

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
 ISSN Online: 2617-4707
 NAAS Rating (2026): 5.29
 IJABR 2026; SP-10(4): 1254-1258
www.biochemjournal.com
 Received: 12-02-2026
 Accepted: 16-03-2026

Wasim Khan
 SMS (Agrometeorology),
 Krishi Vigyan Kendra,
 CSAUA&T, Kanpur,
 Uttar Pradesh, India

Naushad Alam
 Sr. Scientist (Agriculture
 Extension), Krishi Vigyan
 Kendra, CSAUA&T, Kanpur,
 Uttar Pradesh, India

Sanjay Kumar Pandey
 SMS (Animal Science), Krishi
 Vigyan Kendra, CSAUA&T,
 Kanpur, Uttar Pradesh, India

Corresponding Author:
Wasim Khan
 SMS (Agrometeorology),
 Krishi Vigyan Kendra,
 CSAUA&T, Kanpur,
 Uttar Pradesh, India

Effectiveness of district agromet advisory bulletins in improving economic efficiency of rice cultivation in Fatehpur, Uttar Pradesh

Wasim Khan, Naushad Alam and Sanjay Kumar Pandey

DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i4So.8317>

Abstract

Agriculture in India is highly vulnerable to weather variability, which significantly affects crop productivity and farm income. To address this, Agrometeorological Advisory Services (AAS) under the Gramin Krishi Mausam Seva (GKMS) scheme provide weather-based advisories through District Agromet Units (DAMUs). The present study evaluated the effectiveness of district agromet advisory bulletins in improving the economic efficiency of rice cultivation in Fatehpur district of Uttar Pradesh. The study was conducted in three blocks—Haswa, Vijayipur, and Malwan—with a total sample of 180 farmers (90 AAS and 90 non-AAS). Primary data on cost of cultivation, yield, and returns were collected for the period 2022-2025. Results indicated that mobile-based channels, particularly SMS and WhatsApp, were the major sources of advisory dissemination, with most farmers receiving advisories twice a week and largely following them. Farmers reported advisories to be useful in irrigation scheduling, fertilizer application, pest management, and harvest planning. Economic analysis revealed that AAS farmers recorded lower cost of cultivation (Rs 49,542/ha), higher yield (47.5 q/ha), and greater net returns (Rs 63,040/ha) compared with non-AAS farmers. Net return advantage ranged from 41.63% to 58.03%, with a pooled advantage of 47.62%. The benefit-cost ratio was also higher among AAS farmers (2.26) than non-AAS farmers (1.81). The study concludes that agromet advisory services significantly enhance farm profitability and economic efficiency, supporting climate-resilient agriculture.

Keywords: Agrometeorological Advisory Services (AAS), GKMS, DAMU, rice cultivation, economic efficiency

Introduction

Agriculture is inherently sensitive to weather and climate variability, particularly in tropical countries like India, where fluctuations in rainfall, temperature, humidity, and extreme weather events significantly influence crop productivity and farm income. Weather aberrations such as droughts, floods, heat waves, and unseasonal rains often lead to substantial yield losses and economic instability for farmers (Stern, 2007; IPCC, 2014) ^[12, 5]. Among major crops, rice (*Oryza sativa* L.) is highly climate-sensitive due to its dependence on water availability and its susceptibility to temperature stress during critical growth stages such as flowering and grain filling (Yoshida, 1981; Wassmann *et al.*, 2009) ^[17, 16].

To mitigate the adverse effects of weather variability and enhance agricultural decision-making, the India Meteorological Department (IMD), in collaboration with the Indian Council of Agricultural Research (ICAR), has implemented Agrometeorological Advisory Services (AAS) under the Gramin Krishi Mausam Seva (GKMS) scheme. These services provide location-specific, weather-based advisories that guide farmers on critical agricultural operations such as sowing, irrigation scheduling, fertiliser application, pest and disease management, and harvesting (Rathore *et al.*, 2013; Maini & Rathore, 2011) ^[11, 7]. The advisories are based on medium-range weather forecasts and are disseminated regularly to help farmers minimise weather-related risks and optimise resource use.

In recent years, the outreach and effectiveness of AAS have been strengthened by establishing District Agromet Units (DAMUs) at Krishi Vigyan Kendras (KVKs). These units generate block-level agromet advisory bulletins tailored to local agro-climatic conditions and cropping systems.

The dissemination of advisories through multiple channels such as SMS, mobile applications, WhatsApp groups, and extension services has significantly improved farmers' access to timely and actionable information (Venkataraman *et al.*, 2017) ^[14].

Empirical studies have demonstrated that the adoption of agrometeorological advisory services can lead to improved crop productivity, reduced cultivation costs, and enhanced farm profitability. For instance, studies by Tripathi *et al.* (2014) ^[13] and Vyas *et al.* (2016) ^[15] reported that farmers adopting AAS achieved higher yields and better economic returns due to efficient input management and timely farm operations. Similarly, Anurag *et al.* (2018) ^[12] found that AAS helped reduce climate-related risks and improve resilience among farming communities.

Despite these advancements, region-specific assessments of the economic impact of district-level agromet advisory services remain limited, particularly in districts such as Fatehpur. Given the importance of rice cultivation in this region and its vulnerability to weather variability, evaluating the effectiveness of AAS in improving economic efficiency is essential for strengthening climate-resilient agricultural practices.

Therefore, the present study aims to assess the effectiveness of district agromet advisory bulletins in improving the economic efficiency of rice cultivation in Fatehpur district of Uttar Pradesh by comparing the performance of AAS and non-AAS farmers.

Materials and Methods

The present study was conducted in Fatehpur district, where the District Agro-Meteorological Unit (DAMU) operates under the Krishi Vigyan Kendra. The district lies in the central plain region of Uttar Pradesh and experiences a subtropical climate characterized by hot summers, a monsoon season, and cool winters. Rice is a major Kharif crop of the region. For the study, three blocks—Haswa, Vijayipur, and Malwan—were selected. A total sample of 180 farmers was drawn, comprising 90 AAS farmers (beneficiaries) and 90 non-AAS farmers (non-beneficiaries). Farmers were categorized into two groups: (i) AAS farmers, who received and followed agrometeorological advisory bulletins issued by DAMU, KVK Fatehpur, and (ii) non-AAS farmers, who did not use advisory services. A representative sample from selected villages was chosen using a simple random sampling technique. Primary data were collected during 2022-2025 through personal interviews using a pre-tested structured questionnaire. Data were gathered on key economic parameters of rice cultivation, including cost of cultivation (Rs/ha), grain yield (q/ha), gross returns (Rs/ha), and net returns (Rs/ha). Additionally, for AAS farmers, information on advisory utilization was collected, including source of advisory (SMS, WhatsApp, mobile apps, KVK, others), frequency of receipt (twice weekly, weekly, occasional), adoption level (fully, partially, not followed), and perceived usefulness in farm operations such as irrigation scheduling, fertilizer application, pest and disease management, and harvest planning. Economic analysis was carried out using standard cost-return concepts. Gross return was estimated by multiplying grain yield with the prevailing market price of rice, while net return was computed as the difference between gross return and cost of cultivation. The benefit-cost (B:C) ratio was calculated to assess the economic

efficiency of rice cultivation under both AAS and non-AAS conditions.

Results and Discussion

Adoption and Utilization of Agrometeorological Advisory Services

The results indicated that agrometeorological advisory services were widely adopted by farmers in the study area. WhatsApp was the primary source of dissemination (50.00%), followed by call-based services and extension workers (16.67% each). Most farmers (72.22%) received advisories twice weekly, ensuring timely access to weather information. A high proportion (86.67%) fully followed the advisories, reflecting strong trust in their usefulness (Table 1). Farmers reported that advisories were most beneficial for irrigation scheduling (33.33%) and fertilizer application timing (27.78%), followed by pest management and harvest planning (Table 2). The effective use of advisories improved farm decision-making, enabling efficient resource utilization and reduced input costs. Consequently, AAS farmers achieved higher yields and net returns compared with non-AAS farmers. Overall, the findings demonstrate that agrometeorological advisory services significantly enhance economic efficiency and support climate-resilient rice cultivation. These findings suggest that farmers primarily rely on advisories for time-sensitive operations that are directly influenced by weather conditions. Similar observations have been reported by Meena and Singh (2017) ^[8], who emphasized the importance of ICT-based advisory services in enhancing farmers' decision-making capacity.

Cost of Cultivation (Rs/ha)

The analysis of cost of cultivation revealed that farmers adopting agrometeorological advisory services incurred comparatively lower production costs than non-AAS farmers. The pooled cost of cultivation was Rs 49,542/ha for AAS farmers, which was 5.25% lower than Rs 52,286/ha for non-AAS farmers (Table 3). The lower cost among AAS farmers may be attributed to improved input management practices recommended in agrometeorological advisory bulletins. Weather-based advisories enable farmers to plan irrigation, fertilizer application, and plant protection measures according to forecasted weather conditions. This helps reduce unnecessary input use and prevents economic losses associated with inefficient farm operations. Similar findings were reported by Rathore and Maini (2008) ^[10], who observed that agrometeorological advisory services significantly reduce production costs by improving resource-use efficiency.

Yield Performance (q/ha)

Rice yield was consistently higher among AAS farmers compared with non-AAS farmers. The pooled yield was 47.5 q/ha compared to 39.5 q/ha for non-AAS farmers, representing a 20.25% increase (Table 3). Agrometeorological advisories provide timely recommendations related to transplanting dates, irrigation scheduling, pest and disease control, and fertilizer management. Adoption of these practices enables farmers to perform critical crop operations at appropriate times, thereby improving crop growth and productivity. Similar results were reported by Gupta *et al.* (2017) ^[3], who found that farmers receiving agromet advisories achieved

significantly higher crop yields compared with non-beneficiary farmers.

Gross Returns (Rs/ha)

The higher productivity observed among AAS farmers led to higher gross returns than among non-AAS farmers. The pooled gross return was Rs 112,583/ha, which was 18.52% higher than Rs 94,990/ha recorded for non-AAS farmers (Table 3). The increase in gross returns is primarily due to improved crop productivity resulting from timely weather-based management practices. Agrometeorological advisory services help farmers mitigate weather-related risks and adopt appropriate agronomic practices, ultimately enhancing crop yields and farm income. Anandhi *et al.* (2018) ^[1] also reported that agrometeorological advisory services significantly improve crop productivity and economic returns for farmers.

Net Returns (Rs/ha)

Net returns represent the actual profit farmers obtain after deducting the cost of cultivation from gross returns. The study found that AAS farmers achieved significantly higher net returns than non-AAS farmers. The pooled net return was Rs 63,040/ha compared to Rs 42,703/ha for non-AAS farmers, indicating a 47.62% advantage (Table 3). This indicates that AAS farmers earned nearly 48 percent higher profits compared with farmers who did not utilise agrometeorological advisories. The higher net returns among AAS farmers can be attributed to both increased crop productivity and reduced cultivation costs. Similar findings were reported by Kumar *et al.* (2019) ^[6], who observed that weather-based agrometeorological advisory services contribute to increased farm income and improved economic efficiency.

Benefit-Cost Ratio

The benefit-cost ratio is an important indicator of the economic efficiency of crop production systems. The results showed that the benefit-cost ratio was higher among AAS farmers compared with non-AAS farmers. The average B:C ratio for AAS farmers was 2.26, whereas non-AAS farmers

recorded a B:C ratio of 1.81 (Table 3). A higher B:C ratio indicates that farmers who adopted agrometeorological advisory services obtained greater economic returns per unit of investment. This finding confirms that adopting weather-based advisory services improves the economic sustainability of rice cultivation by optimising resource utilisation and minimising weather-related risks. Similar results were reported by Pandey and Patel (2021) ^[9], who concluded that agrometeorological advisory services significantly enhance farm profitability and climate resilience.

Table 1: Adoption and Utilization of Agrometeorological Advisory Services by Farmers

Particulars	Number of Farmers	Percentage (%)
Source of advisory		
Call	15	16.67
WhatsApp	45	50.00
Mobile App (Meghdoot/Mausam)	5	5.56
Krishi Vigyan Kendra/Extension workers	15	16.67
Others (Radio/TV)	10	11.11
Frequency of advisory received		
Twice per week	65	72.22
Once per week	20	22.22
Occasionally	5	5.56
Adoption of advisory		
Fully followed	78	86.67
Partially followed	10	11.11
Not followed	2	2.22

Table 2: Perceived Benefits of Agrometeorological Advisory Services in Rice Cultivation

Farm Operation	Farmers Benefited	Percentage (%)
Irrigation scheduling	30	33.33
Fertilizer application timing	25	27.78
Pest and disease management	18	20.00
Harvest planning	12	13.33
Reduction in crop losses due to weather	5	5.56

Table 3: Overall Impact of Agromet Advisory Services on Rice Economics in Fatehpur District (Pooled Analysis 2022-2025)

Parameter	AAS Farmers	Non-AAS Farmers	Absolute Difference	Percentage Advantage (%)
Cost of Cultivation (Rs/ha)	49,542	52,286	-2,744	5.25 (cost saving)
Yield (q/ha)	47.5	39.5	8.0	20.25
Gross Return (Rs/ha)	112,583	94,990	17,593	18.52
Net Return (Rs/ha)	63,040	42,703	20,337	47.62
Benefit-Cost Ratio	2.26	1.81	0.45	24.86

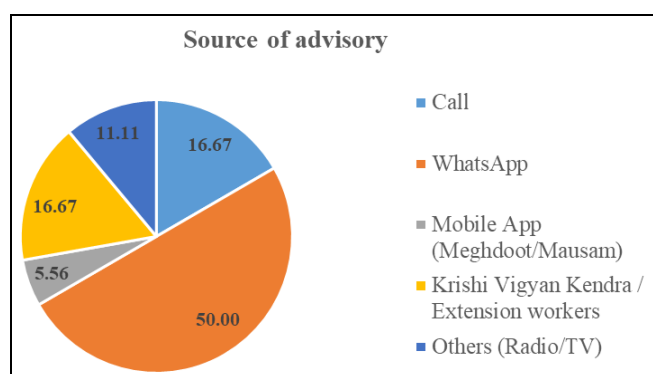


Fig 1: Source of Agrometeorological Advisory Services Among Farmers

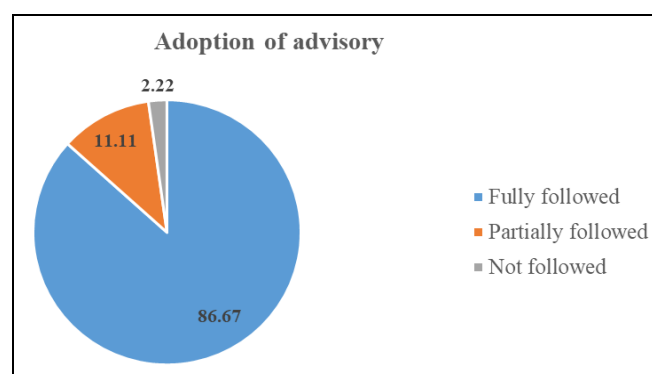


Fig 2: Adoption of Agrometeorological Advisory Services Among Farmers

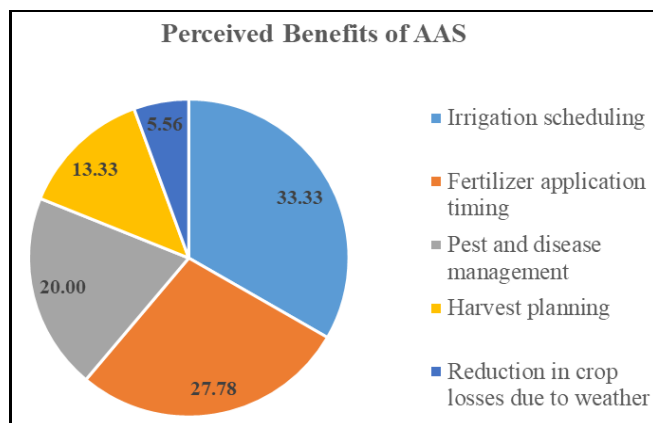


Fig 3: Benefits of Agrometeorological Advisory Services among farmers

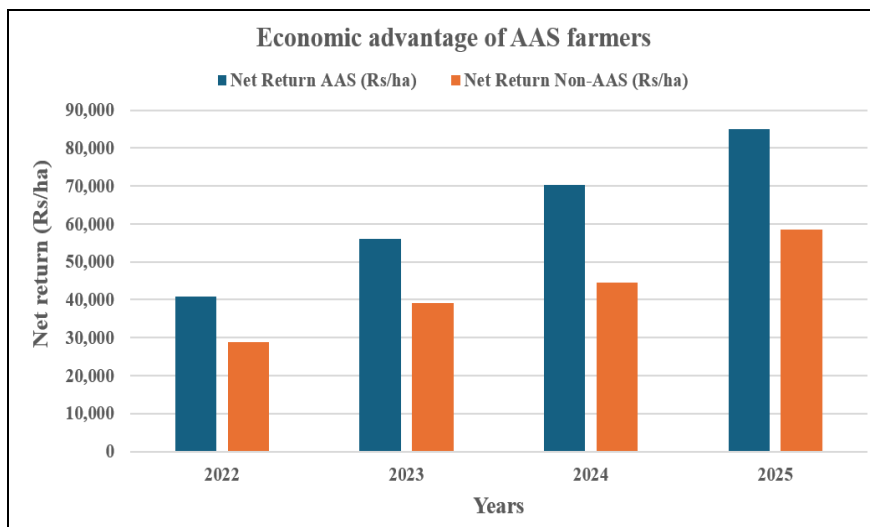


Fig 4: Comparison of net returns from rice cultivation between AAS and Non-AAS farmers in Fatehpur district during 2022-2025.

Conclusion

The study concludes that agrometeorological advisory services (AAS) delivered through DAMU significantly improved the economic efficiency of rice cultivation in Fatehpur district. Farmers receiving advisories demonstrated higher adoption of weather-based recommendations, primarily through mobile platforms such as WhatsApp, and utilized them effectively for key operations like irrigation scheduling, fertilizer application, and pest management. This resulted in more efficient use of resources, reduced cultivation costs, and improved crop productivity. Consequently, AAS farmers achieved higher yields, greater net returns, and a superior benefit-cost ratio compared to non-AAS farmers. The findings clearly establish that timely and location-specific agromet advisories enhance farm decision-making, increase profitability, and contribute to climate-resilient agriculture. Strengthening dissemination mechanisms and expanding farmer awareness can further enhance the impact of these services on agricultural sustainability and income.

References

1. Anandhi A, Gowda PH, Steiner JL. Role of agrometeorological advisory services in improving farm productivity and income. *J Agrometeorol.* 2018;20(3):197-204.
2. Anurag TS, Singh R, Patel HR. Impact of agrometeorological advisory services on farmer's income and climate risk management. *J Agrometeorol.* 2018;20(2):170-174.
3. Gupta A, Singh R, Sharma P. Impact assessment of agro-meteorological advisory services on farmers' crop productivity and farm income. *Indian J Agric Sci.* 2017;87(9):1234-1238.
4. India Meteorological Department. Gramin Krishi Mausam Seva (GKMS): operational guidelines for agrometeorological advisory services. New Delhi: Ministry of Earth Sciences, Government of India; 2020.
5. Intergovernmental Panel on Climate Change. Climate change 2014: impacts, adaptation, and vulnerability. Cambridge: Cambridge University Press; 2014.
6. Kumar R, Singh S, Yadav OP. Economic impact of weather-based agromet advisory services on crop production and farm income. *J Agric Ext Manag.* 2019;20(1):45-52.
7. Maini P, Rathore LS. Economic impact assessment of agrometeorological advisory service of India. *Curr Sci.* 2011;101(10):1296-1310.
8. Meena BS, Singh KM. Impact of ICT-based agromet advisory services on farmers' decision making. *J Ext Educ.* 2017;29(3):5900-5905.
9. Pandey V, Patel H. Effectiveness of agrometeorological advisory services in enhancing farm productivity and climate resilience. *Int J Curr Microbiol Appl Sci.* 2021;10(6):2587-2594.

10. Rathore LS, Maini P. Operationalization of agrometeorological advisory services in India. *J Agrometeorol.* 2008;10(2):1-6.
11. Rathore LS, Attri SD, Jaswal AK. State level climate services for farmers in India. *Mausam.* 2013;64(3):459-470.
12. Stern N. The economics of climate change: the Stern review. Cambridge: Cambridge University Press; 2007.
13. Tripathi H, Mishra D, Kumar P. Economic impact of agrometeorological advisory services in India. *Indian J Agric Econ.* 2014;69(3):348-356.
14. Venkataraman R, Geethalakshmi V, Lakshmanan A. Dissemination of agromet advisories through ICT: impact on farmers. *J Agrometeorol.* 2017;19(1):45-50.
15. Vyas S, Patel HR, Pandey V. Evaluation of agrometeorological advisory services on crop productivity and farm income. *Int J Agric Sci.* 2016;8(53):2825-2828.
16. Wassmann R, Jagadish SVK, Heuer S, Ismail A, Redoña E, Serraj R, *et al.* Climate change affecting rice production: the physiological and agronomic basis for possible adaptation strategies. *Adv Agron.* 2009;101:59-122.
17. Yoshida S. Fundamentals of rice crop science. Los Baños: International Rice Research Institute; 1981.