely disease management and temperature forecasts enable farmers to proactively safeguard crops from cold, frost, and heat damage and the information is location-specific rather than generalized. 46.11 percent of farmers agree that AAS assists farmers in the judicious application of fertilizers and 45.56 per cent of farmers agree that rainfall forecasts aid farmers by supplying information about the water availability period for crops.

The study revealed that 32.78 percent of farmers



Table 1. Aspect wise farmers' perception about DAMU Services (n=180)

S.No.	Statements	Fully Agree		Agree		Disagree		Mean
		F	%	F	%	F	%	
1	Weather based AAS helps in scheduling the sowing/ transplanting time	138	76.67	36	20.00	6	3.33	2.73
2	AAS helps in judicious application of fertilizers by the farmers	48	26.67	83	46.11	49	27.22	1.99
3	Rainfall forecasts help the farmers by providing information regarding water availability period for the crops	69	38.33	82	45.56	29	16.11	2.22
4	Weather based AAS helps in scheduling the irrigation	113	62.78	54	30.00	13	7.22	2.56
5	Weather based AAS helps in timely disease management	47	26.11	87	48.33	46	25.56	2
6	Weather based AAS helps in mitigating the insect pest attacks	50	27.78	82	45.56	48	26.67	2.01
7	Weather based AAS helps in knowing the weather uncertainties well in advance	100	55.56	60	33.33	20	11.11	2.44
8	Weather based AAS provide timely information to the farmers	97	53.89	58	32.22	25	13.89	2.4
9	Information provided on weather parameters viz. maximum and minimum temperature, rainfall, maximum and minimum relative humidity, cloudiness, wind speed and wind direction help in better crop management	107	59.44	59	32.78	14	7.78	2.51
10	Temperature forecasts helps the farmers to take necessary measures before-hand to save the crops from cold, frost and heat injury	41	22.78	87	48.33	52	28.89	1.94
11	Weather based AAS helps in mitigating the ill effects of climate change	49	27.22	81	45.00	50	27.78	1.99
12	On the basis of Weather forecast the farmer shall consider altering their farm operation	114	63.33	47	26.11	19	10.56	2.53
13	Telephone weather services will be useful to the farmers if the call made is free and timely	96	53.33	62	34.44	22	12.22	2.41
14	Language of weather forecasting is less understandable	76	42.22	77	42.78	27	15.00	2.27
15	Weather forecast information is more location specific, rather than generalized	66	36.67	87	48.33	27	15.00	2.22
16	The reliability of traditional weather forecasting advisory services information is very high	58	32.22	63	35.00	59	32.78	1.99



Table 1.Continued

S.No.	Statements	Fully Agree		Agree		Disagree		Mean
		F	%	F	%	F	%	
17	Information provided under DAMU is clearly understandable	132	73.33	39	21.67	9	5.00	2.68
18	DAMU provides time-based information	58	32.22	92	51.11	30	16.67	2.16
19	DAMU provides need-based information	84	46.67	72	40.00	24	13.33	2.33
20	DAMU services promotes increase in knowledge	57	31.67	76	42.22	47	26.11	2.05
21	DAMU services promotes increase in productivity	73	40.56	71	39.44	36	20.00	2.20
22	Information provided by DAMU service is adaptable in field conditions	112	62.22	51	28.33	17	9.44	2.53
23	The advisory services in the form of posters are understandable, useful & effective	69	38.33	72	40.00	39	21.67	2.17
24	The advisory services in the form of video link are understandable, useful & effective	116	64.44	53	29.44	11	6.11	2.58
25	The advisory services in the form of SMS are understandable, useful & effective	61	33.89	80	44.44	39	21.67	2.12

(*F- Frequency, %- Percentage)

were disagreed that the reliability of traditional weather forecasting advisory services information is considered relatively low. There is a 28.89 per cent disagreement that temperature forecasts assist farmers in taking proactive measures to protect crops from cold, frost, and heat injury. And 27.78 percent of farmers were disagreed that weather-based AAS contributes significantly to mitigating the adverse effects of climate change. Further, 21.67 per cent of farmers are not convinced that advisory services delivered through SMS are understandable, useful, and effective.

Overall, the data suggested that weather-based AAS can play a critical role in improving crop management practices such as scheduling of irrigation, crop management, and location-specific forecasts, there are still challenges to overcome, such as language barriers and the need for timely and more location-specific information and weather-based advisory services hold promises in supporting farmers, but continuous refinement and adaptability to meet farmers' needs are essential for maximizing their effectiveness.

The table 2 shows that the farmers' perception index regarding various aspects of weather-based advisory services (AAS) and their effectiveness. The highest-rated aspect is "Weather-based AAS helps in scheduling the sowing/transplanting time" with a PI of 91.11. Other positively perceived aspects include "Information provided under DAMU is clearly understandable" (PI: 89.44) and "The advisory services in the form of video link are understandable, useful & effective" (PI: 86.11). Some aspects have relatively lower perception indices, such as "Weather based AAS helps in mitigating the insect pest attacks" (PI: 67.03) and "Weather based AAS helps in timely disease management" (PI: 66.85). The study revealed that farmers generally perceive weather-based AAS as helpful, but there is scope for enhancing specific areas to improve the overall effectiveness and acceptance of these advisory services.

From table 3, it is inferred that, the ranking of these statements highlights the importance of weather-based AAS and information provided by advisory



Table 2. Ranking based on Perception Index for Statements on District Agro Meteorological Unit (DAMU) Services (n=180)

S. No.	Statements	Perception index	Rank
1	Weather based AAS helps in scheduling the sowing/ transplanting time	91.11	I
2	Information provided under DAMU is clearly understandable	89.44	II
3	The advisory services in the form of video link are understandable, useful & effective	86.11	III
4	Weather based AAS helps in scheduling the irrigation	85.19	IV
5	Information provided by DAMU service is adaptable in field conditions	84.44	V
6	On the basis of Weather forecast the farmer shall consider altering their farm operation.	84.25	VI
7	Information provided on weather parameters viz. maximum and minimum temperature, rainfall, maximum and minimum relative humidity, cloudiness, wind speed and wind direction help in better crop management	83.89	VII
8	Weather based AAS helps in knowing the weather uncertainties well in advance	81.48	VIII
9	Telephone weather services will be useful to the farmers if the call made is free and timely	80.37	IX
10	Weather based AAS provide timely information to the farmers	80.00	X
11	DAMU provides need-based information	77.78	XI
12	Language of weather forecasting is less understandable.	75.74	XII
13	Rainfall forecasts help the farmers by providing information regarding water availability period for the crops	74.07	XIII
14	Weather forecast information is more location specific, rather than generalized	73.89	XIV
15	DAMU services promotes increase in productivity	73.51	XV
16	The advisory services in the form of posters are understandable, useful & effective	72.22	XVI
17	DAMU provides time-based information	71.85	XVII
18	The advisory services in the form of SMS are understandable, useful & effective	70.74	XVIII
19	DAMU services promotes increase in knowledge	68.51	XIX
20	Weather based AAS helps in mitigating the insect pest attacks	67.03	XX
21	Weather based AAS helps in timely disease management	66.85	XXI
22	The reliability of traditional weather forecasting advisory services information is very high	66.66	XXII
23	Weather based AAS helps in mitigating the ill effects of climate change	66.48	XXIII
24	AAS helps in judicious application of fertilizers by the farmers	66.29	XXIV
25	Temperature forecasts helps the farmers to take necessary measures beforehand to save the crops from cold, frost and heat injury	64.62	XXV

services like DAMU in managing crop production. The statements emphasize the significance of weather forecasting, timely information and practical advice in cultivating crops and mitigating risks associated with climate change, pests and diseases. Additionally, the ranking underscores the effectiveness of various communication methods, such as video links, SMS messages and posters, in conveying agricultural

information to farmers. Overall, using AAS and advisory services can lead to increased knowledge, productivity and yield in farming.

The farmers' responses regarding weather forecast timeframes can be categorized as follows: In now-casting (3 to 6 hours), temperature forecasts help the



farmers take necessary measures beforehand to save the crops from cold, frost, and heat injury. In the short-range forecast (1-3 days), farmers acknowledged the practical benefits of weather-based advisory services (AAS) such as aiding in scheduling sowing/transplanting, irrigation, and disease management. They emphasized the importance of timely information delivery and recognized the role of temperature forecasts in safeguarding crops from potential threats. During the medium-range forecast (4-7days), farmers liked that the information from the District Agromet Unit (DAMU) was easy to understand. They found various forms of communication effective, including video links, adaptable DAMU services, and advisories through posters and SMS. The medium-range forecasts guided farmers in adjusting their farming operations based on weather predictions, incorporating parameters like temperature, rainfall, humidity, and wind direction for better crop management. Rainfall forecasts were particularly valued for aiding decisions related to water availability periods. In the long-range forecast (beyond 7 days), farmers saw things from a wider perspective. They realized that AAS could help in crop planning and encourage wise use of fertilizers. This showed that they were becoming more aware of the benefits of using weather forecasts for planning beyond just the near future.

Table 3 showed that, Short-Range Forecast (1-3 days) is the most prominent category, accounting for 51.11 per cent of weather forecasts available to farmers. These forecasts provide accurate predictions for the next 1 to 3 days, allowing farmers to confidently plan their daily agricultural activities. They rely on these forecasts to make decisions about irrigation, planting, spraying, and other time-sensitive tasks. The Medium-Range Forecast (4-7 days) category (31.11 per cent) the accuracy decreases compared to short-term forecasts, still offer valuable insights for farmers

to plan their activities for the upcoming week. These forecasts help farmers in making decisions related to crop protection, disease management, and resource allocation.

The Long-Range Forecast (Beyond 7 days) category accounts for 12.22 per cent of the total, which provide farmers with a general understanding of potential weather trends. These assist farmers in making strategic decisions such as selecting appropriate crop varieties, managing long-term resource allocation, and assessing potential risks associated with prolonged weather patterns. Lastly, the Now-casting (3 to 6 hours) category has the lowest percentage, representing 5.56 per cent of the total. Now-casting forecasts provide farmers with immediate weather predictions for the next few hours to respond quickly to sudden weather changes and make on-the-spot decisions. In the research by Prasad *et al.* 2020, it was noted that 58 per cent of farmers favoured short-range forecasts, while 28 per cent opted for medium-range predictions, to strategically schedule crucial agricultural tasks such as sowing, fertilizer application, and livestock management.

CONCLUSION

The study indicated that weather-based advisory services are crucial in supporting farmers' agricultural practices. The majority of farmers perceived DAMU services as beneficial, particularly in aspects related to crop scheduling, irrigation management and field-specific information. However, there are areas where improvements can be made, such as enhancing the understanding of weather forecasting and increasing knowledge through these services. To enhance the overall impact of weather-based advisory services, efforts should be made to make the information more accessible and understandable to all farmers, regardless of their location or level of education. The

Table 3. Distribution of Farmers' responses by weather forecast timeframes (n=180)

Category	Frequency	Percentage (%)
Now-casting (3 to 6 hours)	10	5.56
Short-Range Forecast (1-3days)	92	51.11
Medium-Range Forecast (4-7days)	56	31.11
Long-Range Forecast (Beyond 7 days)	22	12.22
Total	180	100



study suggested that focusing on these aspects could further improve the effectiveness of advisory services and contribute to increased productivity and yield in farming by way of managing unexpected natural calamities through DAMU and reduction in investment. By addressing these issues, weather-based advisory services can become even more valuable tools for farmers in managing their crops and adapting to changing weather patterns and climate conditions. The study extensively examined farmers' perceptions of weather-based advisory services (AAS) and their responses towards different forecast timeframes.

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Conflict of interest:

The authors declare that there is no conflict of interest related to this article

Author contributions

Research - K A¹
 Idea conceptualization - N A K A H^{2*}, S N³
 Experiments - K A¹
 Guidance - N A K A H^{2*}
 Writing-original draft - K A¹
 Writing- reviewing & editing - N A K A H^{2*}, S N³, S N K⁴ and G S R⁵

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