



“Voices from the Field”

Success Stories and Farmers Feedback on IMD's Agrometeorological Advisory Services



January 2026

**Agromet Advisory Services Division
India Meteorological Department
Ministry of Earth Sciences
Government of India**



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Ministry of Earth Sciences, Government of India
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डॉ० जितेन्द्र सिंह

राज्य मंत्री (स्वतंत्र प्रभार),
विज्ञान एवं प्रौद्योगिकी मंत्रालय;
राज्य मंत्री (स्वतंत्र प्रभार) पृथ्वी विज्ञान मंत्रालय;
राज्य मंत्री, प्रधान मंत्री कार्यालय;
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MESSAGE

Indian agriculture today operates under increasing climate variability, frequent extreme weather events, and growing uncertainty in weather-dependent decision-making. In this context, the availability of timely, reliable, and locally relevant weather information has become essential for resilient and sustainable farming. It is a privilege to release this compendium, **"Voices from the Field"** which documents the tangible impact of science-based advisory services at the grassroots.

The Gramin Krishi Mausam Sewa (GKMS), implemented by the Ministry of Earth Sciences through the India Meteorological Department, is a flagship national initiative for translating weather and climate information into actionable agricultural advisories. Over the years, GKMS has evolved into a robust and operationally matured system. Central to the programme is a nationwide network of 130 Agrometeorological Field Units (AMFUs), established through collaboration with the Regional Meteorological Centres and Meteorological Centres of IMD, State Agricultural Universities, ICAR institutions, IITs, and NGOs. These units play pivotal roles in contextualizing forecasts to local Agro-climatic conditions and crop stages, ensuring advisories that are both scientifically robust and practically relevant. The success stories presented here demonstrate how AMFUs have enabled informed decisions, reduced weather-induced losses and improved farm efficiency.

Under the able guidance of the Honourable Prime Minister, Shri Narendra Modi Ji, the agrometeorological services of IMD have attained new heights in the recent decade. These services are now reaching and benefitting nearly 2.7 crore farmers across the country through a wide array of dissemination channels, including SMS-based advisories, mobile applications, WhatsApp groups, mass media, extension networks, State Government digital portals, and direct field-level interactions. This multi-channel approach ensures effective last-mile connectivity and delivery in local languages and farmer-friendly formats, enhancing accessibility and adoption.

Mission Mausam provides the overarching vision for integrating science, technology, and service delivery to enhance climate resilience and support informed agricultural decisions across the country. These field-level narratives demonstrate how climate services yield measurable benefits when science, technology, and outreach operate in unison. I am confident that this compendium will serve as a valuable reference and inspiration for strengthening agrometeorological advisory services and advancing climate-resilient, sustainable agricultural development in the country.

I congratulate IMD and its scientists and experts for bringing out this report.

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FOREWORD

Delivering climate services for agriculture at a national scale requires strong institutional frameworks, sustained cross-sectoral coordination, and the ability to translate scientific capability into reliable public services. The experiences presented in this compendium “Voices from the Field” reflect the steady evolution of India’s agrometeorological service from a forecast-centric approach to an integrated, decision-support framework.

Under the Gramin Krishi Mausam Sewa (GKMS), the Ministry of Earth Sciences, through the India Meteorological Department, has focused on building durable institutional linkages that enable weather and climate information to flow seamlessly into agricultural planning and extension systems. The role of Agrometeorological Field Units (AMFUs) extends well beyond advisory preparation to include coordination with ICAR institutions, IITs, NGOs, localization of advisory content, and systematic feedback collection. The success stories documented in this volume demonstrate how such an institutionalized approach has improved consistency, credibility, and operational uptake of agrometeorological services across diverse Agro-climatic regions of the country.

Within the framework of Mission Mausam, the Ministry of Earth Sciences is strengthening institutional convergence, standardized workflows, and interoperable platforms to ensure that weather and climate services are delivered in a coordinated, scalable, and sector-responsive manner. This mission-driven approach is enabling agrometeorological services to move from isolated interventions to system-level solutions.

As India advances towards becoming a climate-smart and weather-ready nation, the lessons emerging from AMFU operations assume particular significance. They underscore the importance of governance, coordination, and service design in converting scientific advances into measurable outcomes. This compendium therefore serves not only as a record of field-level success, but also as a guide for future policy formulation, programme design, and operational strategies aimed at strengthening climate-resilient agricultural systems in India.

I congratulate the scientists and experts involved in the preparation of this report and express my deep appreciation to them for their valuable contributions.


(M. Ravichandran)



डॉ. मृत्युंजय महापात्र

मौसम विज्ञान विभाग के महानिदेशक,
विश्व मौसम विज्ञान संगठन में भारत के स्थाई प्रतिनिधि
विश्व मौसम विज्ञान संगठन के तीसरे उपाध्यक्ष

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PREFACE

The India Meteorological Department (IMD) has been at the forefront of delivering science-based agrometeorological support to Indian agriculture through its nationwide operational framework. Effective agrometeorological services depend on the ability to convert advances in atmospheric science into reliable, timely, and locally actionable guidance. Agrometeorological advisories have steadily evolved since their inception from forecast dissemination to integrated, impact-oriented decision support. The success stories presented in this compendium are a direct outcome of that evolution.

Under Mission Mausam, IMD is consolidating advances in observations, numerical weather prediction, impact-based forecasting, and digital dissemination to strengthen end-to-end service delivery. The mission provides a structured pathway to improve forecast skill and translate improved skill into actionable agrometeorological advisories. IMD has significantly enhanced forecast quality and service delivery through various initiatives including the implementation of Bharat Forecast System, expansion of high-resolution numerical weather prediction, and a transition towards impact-based forecasting. Initiatives such as Panchayat Mausam Sewa, integration of advisories with Ministry of Panchayati Raj portals, Ministry of Rural Development services, State Government digital portals, and the creation of Panchayat-level WhatsApp dissemination networks have multi fold improvement in the last-mile delivery.

These efforts are laying a strong foundation for scalable agrometeorological advisories. Notably, this approach is now being extended beyond crops to support emerging sectoral services for poultry, livestock, and fisheries, reflecting a broader and more inclusive climate services framework.

The experiences documented in this volume demonstrate how this science-service interface has improved the relevance, consistency, and usability of agrometeorological advisories across regions. As IMD advances under Mission Mausam towards digital, and impact-oriented climate services, the lessons emerging from Agrometeorological Field Units (AMFUs) operations highlight the importance of strong science operation linkages, standardization, and feedback-driven refinement. This compendium therefore serves as a practical reference for strengthening forecast utilization and service design in support of climate-resilient and sustainable agriculture in India.

I extend my heartiest congratulations and appreciation to the scientists and experts involved in the preparation of this report.

(M. Mohapatra)

Acknowledgement

Agromet Advisory Services (AAS) serve as a basic tool to address climate variability and safeguard the livelihoods of farmers across India. It plays a key role in making agriculture climate-resilient in the face of increasing climate variability and change, along with emerging threats from extreme weather events. The India Meteorological Department (IMD), through Gramin Krishi Mausam Sewa (GKMS), has been providing agromet advisory services to support farmers in decision making.

Recognizing the importance of documenting the field-level impacts of AAS, a need was felt to compile success stories from diverse agro-climatic regions of the country. Accordingly, these stories were collected in a structured manner through the Agro-Meteorological Field Units (AMFUs). This compendium presents nearly 100 success stories reflecting the practical benefits of weather-informed agricultural decision-making across India. These real-life experiences highlight how timely and accurate weather information has helped farmers make informed strategic and tactical farm decisions to manage weather-related risks such as droughts, floods, heatwaves, cyclones, hailstorms, pest outbreaks, and unseasonal rainfall, while also improving crop productivity and resource-use efficiency.

We extend our sincere gratitude to the farmers who generously shared their experiences, data, and photographs for this compilation. Their willingness to document and communicate their success has made this initiative meaningful and impactful. We are also deeply grateful to the Various offices of IMD, State Agricultural Universities (SAUs), Agro-Meteorological Field Units (AMFUs), Krishi Vigyan Kendras (KVKs), and extension personnel who coordinated with farmers, facilitated data collection, and ensured the authenticity of the information presented.

We acknowledge the continuous support and guidance of the leadership of the India Meteorological Department (IMD) and the Ministry of Earth Sciences (MoES) in strengthening agrometeorological services across the country. Their vision and institutional backing have been instrumental in advancing weather-based advisory systems and outreach mechanisms.

We also appreciate the dedicated efforts of scientists and project staff involved in collecting, compiling, reviewing, and presenting these success stories in a systematic way. Their contributions have helped transform field experiences into a valuable knowledge resource for policymakers, researchers, extension workers, and farmers alike. This compendium stands as a testament to the collective commitment of India's agrometeorological community toward promoting climate-resilient agriculture, improving farmer livelihoods, and ensuring sustainable food systems through science-based weather services.

D. S Pai
Head, AASD

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Executive Summary

This compendium presents an overview of the Gramin Krishi Mausam Sewa (GKMS) of the India Meteorological Department (IMD) and the nationwide network of Agro-Meteorological Field Units (AMFUs) that support its implementation. Coordinated by IMD, GKMS links weather forecasting with agricultural decision-making by translating meteorological information into practical advisories that farmers can apply at the field level to minimize losses due to adverse weather conditions. The service focuses on reducing weather-related risks, improving the timing of farm operations, and strengthening resilience under variable weather conditions.

AMFUs play a central role in this process. Located at State Agricultural Universities, ICAR institutes, and other research organizations, these units prepare bi-weekly weather-based agromet advisories by interpreting IMD forecasts in the context of local crops, soil conditions, and crop growth stages. Over time, GKMS has expanded from state-level advisories to cover almost all districts and to provide weather forecasts for more than 7,000 blocks across the country. Recent efforts are directed towards offering more localized services at the panchayat level. A key feature of this compendium is the presentation of farmer's success stories compiled state-wise through 130 AMFUs. These cases show how farmers used weather-based advisories to adjust farm operations from sowing to harvesting, manage irrigation, nutrient application, and pest and disease control, and take timely protective measures during events such as heavy rainfall, heat waves, dry spells, floods, and storms etc. The reported outcomes include yield improvements, reduced input costs, and lower crop losses, with economic benefits ranging from a few thousand to over twenty-five thousand rupees per hectare.

In addition, GKMS is periodically reviewed through the collection of farmer feedback during major crop seasons between 2020 to 2025. The feedback further confirms the usefulness of GKMS advisories. Most farmers reported regular receipt of bi-weekly advisories, primarily through mobile-based platforms such as WhatsApp and SMS. Rainfall and extreme weather forecasts were identified as the most valuable inputs for farm planning, and overall satisfaction with the service remained consistently high. Together, the success stories and farmer feedback presented in this compendium highlight the practical value of GKMS as a field-oriented advisory service. The documentation demonstrates its role in supporting informed decision-making, reducing climate-related risks, and contributing to more resilient agricultural systems across India.

1. Introduction

Agricultural production in India is inherently sensitive to weather variability and extreme meteorological events. A substantial body of national and international research has demonstrated that nearly 60–70% of inter-annual fluctuations in crop production can be attributed to weather-related factors, particularly variability in rainfall and extremes of temperature (Rathore, 2013; FAO, 2017). Post-disaster assessments and sectoral loss analyses further indicate that a large share of crop damage in the country results from weather hazards such as droughts, floods, cyclones, heat waves, thunderstorms, and lightning, leading to significant and recurring economic losses in the agriculture sector (IMD, 2020; NDMA, 2021).

Globally, similar trends have been reported by the Food and Agriculture Organization (FAO), which estimates that more than 80% of total disaster-related losses to crops and livestock in developing regions are linked to weather and climate extremes, with South Asia identified as one of the most vulnerable regions (FAO, 2015). These persistent and large-scale impacts underscore the necessity for anticipatory, weather-informed agricultural planning and risk management systems that can support farmers in making timely and informed decisions.

In response to these challenges, the India Meteorological Department (IMD) has progressively strengthened its institutional role in managing weather-related agricultural risks through the Gramin Krishi Mausam Sewa (GKMS) scheme. Operational since 2007, GKMS is implemented through close collaboration with national and state-level agricultural institutions, including State Agricultural Universities (SAUs), Indian Council of Agricultural Research (ICAR) institutes, and selected Indian Institute of Technology (IITs). The programme delivers bi-weekly, weather-based agrometeorological advisories at the district level in vernacular languages, ensuring that scientifically generated information remains accessible and relevant to farming communities (Rathore & Singh, 2020).

GKMS represents a farmer-centric and science-driven advisory system that translates meteorological forecasts into actionable, crop and location-specific recommendations. By integrating short-range weather forecasts with agronomic expertise, the programme supports farmers in critical decision-making related to sowing schedules, irrigation planning, fertilizer application, pest and disease management, and harvesting operations. Several impact studies have shown that such integration significantly reduces weather-induced crop losses, improves

resource-use efficiency, enhances farm productivity, and contributes to building long-term climate resilience (Chattopadhyay et al., 2018; Singh & Chattopadhyay, 2019).

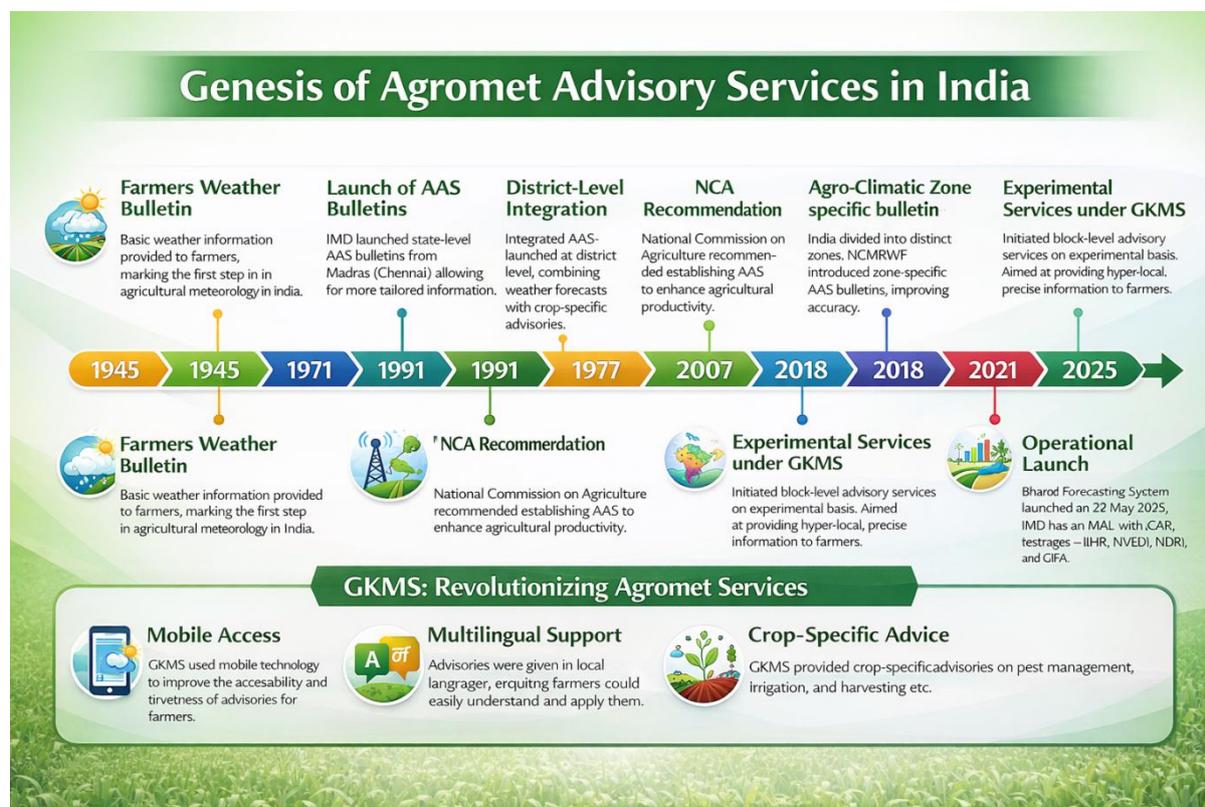


Fig. 1: Genesis of Agromet Advisory Services in India.

The operational framework of GKMS is built on a strong collaborative model that links meteorological science with agricultural extension. IMD provides district- and block-level weather forecasts covering key parameters such as rainfall, maximum and minimum temperature, relative humidity, wind speed, and wind direction. These forecasts are interpreted into practical farm advisories by a nationwide network of 130 Agromet Field Units (AMFUs) located across diverse Agro-Climatic Zones (ACZ) at SAUs, ICAR institutes, and IITs. Fig.1 shows the Network of 130 AgroMet Field Unit (AMFUs) of IMD under GKMS. This decentralized structure ensures both scientific rigor and location-specific relevance of the advisories (Rathore, 2013; Rathore & Singh, 2020).

In recent decades, the agrometeorological services of IMD have achieved several important milestones, reflecting steady progress toward more localized and farmer-oriented weather services. The transition from state-level advisories to district-level services, followed by the introduction of block-level agromet advisories in 2018, marked a significant step in strengthening weather-based decision support for agriculture. The subsequent expansion to

Panchayat level weather forecasts further demonstrates IMD’s commitment to bringing weather information closer to the farm and farmer. A major milestone in this evolution was the introduction of Panchayat level weather forecasts in October 2024, implemented jointly by IMD and the Ministry of Panchayati Raj (MoPR). This initiative has enabled hyper-local weather services and strengthened last-mile connectivity by delivering village-level forecasts through digital governance platforms such as e-GramSwaraj, the Meri Panchayat App, eManchitra, and IMD’s Mausamgram. These forecasts are directly accessible to Panchayat representatives, including Sarpanches, thereby supporting localized planning, preparedness, and community-level decision-making.

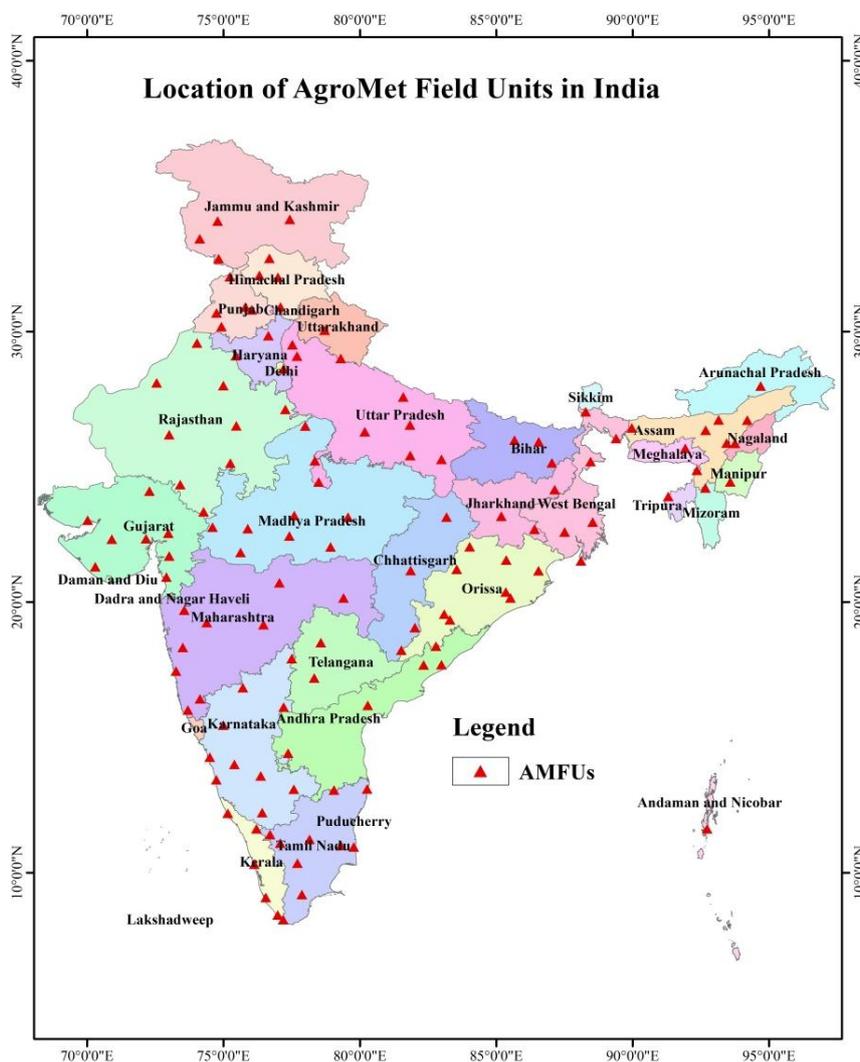


Fig. 2: Network of 130 AgroMet Field Units (AMFUs) of IMD under GKMS

IMD has also expanded digital service delivery through sector-specific mobile applications. The Meghdoot mobile application, launched in 2019, provides weather-based agromet advisories to farmers, while the Mausam app offers general weather services and the Damini app delivers real-time lightning alerts. In parallel, institutional collaborations have been strengthened with the Ministry of Rural Development (MoRD) to support advisory dissemination through community-based networks such as Krishi Sakhis and Pashu Sakhis, improving outreach among farming households.

To strengthen the observational foundation of Agromet Advisory Services (AAS), IMD has installed around 200 Agro-Automatic Weather Stations (Agro-AWS) at Krishi Vigyan Kendra (KVK) premises. These stations provide high-quality agrometeorological observations, including rainfall, air temperature, wind speed and direction, relative humidity, bright sunshine hours, and soil moisture and soil temperature. The availability of such localized observations has contributed to improved accuracy and relevance of agromet advisories.

Advisories under GKMS are disseminated through a diversified communication network that includes traditional media, mobile-based SMS services, digital portals, and mobile applications, reaching approximately 2.7 crore farmers. In addition, AMFUs actively use social media platforms to share real-time advisories and weather warnings in local languages. Studies indicate that this multi-channel dissemination approach enhances farmer awareness, trust, and adoption of weather-based advisories, particularly during extreme weather situations (Chattopadhyay & Singh, 2019).

The advisory content itself is comprehensive and tailored—crop-specific, multilingual, and spanning the entire crop production cycle from land preparation and sowing to irrigation management, pest and disease control, and harvesting. Agromet Advisory Bulletins include structured five-day weather forecasts along with impact-based recommendations, enabling farmers to align farm operations with anticipated weather conditions. The overarching objective of GKMS is to minimize weather-related agricultural risks, optimize input use, promote climate-smart practices, and ultimately enhance farm income and livelihood security (Chattopadhyay et al., 2018).

An important strength of GKMS lies in its emphasis on feedback, learning, and outcome assessment. AMFUs maintain continuous engagement with farming communities to evaluate the usefulness and timeliness of advisories and to document success stories that reflect field-level impacts. These success stories capture farmers' voices and provide concrete

evidence of benefits such as yield improvement, cost savings, and reduced crop damage during adverse weather events. Empirical studies indicate that farmers who regularly use agrometeorological advisories are better equipped to undertake timely, event-based farm operations, especially under conditions of weather extremes (Singh & Chattopadhyay, 2019).

The compilation of such experiences into a dedicated compendium is therefore essential. A consolidated repository of success stories not only demonstrate the practical value of weather-based advisories but also facilitates cross-learning among farmers, extension workers, researchers, and policymakers. International experiences from Africa, Southeast Asia, and Latin America similarly highlight that systematic documentation of farmer feedback and outcomes strengthens the effectiveness, credibility, and uptake of climate services in agriculture (Hansen et al., 2019; Sivakumar et al., 2014; McKune & Hutchinson, 2013).

In this broader national and global context, the GKMS compendium serves as both an evidence base and a learning tool. By bringing together field-level experiences across diverse agro-ecological regions, it highlights adaptive practices, reinforces climate-resilient farming strategies, and provides valuable insights for the continuous refinement of agrometeorological advisory services. Through its integrated approach to forecasting, advisory dissemination, farmer engagement, and capacity building, GKMS has emerged as a nationally significant decision-support system contributing to sustainable and climate-resilient agriculture in India.

The success stories presented below are organized state-wise and Agromet Field Unit (AMFU)-wise, showcasing the pan-India coverage of the GKMS. These cases demonstrate farmers' experiences in effectively using weather-based agromet advisories to improve farm operations, reduce weather-related risks, and enhance productivity for their farm. Together, they provide field-level evidence of the reach and impact of GKMS across the country.

2. State-wise Success Stories

2.1 Andhra Pradesh

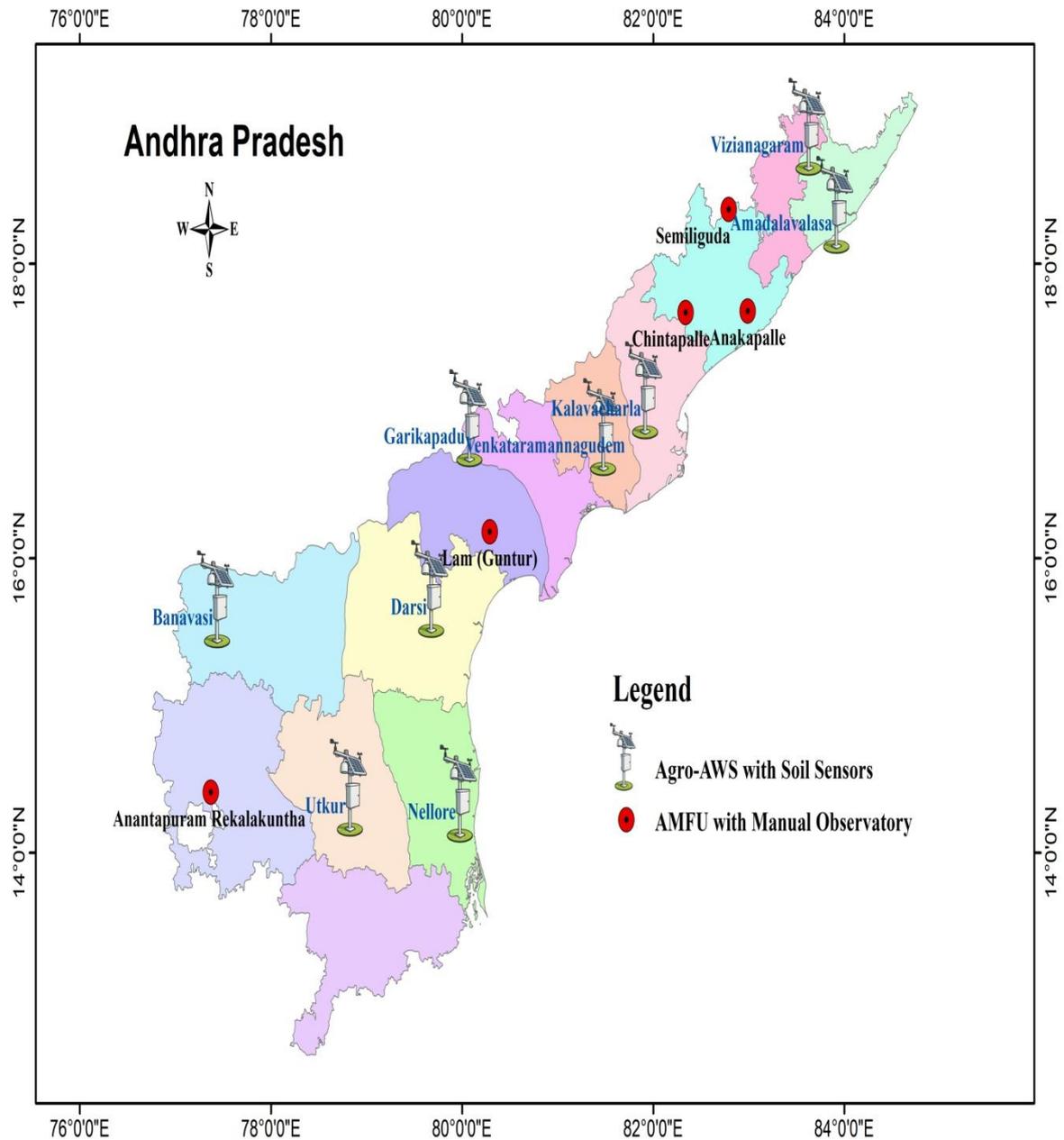


Fig. 3: Schematic map of Andhra Pradesh showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.1.1 Weather-Smart Paddy Harvesting amid Cloudy and Rainy Conditions in Anakapalle District - AMFU, Anakapalle

Weather Related Challenges during 2024-25

In December 2024, during the peak harvesting period of *Rabi* paddy in the North Coastal Zone of Andhra Pradesh, farmers experienced continuous cloud cover and moderate rainfall. These weather conditions resulted in grain germination due to rainwater exposure and discoloration of harvested paddy, which adversely affected its market value.

Agromet Advisory issued and Interventions Suggested

The AMFU, Anakapalle, issued timely Agro Advisory Bulletins (Nos. 101, 102 & 103) and special district-specific bulletins and warned of continuous cloud cover and moderate rainfall.

Key recommendations included:

- Postpone harvesting of paddy in view of rains.
- If already harvested heap the produce and cover with tarpaulin sheet or keep in safe shaded place.
- Immediate draining of stagnated water from the fields during heavy rainfall events.
- Postpone sowing of *Rabi* crops.
- Harvesting of matured vegetables and sending to the market immediately and making arrangements for draining excess water in standing vegetable crop to prevent rotting diseases and drenching the crop with COC @ 3g/L after cessation of rain.

Farmer Response and Field-Level Action

Farmer Name: Mr. Virodi Simhachalam, **Village:** Medivada, **District:** Anakapalle

Crop(s): Paddy (Variety: BPT 5204), **Crop type:** Cereals.

The farmer has been actively receiving and following Agromet Advisory Bulletins issued by AMFU, Anakapalle. These bulletins guided him in scheduling critical farm operations and acting on the forecast issued during peak harvesting period of rice in December, Simhachalam postponed harvesting of his crop; this timely decision saved his produce.

Outcome and Reported Benefits

Reported yield impact: Crop saved during the rainfall event in the peak harvesting period and yield losses minimized and fetched good price.

Reported economic benefit: ₹19,000/- per acre.



Fig. 4: Weather forecast–based farm operations implemented by farmer V. Simhachalam in a paddy field

2.1.2 Weather-Savvy Groundnut Farming Turns Weather Risks into Farmer Profits - AMFU, Ananthapuramu

Weather-Related Challenges during *Kharif* 2024

During the 2024 *Kharif* season, farmers experienced prolonged dry spells in July & September months and intense heavy rainfall events in August month. These erratic weather conditions resulted in soil moisture stress, crop wilting, and increased risk of waterlogging, posing a serious threat to crop yield and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Ananthapuramu, issued timely advisories on July Month (dry spell conditions) and 17th & 20th August 2024 (heavy rainfall event 115.8 mm & 95 mm).

Key recommendations included:

- Protective irrigation during dry spell conditions and foliar spray of KNO₃ (Potassium Nitrate) as an alternative measure to sustain crop growth.
- Farmers are advised to practice soil moisture conservation practices in rainfed groundnut which helps in alleviate moisture stress during the dry spell period while also acting as a drainage channel during heavy rainfall.
- Farmers are advised to take up inter-cultivation and apply gypsum @200 kg/ acre to groundnut crop at 30 to 35 days or maximum flowering stage.

- Drain out excess water during heavy rainfall events to prevent root damage and reduce the incidence of pest and diseases and postponement of spraying operation during the period.

Farmer Response and Field-Level Action

Farmer Name: Mr. Mandli Narasimhudu, **Village:** Peravali, **District:** Ananthapuramu
Crop(s): Groundnut, **Crop type:** Oil seed.

Farmers provided lifesaving irrigations in the month of July, following the dry spells forecast. The forecast of rainfall in the month of August during which crop is at flowering to pegging stage, the farmer was advised to provide irrigations only, if necessary, which resulted in minimising the irrigation costs during forecast days. This has saved the cost of chemical and labour charges by going for spraying during dry days. Further, it was suggested to go for adding gypsum during rainy days forecast in the August month. This helped farmer to get maximum benefit with good pegging and pod filling.

Outcome and Reported Benefits

Reported yield impact: Crop saved during dry spell and yield losses minimized during heavy rainfall. Addition of gypsum during rainy days forecast in the August month helped farmer to get maximum benefit with good pegging and pod filling.

Reported economic benefit: ₹86,000/- per ha.



Fig. 5: Farmer Mandli Narasimhudu proving feedback on agro advisory services

2.1.3 Turning Forecasts into Protection: Crops Saved During Cyclone ‘Montha’ - AMFU, Chintapalli

Weather-Related Challenges during Cyclone Montha (October 2025)

During 29th and 30th October 2025, the Alluri Sitharama Raju district experienced heavy rainfall accompanied by strong winds due to Cyclone Montha. Such extreme weather posed a serious threat to standing crops, especially paddy nearing harvest and other field crops, due to risks of lodging, grain discoloration, waterlogging, and yield loss.

Agromet Advisory Issued and Interventions Suggested

The Agrometeorological Field Unit (AMFU), RARS, Chintapalli, issued a district-level agromet advisory bulletin on 28th October 2025, warning farmers about heavy rainfall and strong winds associated with Cyclone Montha.

Key recommendations included:

- Advance harvesting of paddy that had reached maturity to avoid lodging and grain quality deterioration.
- Ensuring proper drainage in crop fields to prevent water stagnation and soil erosion.
- Avoidance of fertilizer and pesticide application during the cyclone period.
- Protection of standing crops by timely removal of excess water after heavy rains.

Farmer Response and Field-Level Action

Farmer Name: Mr. V. Sathibabu, **Village:** Ebolam, **District:** Alluri Sitharama Raju
Crop(s): Rice (Paddy), Niger, and other field crops **Crop type:** Cereals.

The farmer closely followed the agromet advisory issued prior to the cyclone. As advised, he harvested the paddy crop in advance before the onset of heavy rains. For the remaining crops such as niger and other field crops, he ensured proper drainage and avoided field operations during the cyclone period.

Outcome and Reported Benefits

Reported yield impact: Paddy safely harvested ahead of cyclone impact, preventing damage and post-harvest losses. Standing crops effectively protected from waterlogging and lodging.

Input costs reduced by avoiding unnecessary chemical sprays.

Reported economic benefit: ₹10,000/- to ₹15,000/- (approx.) per acre.



Fig. 6: Farmer Sathibabu harvest paddy early to prevent damage from heavy rainfall

2.1.4 Climate-Responsive Crop Management under Variable Weather Conditions - AMFU, Lam

Weather-Related Challenges during *Kharif* and *Rabi*, 2024

During the 2024 *Kharif* season, farmers experienced heavy rainfall in the month July, which led to waterlogging and lodging of crops. In contrast, the *Rabi* season was marked by deficient Northeast monsoon rainfall, accompanied by prolonged dry spells. These conditions forced upland crops to depend on residual soil moisture and resulted in terminal moisture stress. The combination of excess rainfall during *Kharif* and rainfall deficit during *Rabi* created favourable conditions for the incidence of pests and diseases such as fall armyworm, wilting, and sucking pest complexes. Consequently, crop yield and quality were adversely affected in several locations.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Lam, Guntur, Andhra Pradesh issued timely agrometeorological advisories on 13th July 2024 (heavy rainfall conditions) along with pre-warnings and post remedial measures. During the *Rabi* season, advisories were also issued to address the increased incidence of fall armyworm in maize due to cool and dry weather conditions.

Key recommendations included:

- Delayed sowing of direct-seeded rice in command areas under heavy rainfall conditions, which was adopted over 30 acres.
- Safe drainage of excess stagnated water from fields following heavy rains.
- Provision of protective irrigation during dry spells and foliar application of potassium nitrate (KNO₃) to sustain crop growth under moisture stress.

Farmer Response and Field-Level Action

Farmer Name: Shri Raavi Srihari, **Village:** Ipuru, **District:** Bapatla

Crop(s): Maize, **Crop type:** Cereals.

The farmer effectively implemented the agro-met advisories for real-time monitoring and management of fall armyworm in maize, a pest that had caused significant economic losses in the village. Timely advisories from AMFU, Lam enabled early detection, continuous monitoring, and prompt control measures, thereby preventing severe damage to the crop.

Outcome and Reported Benefits

Reported yield impact: The farmer obtained normal maize yields compared to neighbouring farmers, who recorded lower yields due to severe fall armyworm infestation in the cobs.

Reported economic benefit: ₹2,000/- to ₹3,000/- per acre was saved through accurate forewarning that facilitated timely monitoring and control of pest outbreaks.



Fig. 7: Farmer Raavi Srihari utilised weather & pest advisory to mitigate maize yield loss

2.1.5 Forecast-Driven Harvesting Protects Kharif Black Gram - AMFU, Tirupati

Weather-Related Challenges during *Kharif* 2025

During the 2025 *Kharif* season, farmers experienced heavy and erratic rainfall during October and November. These adverse weather conditions led to waterlogging and excess soil moisture stress, resulting in crop lodging and partial submergence. Such conditions posed a serious threat to crop yield and quality, particularly in low-lying areas.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Tirupati, issued timely agrometeorological advisories on 12th and 16th September, 2025 (Bulletin No: 73 and 74) warning of heavy rainfall events.

Key recommendations included:

In view of continuous rainfall, farmers were advised to immediately harvest matured black gram crops and ensure safe storage and protection of harvested produce on threshing floors.

Farmer Response and Field-Level Action

Farmer Name: Mr. Guru, **Village:** Produtur, **District:** YSR Kadapa

Crop(s): Black gram, **Crop type:** Pulses.

The farmer cultivated black gram over an area of 2 acres under lowland conditions, where even 25 mm of rainfall can cause water stagnation. Based on the heavy rainfall forecast issued for the period 12–17 September, the farmer promptly harvested the mature crop using a tractor and additional labour. This timely action helped safeguard the produce and prevented complete crop loss. In contrast, farmers who did not follow the advisory experienced significant crop damage and yield loss.

Outcome and Reported Benefits

Reported yield impact: Crop damage was minimized and yield losses were significantly reduced despite heavy rainfall conditions.

Reported economic benefit: An estimated saving of ₹10,000/- per acre was achieved through timely harvest guided by accurate agrometeorological advisories.

2.2 Arunachal Pradesh

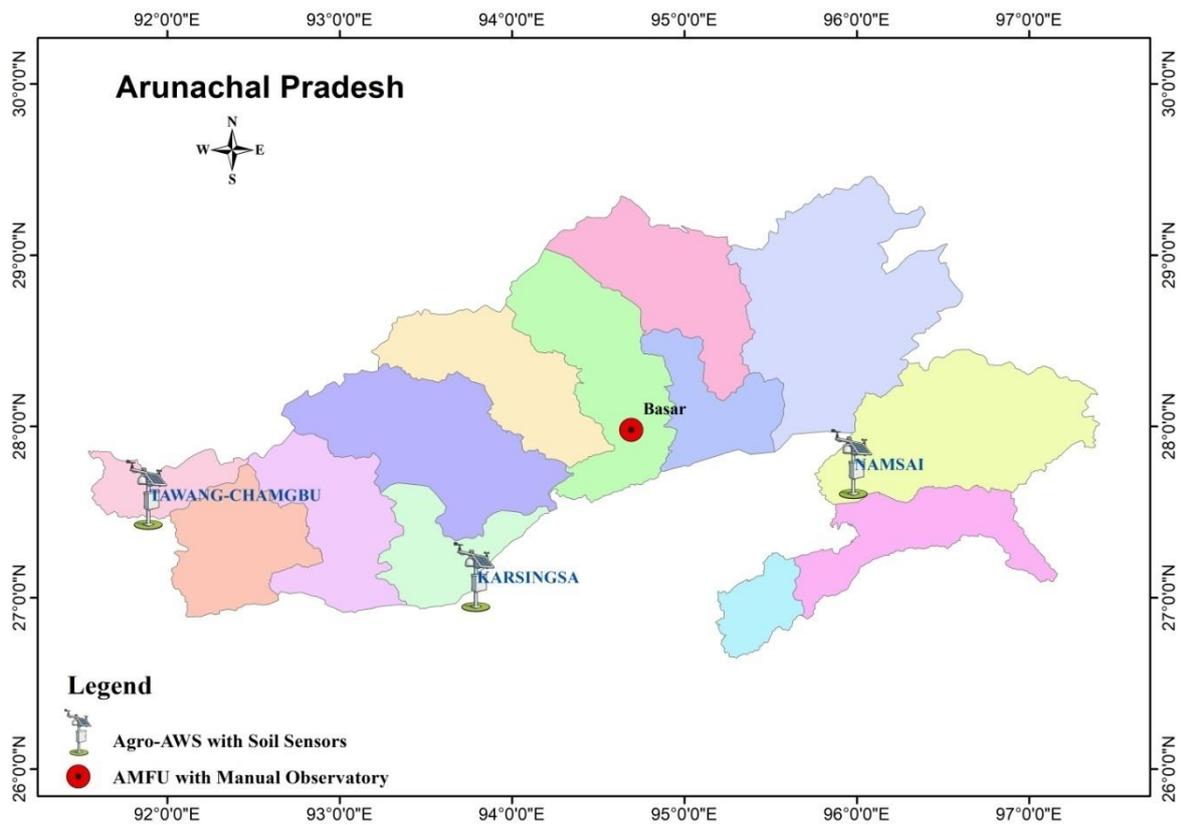


Fig. 8: Schematic map of Arunachal Pradesh showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.2.1 Early Warning, Reduced Loss: A *Kharif* 2025 Jhum Paddy Success Story - AMFU, Basar

Weather-Related Challenges during *Kharif* 2025

During June, the entire state of Arunachal Pradesh experienced persistent and high-intensity rainfall events. The cumulative rainfall for the month was 518.1 mm at West Siang District, which was approximately 86% above the normal rainfall for the month. Such anomalously high precipitation during the main cropping season resulted in widespread flooding, excessive surface runoff, and landslides in the hilly regions.

Agromet Advisory Issued and Interventions Suggested

On 24th June 2025, the Agrometeorological Field Unit (AMFU), Basar issued agro-advisories forecasting heavy rainfall during the ensuing week and alerted farmers in advance to enable timely preparedness and risk-mitigation measures.

Key recommendations included:

- Place logs or bamboo barriers along contour lines to reduce runoff and soil erosion.
- Provide proper diversion drains to safely channel excess rainwater away from fields.
- Apply organic mulching to check soil erosion and protect soil structure.
- Avoid the application of fertilizers and pesticides before and during the heavy rainfall period.

Farmer Response and Field-Level Action

Farmer Name: Mr. Yito Riram, **Village:** Sago, **District:** West Siang

Crop(s): Jhum Paddy (Upland Paddy), **Crop type:** Cereals.

On 25th June 2025, the area around the village experienced an intense rainfall event of 185 mm, triggering widespread runoff and near-flood conditions. Many farmers in the village suffered significant crop damage due to unprepared fields. However, Yito's proactive measures following the advisories ensured that his paddy fields remained intact.

Impact and Economic Gains: He estimates that his timely response, guided by the weather advisory, helped him avoid losses of around ₹30,000/-. His experience highlights how warnings can turn uncertainty into preparedness.



Fig. 9: Advisory-based actions helped farmer Yito Riram safeguards his paddy field

2.3 Assam

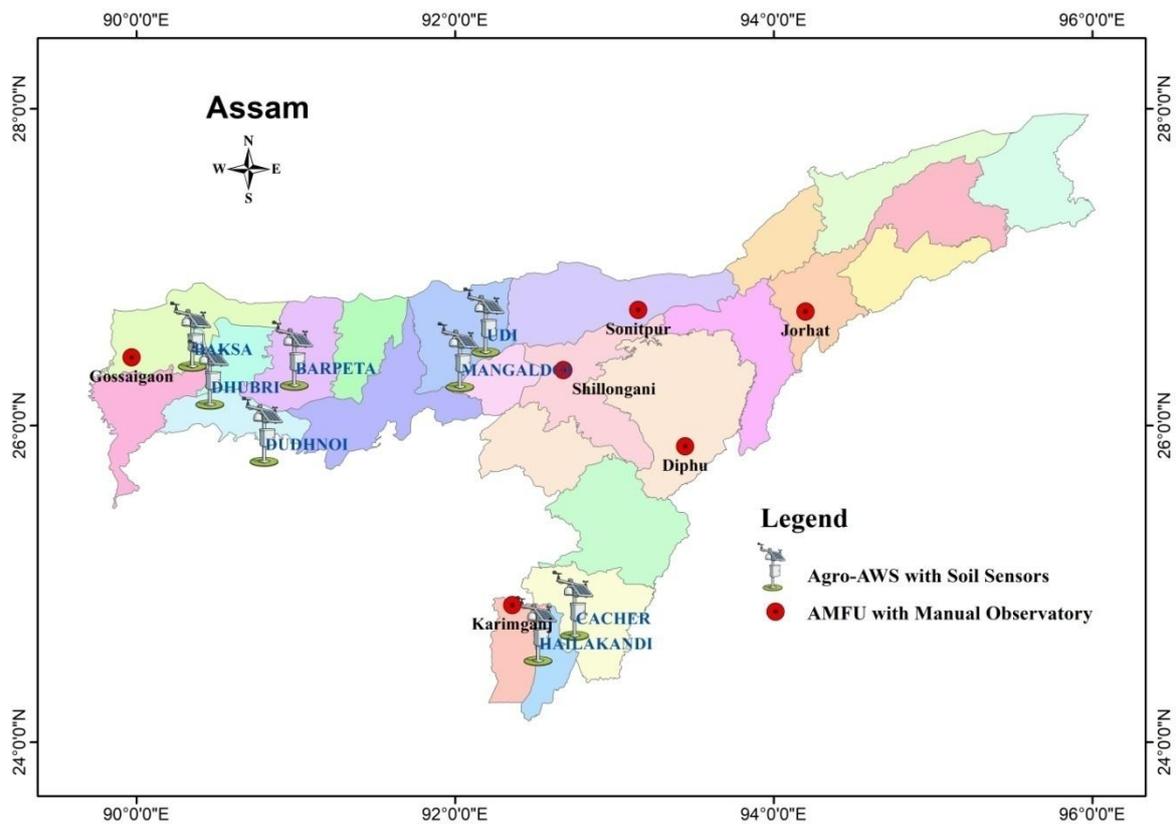


Fig. 10: Schematic map of Assam showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.3.1 Advisory Protects *Rabi* Crops from Dry and Cold Weather Condition - AMFU, Diphu

Weather-Related Challenges during *Rabi* 2024

In the 2024 *Rabi* season, farmers are facing a tough environment. December began with dry and low temperature weather. This specific combination of cold and lack of moisture is creating serious problems for key winter crops. Farmers are particularly concerned about the growth of Boro rice, mustard, *Rabi* maize, potatoes, and various winter vegetables.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Diphu, issued timely agrometeorological advisories on 20th December 2024 (dry and cold weather condition).

Key recommendations included:

- As there was no rainfall in past week and due to dry weather condition timely sown mustard crop may affect as the crop is in flowering stage advice for irrigation.
- Farmers are also advice for thinning and weeding of the mustard crop and as due to low temperature aphids may be seen in the field and may control by used chemical like Thiamethoxam 25 WG @ 12.5g a.i./ha or 0.2g/l against aphids.
- Farmers advice for weeding the maize field as a when necessary and also advice for monitor the crop against Aphids and stem borer in the Maize field. The dead hearts should be pulled out and destroyed to kill the lingering stage of the stem borer pest in the stubbles and control measure farmers may use yellow sticky cards and light trap and also advice for one weeding in maize field.

Farmer response and field-level action

Farmer Name: Mr. Baloram Sarongsa, **Village:** Silputa Nagarjan, **District:** Karbi-Anglong, **Crop(s):** Mustard & maize, **Crop type:** Cereals & Oil seed.

By following the expert advice immediately, the farmer was able to protect their crops from the harsh dry and cold. These quick actions prevented major damage and kept the plants healthy despite the difficult weather.

Outcome and Reported Benefits

Reported yield impact: Crop saved during dry and low temperature and yield losses minimized during adverse weather.

Reported economic benefit: Mustard: ₹25,000/- per acre and *Rabi*-Maize: ₹50,000/-.



Fig. 11: Farmer Baloram adopted measures to mitigate the impact of dry and cold stress on crops

2.3.2 Flood-Induced Disruption of Rice Cultivation - AMFU, Gossaigaon

Weather related challenges during *Kharif* 2025

During the *Kharif* season which is the main season for the winter rice. But due to extremely heavy to very heavy rainfall which lead to flood like situation in the month of July therefore most of the seedling were damaged and farmers were unable to transplant the seedling in the main field in time due to water logging in the field.

Agromet Advisory Issued and Interventions Suggested

AMFU, Gossaigaon, issued timely agrometeorological advisories on 9th July 2024 and 16th July 2024 for contingency planning based on situation and weather forecast.

Key recommendations included:

- Go for re sowing of medium and short duration rice varieties.
- Farmers are suggested to wait until the flood water recede from the main field then go for transplanting the seedling whose farmers seedling were not damaged.

Farmer Response and Field-Level Action

Farmer name: Mrs. Banajit Barmon, **Village:** Barshetri Barni, **District:** Nalbari

Crop(s): Sali Rice (Winter Rice), **Crop type:** Cereals.

The above farmer nicely implemented the advisories. Accordingly, the farmer re sowing the seed of medium duration rice variety in the nursery bed as his seedling was damaged by the

extremely heavy rainfall. Timely intervention by the farmer able him to harvest the crop in time without any loss otherwise he would be without harvest during the main Sali rice season.

Outcome and Reported Benefits

Reported yield impact: Got the bumper yield in medium duration rice variety.

Reported economic benefit: ₹15,000/- per ha.



Fig. 12: By following agromet advisories, farmer Banajit delayed rice transplanting and prevented crop damage from heavy rainfall

2.3.3 Proactive Advisory Minimizes Drought Impact on *Kharif* Crops – AMFU, Jorhat

Weather-Related Challenges during *Kharif* 2025

During the 2025 *Kharif* season, extended dry periods in July disrupted farming activities. The insufficient and irregular rainfall led to crop water stress, inadequate standing water, and wilting, significantly threatening both yield and crop quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU Jorhat issued timely agrometeorological advisories on 12th August 2025 (due to inadequate rainfall in July).

Key recommendations included:

- Nursery raising of the photo insensitive short duration (90-100 days) varieties like Luit, Kopilee and Dishang or recommended late sowing rice varieties like Monoharsali, Salpona, Prasadbhog, Gobindabhog etc is advocated for areas where the *sali* rice crop was totally damaged due to drought like condition or for those farmers who have not yet started its cultivation due to insufficient standing water in the field.
- The tender seedlings of these varieties can be transplanted during 1st week of September.

- Before sowing the seeds, treat the seeds with 4% MOP (KCL) @600ml/kg of seed for 24 hours and dry in shade for 24 hours.
- Maintain standing water of 5±2cm depth in the field from the active tillering stage.

Farmer Response and Field-Level Action

Farmer's Name: Mr. Manash Jyoti Bora, **Village:** Na-Bora Gaon, **District:** Jorhat **Crop(s):** *Sali* rice (Monoharsali), **Crop type:** Cereals.

Real time adoption of advisories in August allowed the farmer to carry out timely interventions that mitigated crop damage during the drought like situation in July. Improved crop management based on these recommendations led to enhanced crop performance throughout the *Kharif* season.

Outcome and reported Benefits

Reported yield impact: Yield losses minimized during drought like situation of *Kharif* rice.

Reported economic benefit: ₹12,750/- per bigha (Total area cultivated under rice: 12 bighas.



Fig. 13: Advisory-based measures adopted by farmer Manash to mitigate drought stress in rice

2.3.4 Reducing Flood-Related Crop Loss during *Kharif* 2025 through Weather Forecast Based Farm Advisories – AMFU, Karimganj

Weather-Related Challenges during *Kharif* 2025

During the 2025 monsoon season, AMFU-Karimganj adopted a proactive approach to reduce flood-related crop damage.

Weather forecast and advisories before flood and Interventions

In the first week of July 2025, Karimganj district experienced a flash flood due to very heavy rainfall. Prior to this event, AMFU-Karimganj issued the following weather warning based on IMD forecasts: Heavy to very heavy rainfall is predicted from 1st to 4th July, 2025.

Advisories issued before flood

- Farmers were advised to withhold transplanting of Sali rice during the period of heavy to very heavy rainfall (1st-4th July 2025).
- Farmers were advised not to spray any fertilizers or plant protection chemicals during heavy rainfall to avoid economic loss.

Farmer Response and Impact

Farmer name: Mr. Khalil Ali, **Village:** Akbarpur, **District:** Karimganj

Crop: Rice, **Crop type:** Cereals.

Mr. Khalil Ali is a regular follower of the Agromet Advisory Bulletin issued by AMFU-Karimganj. After receiving timely weather warnings and advisories, he withheld transplanting Sali rice during the forecasted heavy rainfall period. As a result, his crop escaped damage from floodwater.

Outcome and reported Benefits

Reported yield impact: Advisories helped to avoid flood-related crop loss.

Reported economic benefit: Net profit of ₹12,000/- to ₹15,000/- per bigha due to reduced input losses and improved crop performance.



Fig. 14 : Farmer Khalil Ali delayed rice transplanting to avoid flood damage

2.3.5 Minimization of *Kharif* Maize Crop Loss under Heavy Rainfall - AMFU, Sonitpur

Weather-related challenges during the *Kharif* 2024 season

In 2024, Assam received intense and prolonged monsoon rainfall leading to waterlogging, flooding and delayed crop operation is early in the *Kharif* season. Standing crops such as maize, paddy, and vegetables were particularly affected during sensitive growth stages.

Agromet Advisory Issued and Interventions Suggested

Heavy rainfall caused waterlogging in maize fields during the critical cob development stage (1st week of August)

Key recommendations included:

- Immediately remove standing water from fields using available drainage channels or temporary furrows.
- In waterlogged patches where drainage is not possible, harvest green cobs early to avoid crop loss. Use the remaining biomass as livestock feed to minimize economic loss.

Farmer Response and Field-Level Action

Farmer Name: Sri Harendra Neog, **Village:** Chamua, **District:** Lakhimpur

Crop: Maize, **Crop type:** Cereals.

Sri Harendra Neog, a dedicated farmer from Chamua village in Lakhimpur district, cultivated maize during the last *Kharif* season. During the critical cob development stage, his field experienced heavy rainfall, leading to waterlogging conditions, which could have adversely affected the crop. As advised, he drained out excess water from the maize field to reduce waterlogging stress. In portions of the field where drainage was not feasible, he harvested green cobs at an early stage and utilized the remaining crop biomass as fodder for livestock, thereby minimizing economic loss.

Outcome and Reported Benefits

Reported yield impact: Avoided crop damage through timely action. Saved partial yield by harvesting green cobs. Made efficient use of crop biomass as fodder.

Reported economic benefit and Area under Cultivation: 2.0 bigha Yield of green cobs: 3-4 quintals/bigha and Price of green maize: ₹1,200/- to 1,500/-quintal.



Fig. 15: Advisory-based early harvesting and biomass utilization helped farmer Harendra Neog mitigate crop loss

2.4 Bihar

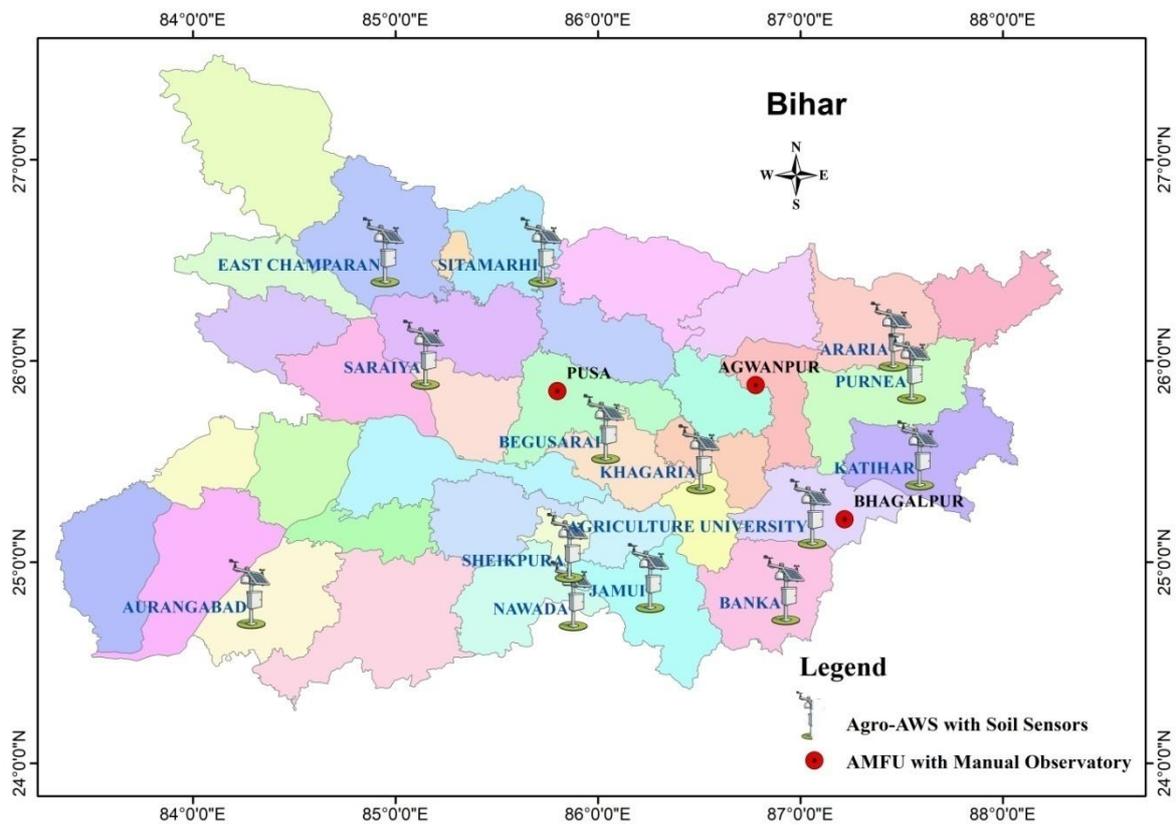


Fig. 16: Schematic map of Bihar showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.4.1 Livestock Protection during Cold Days - AMFU, Agwanpur

Weather-Related Challenges during winter season 2024

During the 2024 winter season, farmers experienced prolonged Cold day in last month of December. These weather conditions resulted in cold stress all living likely Cow, and buffalo.

AMFU Issued Agromet Bulletin and Interventions Suggested

The AMFU, Agwanpur, issued timely agro meteorological advisories on 27th December 2024(cold conditions) and 31st December 2024(cold day and cold speedy wind event).

Key recommendations included:

- Protective, keep the cattle shed clean and tidy and do not let the fur of the cattle shed get wet. Wipe the body of animals several times a day during extreme cold by soaking a cloth in lukewarm water.
- Always feed clean and fresh water to animals several times a day.

Farmer Response and Ground -Level Action

Farmer Name: Mr. Sani Kumar, Village: Sisai, Livestock- Buffalo.

The farmer implemented the advisories in real time. Timely interventions helped in saving the livestock during the cold season and minimizing. Improved cattle management as per advisories contributed to enhanced performance during the winter season.

Outcome and Reported Benefits

Reported yield impact: Protect cattle (Buffalo) saved during cold wave and milk losses minimized during this winter season.

Reported economic benefit: ₹ 25,000/- (Milk & Medicine) / 2 buffaloes



Fig. 17: Advisory-based livestock management practices adopted by a farmer Sani to protect buffaloes during cold-wave conditions

2.4.2 Crop and Irrigation Management for *Kharif* Season – AMFU, Pusa

Weather-Related Challenges during *Kharif* season

Rainfall patterns characterized by irregular temporal distribution and moderate rainfall events in September were observed. These deviations from normal climatic conditions induced crop water stress and physiological wilting, thereby elevating the risk of reduced crop yields and compromised produce quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Pusa, issued timely agrometeorological advisories on 14th August 2024 (light rainfall may appear in the coming days) and 12th September 2024 (medium rainfall may be forecasted cast period).

Key recommendations included:

- Transplanting of rice may be suggested only in lowland areas.
- Proper drainage may be provided in the vegetable crops.
- Immediate removal of stagnated water during heavy rainfall events to prevent root damage and reduce the incidence of pest and disease outbreaks.

Farmer Response and Field-Level Action

Farmer Name: Rajesh Ranjan Kumar **Village:** Bhagwanpur, **District:** Muzaffarpur, **Crop(s):** Rice & Vegetables **Crop type:** Cereals & Vegetables.

He used to be a traditional farmer, but since they started getting advisory bulletins, they use advice given in bulletin and do all farm operations based on it. By following the advisory, they saved four irrigations in rice crop in one season.

Outcome and Reported Benefits

Reported yield impact: They save 4 irrigations in the rice crop, through which they save 4000 rupees per hectare.

Reported economic benefit: ₹6,000/- per acre.



Fig. 18: Farmer Rajesh Ranjan Kumar minimised the cost by using advisory

2.4.3 Weather-based Farming Improves Income and Confidence of a Farmer in Banka District - AMFU, Sabour

Weather-Related Challenges during *Kharif* 2025

Agriculture in Banka district is largely rainfed and highly sensitive to weather variability. Farmers frequently face challenges such as erratic monsoon rainfall, dry spells during crop growth, sudden heavy rainfall events, and temperature fluctuations during the *Rabi* season. These uncertainties often result in higher input costs, yield losses, and reduced farm income.

Key recommendations included:

Agrometeorological Advisory Services (AAS) issued on June for Banka district actionable information related to: Suitable sowing and transplanting windows, Weather-based fertilizer and micronutrient application, Pest and disease forewarning, Irrigation scheduling and harvesting advisories.

Farmer Response and Field-Level Action

Farmer Name: Mr. Priyavrat Sharma, **Village:** Bhikhanpur, **District:** Banka, **Crop(s):** Rice, **Crop type:** Cereals.

By following GKMS agromet advisories, the farmer adopted weather-based decisions for sowing, nutrient management, and irrigation. Timely interventions reduced stress during dry spells, minimized losses from heavy rainfall, and improved overall crop performance during *Kharif*.

Outcome and Reported Benefits

Reported cost savings: Reduced expenditure on major inputs under AAS adoption, resulting in an overall saving of approximately ₹2,375/- per acre compared to non-AAS farming practices. Reported economic benefit: Improved net farm income due to optimized input use and timely farm operations guided by agromet advisories.



Fig. 19: Priyavrat managed rice crop stress under dry spells and heavy rain

2.5 Chhattisgarh

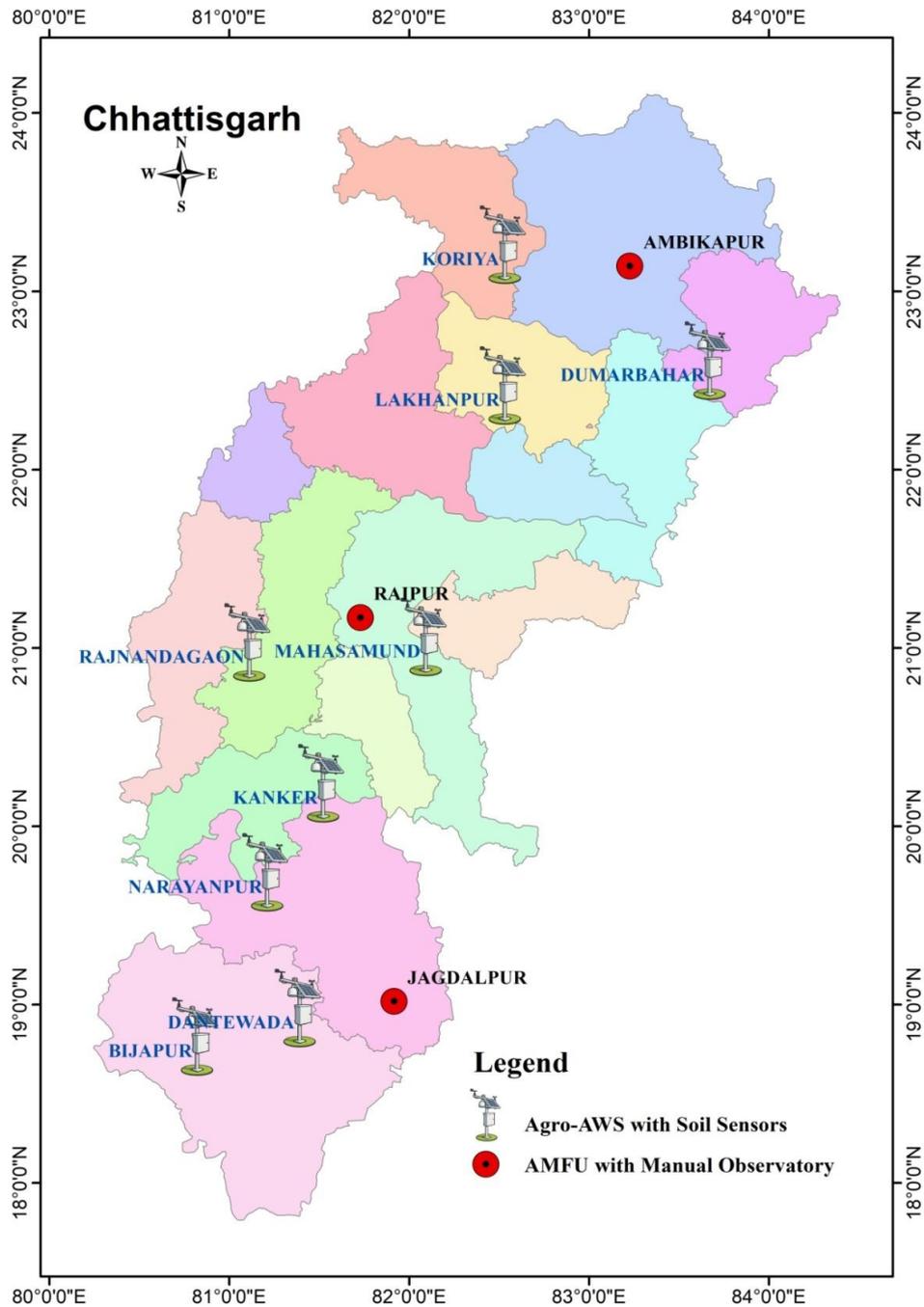


Fig. 20: Schematic map of Chhattisgarh showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.5.1 Protecting Cauliflower during Forecasted Rain in September 2025–AMFU Ambikapur

Weather-Related Challenges during September 2025

In September 2025, farmers in Surajpur and Surguja districts faced forecasted rainfall during the harvesting stage of *Kharif* crops. Untimely rainfall during harvesting posed a risk of yield loss, grain quality deterioration, and post-harvest losses in rice and vegetable crops.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Ambikapur, issued timely agro-meteorological advisories in September 2025, warning farmers about the likelihood of rainfall during harvesting.

Key recommendations included:

- Pre-harvest mature crops to avoid losses due to forecasted rain.
- Ensure proper field drainage to prevent waterlogging in vegetable crops.

Farmer Response and Field-Level Action

Farmer Name: Mr. Shushil Kumar, **Village:** Batouli, **District:** Surguja

Crop(s): Tomato, brinjal and cauliflower. **Crop type:** Vegetables

Outcome and Reported Benefits

Reported yield impact: Pre-harvesting helped avoid crop losses due to forecasted rain.

Reported economic benefit: Farmers protected crops worth ₹1,10,000/-, ₹70,000/-, and ₹20,000/-, respectively.



Fig. 21: Farmer Shushil adopted drainage management and pre-harvesting to protect vegetable crops from heavy rainfall

2.5.2 Protecting Rice and Vegetable Crops during Heavy Rainfall in Kharif 2025 – AMFU, Jagdalpur

Weather-Related Challenges during *Kharif* 2025

During the 2025 *Kharif* season, farmers faced 35-58% above-normal rainfall during July-August, which washed away rice seedlings in delayed fields and increased pest and disease incidence due to high humidity, adversely affecting crop yield and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Jagdalpur, issued timely agro-meteorological advisories bulletins on 13th August 2025 and 26th -27th August 2025 (heavy rainfall event).

Key recommendations included:

- Due to intermittent/heavy rainfall, farmers are advised not to keep the paddy field continuously filled with water.
- Owing to wet field conditions, farmers are advised to undertake earthing up in maize plants and ensure proper drainage.
- Considering the likelihood of rainfall during the *Kharif* season, farmers are advised to make proper arrangements for drainage of excess water from vegetable crop fields.

Farmer Response and Field-Level Action

Farmer Name: Mr. Devendra dewan **Village:** Girola, **District:** Kondagaon

Crop(s): Vegetables.

The farmer implemented the advisory immediately. These timely measures helped protect *Kharif* vegetable crops from heavy rainfall, minimizing damage and improving crop performance during the season.

Outcome and Reported Benefits

Reported yield impact: Crop losses were minimized during the heavy rainfall.

Reported economic benefit: ₹15,000/- to ₹20,000/- per acre.



Fig. 22: Agronomic interventions helped farmer Devendra mitigate excess soil moisture stress in vegetable crops under heavy rainfall

2.5.3 Minimizing Crop Losses during Wet Spells in *Kharif* 2025 – AMFU, Raipur

Weather-Related Challenges during *Kharif* 2025

During the 2025 *Kharif* season, farmers experienced Continuous rainfall events in June and July Month. These erratic weather conditions resulted in increased risk of water logging, crop wilting and posing a serious threat to crop yield and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Raipur, issued timely agrometeorological advisories on 26th June 2025 (wet spell) and 4th July 2025 (heavy rainfall event).

Key recommendations included:

- During forecasted very heavy rainfall, spray fungicides/insecticides only in clear weather and drain excess water quickly.
- During forecasted moderate rainfall, apply weedicide in clear conditions and ensure proper field drainage.

Farmer Response and Field-Level Action

Farmer Name: Shri Pratap Patel, **Village:** Deori, **District:** Mungeli

Crop(s): Rice, Okra & Brinjal, **Crop type:** Cereals & Vegetables.

The farmer implemented the advisories in real time. Timely interventions helped in saving crops and minimizing losses during the heavy rainfall event. Improved crop management as per advisories contributed to enhanced crop performance during the *Kharif* season.

Outcome and Reported Benefits

Reported yield impact:

- Crop saved during wet spell and yield losses minimized during heavy rainfall.
- The farmer postponed the spraying of fungicide/ insecticide/weedicide in the crop field, and Postponed irrigation.

Reported economic benefit: ₹ 2,500/- per acre.



Fig. 23: Farmer Pratap Patel managed crop during heavy rainfall events

2.6 Gujarat

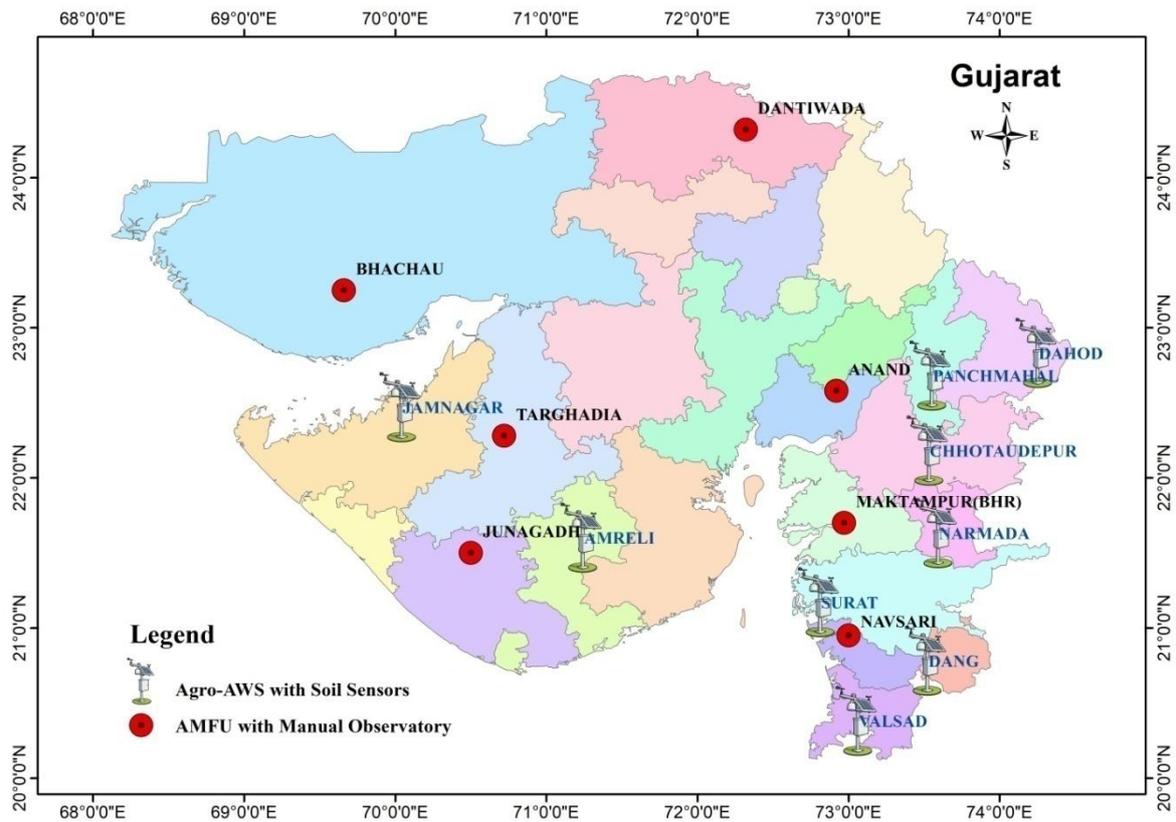


Fig. 24: Schematic map of Gujarat showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.6.1 Weather-Informed Sowing Strategy Improves Rainfed Pearl Millet Performance – AMFU, Anand

Weather-Related Challenges during *Kharif* 2024

During the early *Kharif* season of 2024, farmers in Anand district faced uncertainty regarding the onset and distribution of rainfall. Sowing pearl millet under residual soil moisture without assured rainfall posed a high risk of poor germination, crop failure, and increased cultivation costs due to possible re-sowing.

Agromet Advisory Issued and Interventions Suggested

Agromet Advisory Services issued by AMFU, Anand provided a forecast of light to moderate rainfall during 22nd –26th June 2024 (second fortnight of June).

Key Recommendations Included:

- Scheduling sowing of rainfed pearl millet in alignment with forecasted light to moderate rainfall. Avoiding early sowing under insufficient residual soil moisture conditions.
- Timely application of fertilizers, herbicides, and pesticides based on rainfall and other weather parameters. Planning intercultural operations and harvesting activities according to weather forecasts.

Farmer Response and Field-Level Action

Farmer Name: Sh. Ravindra Mahida, **Village:** Mogar, **District:** Anand

Crop(s): Pearl millet, **Crop type:** Cereals.

Sh. Ravindra Mahida followed the agromet advisory and sowed pearl millet on his three hectares of land only after the forecasted rainfall period. He further adhered to advisories related to herbicide and pesticide spraying, fertilizer application, intercultural operations, and harvesting as per rainfall and weather forecasts issued by AMFU, Anand.

Outcome and Reported Benefits

- Optimum seed germination was achieved due to timely sowing aligned with rainfall.
- In contrast, non-AAS farmers who sowed before the rainfall event experienced poor germination and were forced to re-sow, leading to higher input costs.
- Input cost savings: Approximately ₹8,746/- per hectare compared to non-AAS farmers.

- Improved efficiency in farm operations and reduced weather-related risk.



Fig. 25: Adoption of agromet advisories helped farmer Ravindra Mahida optimize farm operations in pearl millet cultivation

2.6.2 Managing Rainfall Uncertainty in Rainfed Chickpea in *Rabi* 2024-25 – AMFU, Arnej

Weather-Related Challenges during *Rabi* 2024-25

During October 2024, chickpea cultivation in Dholka taluka of Ahmedabad district faced uncertainty in rainfall occurrence and distribution, which is critical for sowing under rainfed conditions. Improper timing of sowing either before or after rainfall often results in poor germination due to inadequate soil moisture, leading to increased input costs and reduced crop establishment.

Agromet Advisory Issued and Interventions Suggested

Agromet Advisory Bulletins (AAB) issued in July 2025

Key recommendations included:

- Sowing of chickpea crop synchronized with forecasted light rainfall to ensure optimum soil moisture for germination.
- Timely application of herbicides and pesticides based on weather conditions.
- Proper scheduling of fertilizer application and intercultural operations as per rainfall and other weather parameters.
- Planning of harvesting operations to avoid weather-related losses.

Farmer Response and Field-Level Action

Farmer Name: Mr. Pratapbhai Boliya, **Village:** Javaraj, **District:** Ahmedabad

Crop(s): Chickpea, **Crop type:** Pulses.

Mr. Pratapbhai Boliya followed the agromet advisories issued by AMFU, Arnej and managed the sowing of rainfed chickpea during October 2024 on two hectares of land based on the forecast of light rainfall. By aligning sowing with the rainfall event, he achieved optimum seed germination. He further followed advisories related to pesticide and herbicide spraying, fertilizer application, intercropping operations, and harvesting as per the weather forecasts.

Outcome and Reported Benefits

By adopting weather-based agromet advisories, the farmer achieved better crop establishment compared to non-AAB-following farmers, whose crops showed poor germination due to delayed sowing under residual soil moisture conditions. As a result of improved planning and efficient input use, Mr. Pratapbhai Boliya saved approximately ₹10,200 per hectare in input costs compared to non-AAB farmers. The case clearly demonstrates that agromet advisory services help farmers make informed decisions, reduce cultivation costs, and improve overall profitability under rainfed farming conditions.

2.6.3 Managing Dry Spell and Erratic Monsoon in Kachchh through Weather-Based Crop Advisory Services – AMFU, Bhachau

Weather-Related Challenges during *Kharif* 2024

During the *Kharif* 2024 season, farmers in Bhachau block of Kachchh district faced multiple weather-related challenges, including uncertain monsoon onset, erratic rainfall distribution, and extended dry spell during August 2024, and fluctuating temperature and humidity conditions. These factors posed serious risks to timely sowing, crop establishment, moisture stress, nutrient loss, and increased incidence of pests and diseases, ultimately threatening crop productivity and farm income.

Agromet Advisory Issued and Interventions Suggested

The Agromet Field Unit under GKMS regularly issued during August 2024.

Key recommendations included:

- Sowing immediately after the first effective rainfall to ensure proper germination.
- Avoiding unnecessary irrigation during forecasted rainfall events.

- Timely fertilizer application aligned with rainfall forecasts to improve nutrient use efficiency.
- Protective irrigation during the August dry spell.
- Temporary reduction of fertilizer dose during moisture stress.

Farmer Response and Field-Level Action

Farmer Name: Mr. Devsibhaiahir, **Village:** Kumbhardi, **District:** Kachchh

Crop(s): Castor, Green gram & Groundnut, **Crop type:** Oilseed & Pulses

Outcome and Reported Benefits

Reported yield impact: Crops survived the August dry spell without major yield reduction; improved crop establishment and overall crop health were observed.

Reported economic benefit: Significant savings in irrigation, fertilizer, and plant protection costs due to advisory based decision making, leading to higher net returns and a profitable harvest.



Fig. 26: Advisory–based interventions helped farmer Devsibhaiahir mitigate dry spell stress in castor crop

2.6.4 From Uncertain Monsoon to Profitable Harvest: A Groundnut Farmer’s -AMFU, Dantiwada

Weather-Related Challenges during *Kharif* 2024

During the *Kharif* 2024 season, Chauhan Jesalsinh Velsinh faced multiple weather-related challenges. These erratic weather conditions posed serious risks to groundnut establishment, growth, and post-harvest quality.

Agromet Advisory Issued and Interventions Suggested

Weather-based agromet advisories were issued *Kharif* and these advisories rainfall distribution, dry spell alerts, humidity conditions, and harvest-time rainfall warnings.

Key recommendations included:

- Timely sowing immediately after receipt of first effective monsoon rainfall. Avoidance of premature sowing to reduce risk of re-sowing
- Scheduling irrigation based on weekly rainfall forecasts. Protective irrigation during August dry spell
- Temporary reduction in fertilizer dose during stress periods

Farmer Response and Field-Level Action

Farmer Name: Mr. Chauhan Jesalsinh Velsinh, **Village:** Chauhangadh, **District:** Banaskantha, **Crop(s):** Groundnut, **Crop type:** Oilseed.

Outcome and Reported Benefits

Reported yield benefit: 2,200 kg/ha of groundnut. Reported economic benefit: ₹20,000/- to ₹25,000/-



Fig. 27: Forecast-based irrigation management adopted by farmer Chauhan

2.6.5 Forecasts Help Farmers Manage Monsoon Risks and Improve Farm Profitability
– AMFU, Targhadia

Weather-Related Challenges during *Kharif* and *Rabi* Seasons of 2024

Earlier, cotton seeds were sown under dry conditions before the monsoon without reliable rainfall information, leading to frequent seed germination failure and economic losses. Prolonged monsoon conditions also affected crop choice decisions, while untimely rainfall caused post-harvest losses in groundnut.

Agromet Advisory Issued and Interventions Suggested

Agromet Advisory Bulletins, weather forecasts, and SMS alerts issued *Rabi* Seasons of 2024.

Key recommendations included:

- Avoidance of pre-monsoon dry sowing of cotton and sowing only after receipt of adequate rainfall. Proper and precise use of nitrogenous fertilizers.
- Use of light traps for monitoring pink bollworm moth activity. Adoption of alternate row irrigation to improve water-use efficiency.

Farmer Response and Field-Level Action

Farmer Name: Mr. Dipakbhai Pravinbhai Vikani, **Village:** Bhayavadar, **District:** Rajkot
Crop (s): Cotton, Groundnut, Sesame, Tomato & Coriander, **Crop type:** Cash crop, Oilseed, Vegetable, Spice.

Mr. Dipakbhai Vikani, a progressive farmer owning 6.4 hectares of land, regularly received weather forecasts, agromet advisory bulletins, and SMS alerts from AMFU–Targhadia. He followed advisories related to cotton sowing time, pest management, fertilizer application, and irrigation scheduling. Based on rainfall forecasts, he avoided dry sowing of cotton, effectively managed pink bollworm infestation within ETL, and optimized input use.

Outcome and Reported Benefits

Due to regular and timely use of agromet advisories:

- Cotton productivity increased by 625-750 kg/ha with reduced cost of cultivation.
- Timely crop diversification ensured better income stability.

2.6.6 Safeguards Mature Mango Crop from Pre-Monsoon Activities high wind speed and heavy rainfall in South Gujarat – AMFU, Navsari

Weather-Related Challenges during the Pre- Monsoon

The mango grower of South Gujarat was at a critical maturity and marketing stage of his orchard when an adverse weather situation developed. On 06th May 2025, weather forecasts indicated the possibility of thunderstorms accompanied by high wind speed and heavy rainfall over the region.

Agromet Advisory Issued and Interventions Suggested

Based on the weather forecast for 6th May 2025, AMFU–Navsari issued a location specific agromet advisory to protect mango crops at maturity and selling stage.

Key recommendations included:

- Orchard Protection: Provide support to heavily laden mango branches using props to prevent breakage due to high wind speed.
- Drainage Management: Ensure proper drainage in orchards to prevent waterlogging due to heavy rainfall.

Farmer Response and Field-Level Action

Farmer Name: Mr. Bhavin Dixit, **Village:** Umbergaon, **District:** Valsad

Crop(s): Mango, **Crop type:** Plantation.

The farmer had been associated with GKMS advisories and actively followed weather-based farm management practices. Upon receiving the advisory on 06th May 2025, he immediately harvested mature mango fruits, strengthened orchard support systems, and ensured proper drainage and safe storage arrangements.



Fig. 28: Farmer Bhavin Dixit minimized stem breakage from high winds & prevented waterlogging during heavy rainfall

2.7 Haryana

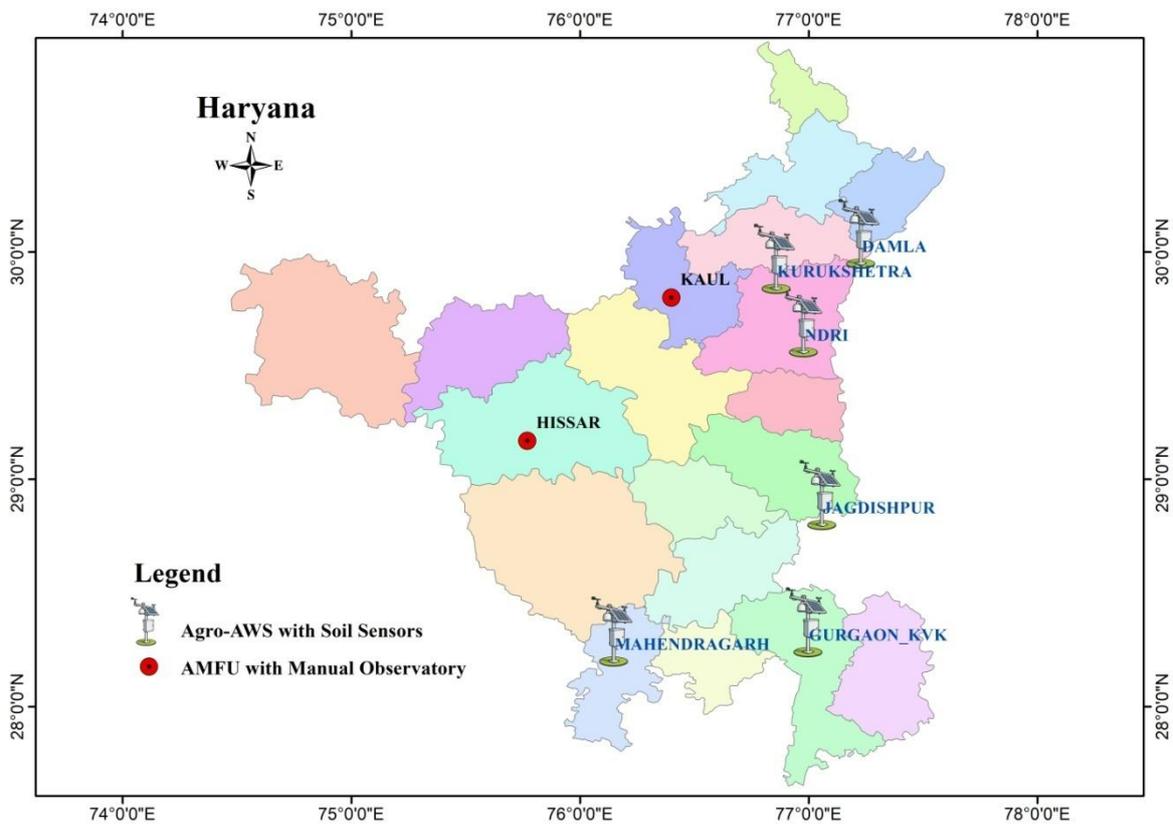


Fig. 29: Schematic map of Haryana showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.7.1 Timely Agromet Advisories and Weather-Based SMS Enhancing Farm Resilience – AMFU, Hisar

Weather-Related Challenges during *Kharif* and *Rabi* 2024-25

During *Kharif* and *Rabi* 2024–25, farmers across Haryana faced abnormal and highly variable weather conditions, including dry spells, intermittent heavy rainfall events, and fluctuating temperatures. These conditions posed serious risks to crop growth, irrigation planning, spraying operations, and overall farm productivity, increasing the likelihood of yield losses and higher cultivation costs.

Agromet Advisory Issued and Interventions Suggested

To address these challenges, the Agromet Field Unit (AMFU), Hisar, issued real-time and advance agrometeorological advisories under the Gramin Krishi Mausam Sewa (GKMS). The advisories were disseminated widely to the farming community through weather-based SMS services and other communication modes, enabling farmers to take timely preventive and adaptive actions during abnormal weather conditions.

Key recommendations included:

- Providing protective irrigation during dry spell conditions and applying foliar spray of potassium nitrate (KNO₃) to sustain crop growth under moisture stress.
- Adoption of the Broad Bed and Furrow (BBF) method for soybean to conserve soil moisture during dry periods and ensure effective drainage during excess rainfall.
- Immediate removal of stagnant water from fields during heavy rainfall events to prevent root damage and reduce pest and disease incidence.

Farmer Response and Field-Level Action

Farmer Name: Multiple farmers (collective response), **Village:** Various villages across, **District:** Haryana State

Crop(s): Cotton and Other major seasonal crops, **Crop type:** Cash & other field crop.

Farmers implemented the agromet advisories in real time by adjusting irrigation schedules, modifying field layouts, and planning spraying and other farm operations based on weather-based SMS alerts. These timely interventions helped farmers protect crops during adverse weather conditions and optimize agricultural operations throughout the cropping seasons.

Outcome and Reported Benefits

An online feedback survey was conducted among 557 farmers across Haryana using Google Forms to assess the impact of weather-based advisories. The evaluation revealed the following benefits:

- 87.6% of farmers reported high usefulness of weather forecast SMS services as agricultural advisory support
- 47.1% of farmers reported savings of approximately ₹1,000/- per acre during spraying operations
- 81.1% of farmers extensively used weather forecast SMS services, particularly information on air temperature, rainfall, and wind speed
- 62% of farmers utilized real-time weather forecasts mainly for sowing and harvesting operations, the highest among all agricultural activities

Overall, timely agromet advisories significantly reduced weather-related risks, improved decision-making, enhanced profitability, and strengthened climate resilience among farmers in Haryana.

2.8 Himachal Pradesh

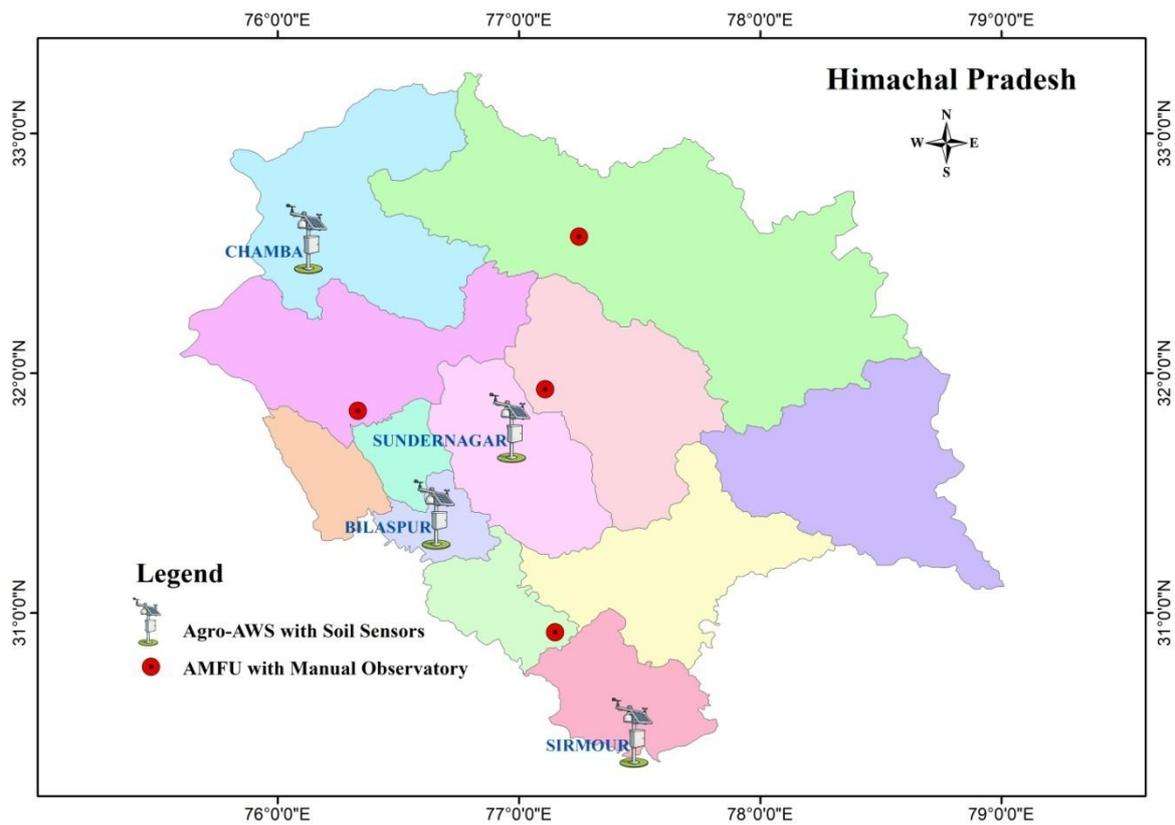


Fig. 30: Schematic map of Himachal Pradesh showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.8.1 Weather-Triggered Disease Advisory Improves Cauliflower Health and Productivity in Cold Arid Regions – AMFU, Kumkumseri

Weather-Related Challenges during Last week of March 2025

The Lahaul–Spiti region experiences a harsh and cold climate with a short growing season and weather fluctuations during *Rabi* 2025. Such conditions create a favourable environment for nursery-stage diseases like damping-off and adult-stage diseases such as black rot in cauliflower.

Agromet Advisory Issued and Interventions Suggested

Gramin Krishi Mausam Sewa (GKMS) bulletins issued on *Rabi* 2025. The advisories focused on preventive and curative measures to manage damping-off in nurseries and black rot during the vegetative stage of cauliflower.

Key recommendations included:

- Seed treatment with Bavistin @ 3 g/kg of seed before sowing in nursery beds to prevent damping-off.
- Spraying of Streptocycline @ 1 g/10 L of water and Bavistin @ 2.5 g/L of water in nursery beds for damping-off disease control.
- Regular field monitoring for early detection of disease symptoms and timely adoption of recommended spray schedules.

Farmer Response and Field-Level Action

Farmer Name: Mrs. Pyar Dei, **Village:** Pimal, **District:** Lahaul–Spiti

Crop(s): Cauliflower, **Crop type:** Vegetable

The farmer followed all the advisories provided through AAS bulletins. She adopted seed treatment and nursery management practices to control damping-off and carefully monitored her crop during the vegetative stage. On observing early symptoms of black rot, she promptly implemented the recommended spraying schedule as advised.

Outcome and Reported Benefits

Reported agronomic impact: Achieved better seedling survival and effective disease control

Reported economic benefit: Her average cauliflower yield increased from 250 q/ha to 256 q/ha, reflecting a 2.4% yield increase, equivalent to an additional 600 kg per hectare.



Fig. 31: Farmer Mrs. Pyar managed damping-off disease in cauliflower nursery by following seed treatment advisories

2.8.2 Enhancing Rainfed Wheat and Vegetable Productivity in Kangra District – AMFU, Palampur

Weather-Related Challenges during *Kharif* 2024

Wheat cultivation in the region is largely rainfed, making it highly vulnerable to rainfall variability and temperature fluctuations. These weather uncertainties posed serious challenges to crop establishment, disease management, and overall productivity during the *Kharif* 2024 season.

Agromet Advisory Issued and Interventions Suggested

Agromet Advisory Services (AAS) were issued *Kharif* 2024. The advisories provided plant protection measures based on prevailing and forecasted weather conditions.

Key recommendations included:

- Synchronization of rainfed wheat sowing with forecasted rainfall to ensure adequate soil moisture.
- Nursery management and timely transplanting in cauliflower based on temperature and humidity forecasts.
- Prophylactic sprays for damping-off diseases in cauliflower under humid conditions.
- Preventive spraying of mancozeb @ 2.5 g/L and need-based systemic fungicides in potato against late blight during high humidity and rainfall periods.

Farmer Response and Field-Level Action

Farmer Name: Mr. Ajit Kumar, **Village:** Malan, **District:** Kangra

Crop(s): Wheat, cauliflower, onion & potato, **Crop type:** Vegetables.

Rainfed wheat and irrigated vegetable crops. He adjusted sowing schedules, adopted seed treatment and disease management measures, and carried out need-based plant protection operations across wheat and vegetable crops based on weather forecasts.

Outcome and Reported Benefits

Reported agronomic impact: Better seedling during irrigation in monsoon season

Reported economic benefit: Wheat yield increased from 42q/ha to 45q/ha, while vegetable yields improved by 5–8% depending on the crop.



Fig. 32: Weather-informed management helped farmer Ajit Kumar optimize sowing and plant protection in wheat

2.8.3 Prevents Hailstorm Damage in Vegetables during *Kharif* 2025 – AMFU, Solan

Weather-Related Challenges during *Kharif* 2025

During May 2025, farmers in Mashobra block of Shimla district faced the threat of hailstorm events, which pose a serious risk to vegetable crops at the vegetative stage. Crops like cucumber, capsicum, and peas are highly vulnerable to hail damage, which can cause leaf injury, plant breakage, and substantial yield loss.

Agromet Advisory Issued and Interventions Suggested

AMFU–Solan issued *Kharif* 2025. The advisory highlighted the need for immediate protective measures to minimize crop damage, especially for vegetables.

Key recommendations included:

- Adoption of protective measures to shield vegetable crops from hailstorm damage.
- Use of locally available materials such as dry grass mulch to cover crops.
- Regular monitoring of weather updates and timely action based on advisories.

Farmer Response and Field-Level Action

Farmer Name: Mrs. Asha Devi, **Village:** Dhagogi, **District:** Shimla

Crop(s): Cucumber, Capsicum & Peas, **Crop type:** Vegetables.

Mrs. Asha Devi, a progressive farmer from Mashobra block, had sown cucumber during the last week of March to the first week of April 2025. By May, the crop was in the vegetative stage. On receiving the hailstorm advisory from AMFU–Solán, she immediately covered her cucumber crop with dry grass mulch to protect young plants and foliage.

Outcome and Reported Benefits

Reported agronomic impact: successfully prevented significant hailstorm damage to her cucumber crop.

Reported economic benefit: Mrs. Asha Devi increased 5-8 % helped maintain crop health and avoided potential yield losses.

2.8.4 From Uncertain Whether to Higher Income: A Horticulture Farmer's in Garsa Valley - AMFU, Seobagh

Weather-Related Challenges during *Kharif* and *Rabi* Seasons

These factors pose *Kharif 2025* serious risks to horticultural crops, particularly pome and stone fruits, affecting flowering, fruit set, disease incidence, irrigation scheduling, and overall orchard management.

Agromet Advisory Issued and Interventions Suggested

Bulletins are issued on *Kharif* and *Rabi 2024* on irrigation scheduling, chemical spraying, disease management, mulching, and advance warnings for extreme weather events such as heavy rainfall and hailstorms.

Key recommendations included

- Use of accurate rainfall forecasts for optimal irrigation scheduling.
- Timely planning of chemical spraying operations to avoid wash-off losses.
- Adoption of mulching practices to conserve soil moisture.
- Management measures to control premature leaf fall in apple orchards.

Farmer Response and Field-Level Action

Farmer Name: Mr. Manoj Kumar, **Village:** Narol, **District:** Kullu

Crop(s): Pome fruits, Apple, Pear & Persimmon, **Stone fruits:** Apricot, Peach, Plum, **Crop type:** Fruit crops.

Mr. Manoj Kumar (31), a progressive farmer implemented recommended measures such as mulching and timely disease management and took preventive actions in response to warnings about heavy rainfall and hailstorms.

Outcome and Reported Benefits

- **Reported agronomic impact:** Control premature leaf falls in apple orchards, maintain adequate soil moisture, and keep other fruit crops largely disease-free.
- **Reported economic benefit:** His annual farm income increased from 8-10% within three years.

2.9 Jammu and Kashmir

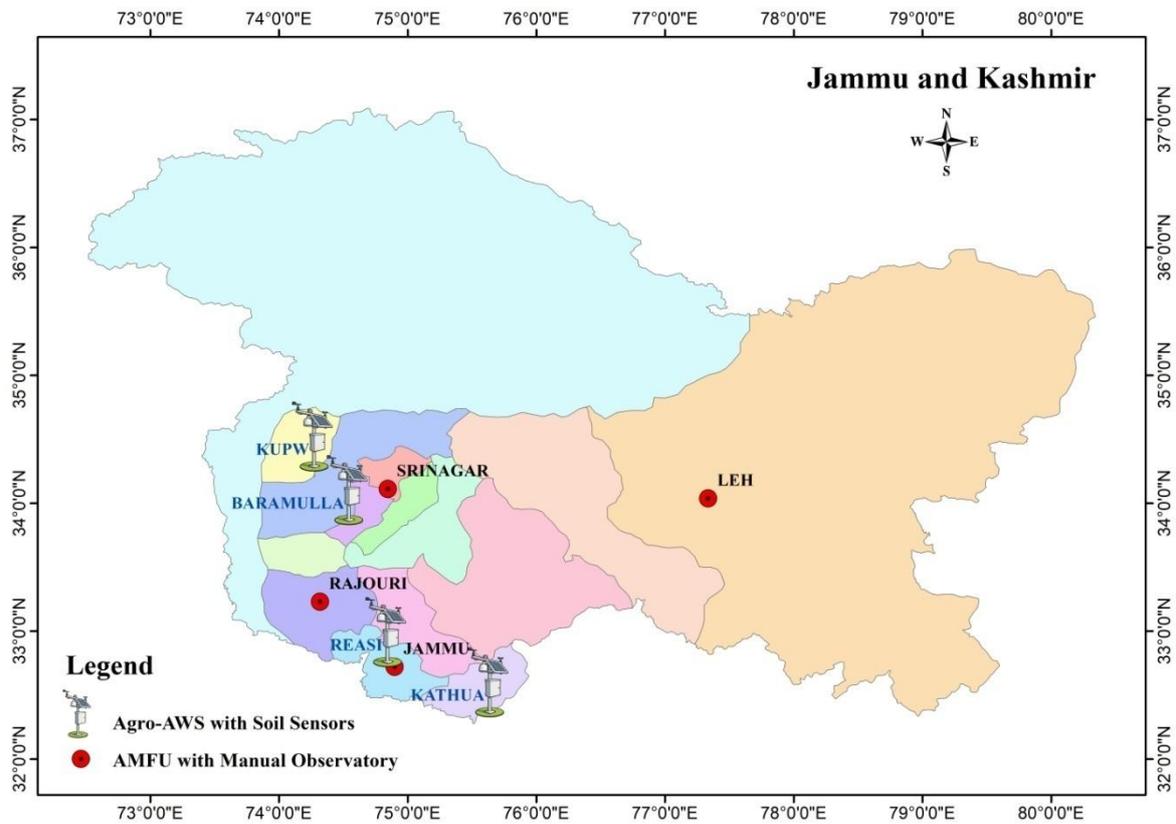


Fig. 33: Schematic map of Jammu and Kashmir showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.9.1 Saving Irrigation Water and Cost in Paddy through Weather-Based Agromet Advisories: A Success Story from Jammu – AMFU, Jammu

Weather-Related Challenges during *Kharif* 2024

During *Kharif* 2024, Sh. Kunal Sharma, a paddy farmer from Bhour Camp, Jammu district, faced challenges related to irrigation management under variable monsoon conditions. Paddy cultivation requires frequent and timely irrigation, and uncertainty in rainfall often leads to excess water use, increased fuel and labour costs, and inefficient crop management, especially during critical crop growth stages such as transplanting, tillering, and spike formation.

Agromet Advisory Issued and Interventions Suggested

Sh. Kunal Sharma regularly followed weather forecast-based agro-advisories issued by AMFU–Chatha, SKUAST–Jammu during 2024–25 under Agromet Advisory Services. The advisories guided him from nursery sowing to harvesting of paddy crop (variety Sunstar/Basmati-370), focusing on weather-based irrigation scheduling and timely cultural operations based on rainfall forecasts.

Key recommendations included:

- Weather-based irrigation scheduling based on medium-range rainfall forecasts
- Avoidance of irrigation during forecasted rainfall events
- Timely execution of cultural operations in paddy at different phenological stages
- Efficient water management during transplanting, tillering, and spike formation stages

Farmer Response and Field-Level Action

Farmer Name: Sh. Kunal Sharma (S/o Sh. Ashok Kumar), **Village:** Hour Camp, **District:** Jammu

Crop(s): Paddy (*Kharif* 2024), **Variety:** Sunstar / Basmati-370, **Crop type:** Cereals.

Sh. Kunal Sharma strictly adhered to the agro-advisories issued by AMFU– Chatha and aligned irrigation and cultural operations with rainfall forecasts. Based on the advisories, he avoided unnecessary irrigations at different crop growth stages. Irrigation savings achieved:

Transplanting stage:

- Saved 3 irrigations due to rainfall forecast on 29–30 June and 2, 6, 18, 19 July 2024
- Saved 1 irrigation due to rainfall forecast on 2 and 6 June.

Tillering stage:

- Saved 3 irrigations due to rainfall forecast on 28th –29th July and 5, 6, 8, 11, 15, 21 August 2024.

Spike formation stage:

- Saved 1 irrigation due to rainfall forecast on 3rd and 6th September 2024

Outcome and Reported Benefits

- Adoption of weather-based agromet advisories resulted in substantial irrigation savings and economic benefits.
- Cost saving per irrigation: ₹5,00/- (considering fuel and labour charges)
- Reported economic impact: ₹4,000/-.

2.9.2 From Climate Risk to Crop Success: A Potato Farmer’s Journey in Kargil through GKMS Advisories – AMFU, Leh**Weather-Related Challenges during *Kharif* Season**

The Barko Sankoo region of Kargil district is characterized by hilly terrain, cool climatic conditions, and high weather variability, which often limit crop productivity. Mrs. Sakeena Banoo initially faced challenges such as low potato yields, pest attacks, and disease infestations, which adversely affected crop health and farm income despite the high quality and market potential of potatoes grown in the region.

Agromet Advisory Issued and Interventions Suggested

AMFU–SAS&T, University of Ladakh, Leh, provided timely, location-specific weather-based agro-advisories under Gramin Krishi Mausam Seva (GKMS). These advisories guided farmers on suitable agronomic practices, pest and disease management, and preventive measures aligned with prevailing and forecasted weather conditions.

Key recommendations included:

- Timely advisories on pest and disease prevention and control based on weather conditions.
- Guidance on optimal farming practices to improve crop health and yield.
- Adoption of weather-based decision-making for crop management operations.

- Improved scheduling of farm activities to reduce climate-related risks.

Farmer Response and Field-Level Action

Farmer Name: Mrs. Sakeena Banoo, **Village:** Barko Sankoo, **District:** Kargil

Crop(s): Potato, Peas & Vegetables, **Crop type:** Tuber & Vegetables.

Mrs. Sakeena Banoo regularly followed the agro-advisories issued by AMFU–SAS&T and adopted the recommended pest management, disease control, and crop management practices. She implemented weather-based advisories not only in potato cultivation but also shared the information with other local farmers, improving overall farm management in the region.

Outcome and Reported Benefits

As a result of adopting GKMS agro-advisory services, Mrs. Sakeena Banoo experienced a substantial increase in potato yield and farm income. Her annual income from potato cultivation increased from ₹45,000/- to ₹55,000/- to nearly ₹90,000/-, almost doubling after adopting weather-based advisories. Improved crop health, reduced pest and disease incidence, and better decision-making contributed to enhanced profitability. Her success has made her a role model for progressive farming in the Barko Sankoo region of Kargil district.

2.9.3 Weather-Based Agromet Advisories: A Pathway to Improved Income and Sustainability – AMFU, Rajouri

Weather-Related Challenges during *Kharif* and *Rabi* Seasons

Sh. Rakesh Kumar, a small rainfed farmer from Tandwal village of Rajouri district, faced major challenges due to lack of assured irrigation, high dependence on rainfall, and frequent insect–pest attacks in cereal and vegetable crops. Uncertain weather conditions often led to excess expenditure on irrigation, pesticides, and labour, resulting in reduced profitability and lower crop quality.

Agromet Advisory Issued and Interventions Suggested

In 2022–23, Sh. Rakesh Kumar came in contact with Agromet Field Unit (AMFU), Rajouri, where scientists introduced him to medium-range weather-based Agromet Advisory Services (AAS) under the Gramin Krishi Mausam Sewa (GKMS) scheme of IMD. The advisories

focused on weather-based crop planning, irrigation scheduling, pest and disease management, and adoption of improved crop cultivation practices.

Key recommendations included:

- Weather-based irrigation scheduling to reduce unnecessary water use.
- Timely and need-based application of insecticides and pesticides based on pest forecasts.
- Adoption of improved crop cultivation practices and suitable crops/varieties.
- Efficient farm operations planning based on medium-range weather forecasts.
- Weather-based advisories for livestock management.

Farmer Response and Field-Level Action

Farmer Name: Sh. Rakesh Kumar (S/o Late Sh. Kali Das), **Village:** Tandwal, **District:** Rajouri

Crop(s): Maize, Wheat, Oats, Mustard & Vegetables, **Crops type:** Cereals, Oilseed, & Vegetables.

Sh. Rakesh Kumar started regularly following Agromet Advisory Services issued by AMFU–Rajouri for *Kharif* and *Rabi* crops. He implemented advisories related to irrigation timing, pest control, and crop management practices for maize, wheat, oats, mustard, and vegetables. He also utilized weather-based advisories for better livestock management. The farmer carefully aligned farm operations with forecast information, reducing unnecessary inputs and labour.

Outcome and Reported Benefits

The adoption of weather-based Agromet Advisory Services resulted in significant reduction in production costs and improvement in crop yields. The farmer achieved:

- 10–15% increase in overall farm income due to reduced expenditure on irrigation, pesticides, and labour.
- Additional income of ₹25,000/- from cereals, fodder, and oilseed crops.
- Additional profit of ₹15,500/- from vegetable cultivation during 2024–25.

Sh. Rakesh Kumar has successfully demonstrated efficient management of a small rainfed landholding using agromet advisories and is now recognized as a progressive and successful

farmer in his village. His experience highlights the vital role of GKMS-based advisories in enhancing farm income and sustainability under rainfed conditions.



Fig. 34: Forecast-based crop management adopted by farmer Rakesh Kumar to optimize inputs and labour in bottle gourd and maize cultivation

2.9.4 From Dry Spells to Heavy Rainfall: Safeguarding Apple Orchards in Pahalgam – AMFU, Srinagar

Weather-Related Challenges during 2025 Apple Growing Season

During the 2025 apple growing season in the Kashmir Valley, farmers faced multiple weather-related challenges. Prolonged dry spells and rising temperatures from April to June resulted in soil moisture stress during critical phenological stages such as flowering and fruit set.

Agromet Advisory Issued and Interventions Suggested

The Agrometeorological Field Unit (AMFU) issued timely agrometeorological advisories during the dry spell period in May–June 2025 and again during the heavy rainfall episodes of August 2025.

Key recommendations included:

- Life-saving irrigation through basin irrigation and use of mulching (dry grass/organic mulch) to conserve soil moisture during prolonged dry spells.
- Avoidance of irrigation before forecasted rainfall and ensuring proper drainage channels in orchards to prevent water stagnation.
- Prophylactic fungicidal spray after rainfall events to manage apple scab and other moisture-related diseases.

Farmer Response and Field-Level Action

Farmer Name: Ayoub Malik, **Village:** Batkoot, **District:** Anantnag

Crop(s): Apple, **Crop type:** cash crop.

During the dry spell, timely irrigation combined with mulching helped maintain adequate soil moisture and reduced moisture stress during flowering and fruit development stages. Preventive drainage measures and timely plant protection sprays during the August rainfall period minimized disease incidence and fruit drop.

Outcome and Reported Benefits

Reported yield impact: Crop Apple orchard successfully protected from moisture stress and disease outbreaks, resulting in improved fruit size, colour, and reduced fruit drop.

Reported economic benefit: ₹45,000/- per acre through yield protection and improved fruit quality.



Fig. 35: Farmer Ayoub Malik receiving awareness on agromet advisory services during a formal meeting with a Technical Officer, along with other farmers

2.10 Jharkhand

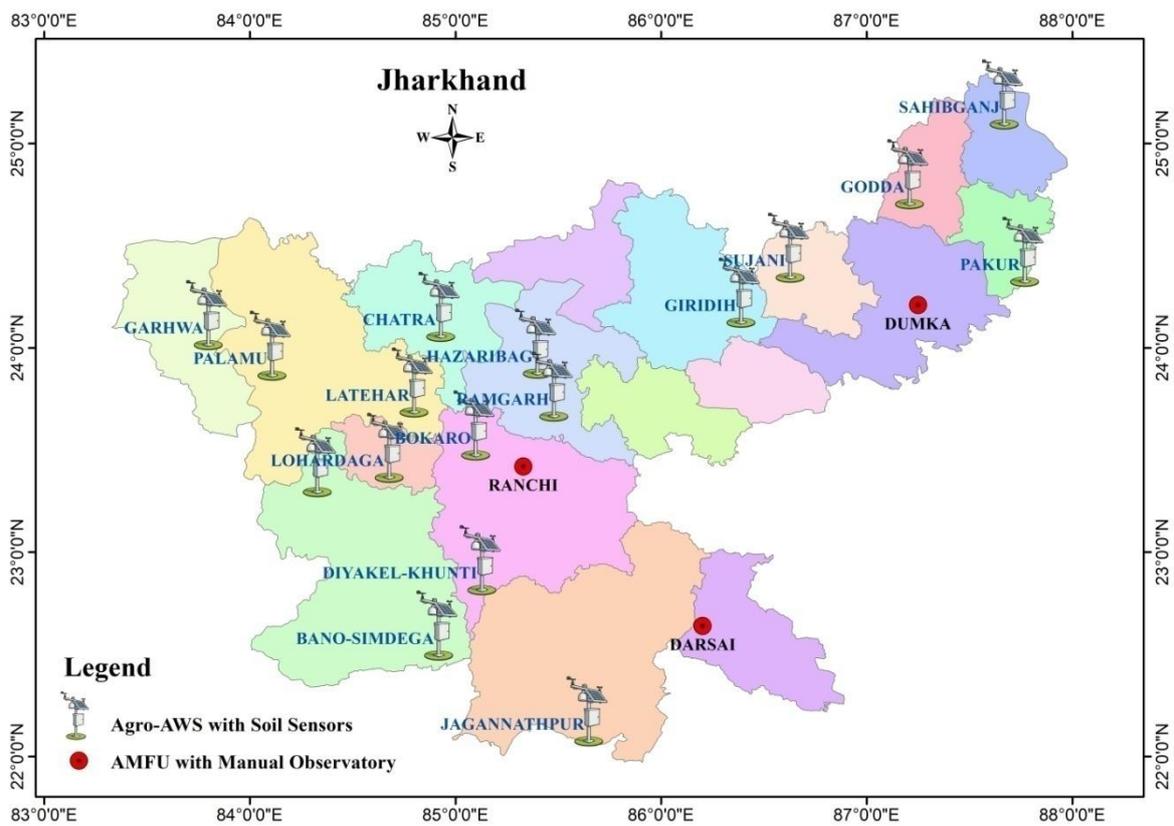


Fig. 36: Schematic map of Jharkhand showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.10.1 From Dry Spells to Heavy Rains: Role of Advisories in Safeguarding *Kharif* Crops – AMFU, Ranchi

Weather-Related Challenges during *Kharif* 2024

During the *Kharif* season of 2024 in Ranchi district, the onset of the monsoon was delayed, accompanied by prolonged dry spells during June, which coincides with the critical sowing window for *Kharif* crops and vegetables. As a result, farmers experienced significant difficulties in timely sowing, leading to delayed planting of crops and vegetables. Subsequently, the months of July, followed by August and September, received heavy rainfall, approximately 65% above normal. This excessive rainfall resulted in widespread waterlogging conditions, causing crop wilting, yellowing of leaves, and ultimately leading to stunted crop growth.

Agromet Advisory Issued and Suggestions given

AMFU Ranchi has been issuing agro advisories on a regular basis. In addition, special advisories were issued during critical weather events, including the late onset of the monsoon and prolonged dry spells on 24th June, as well as during the heavy rainfall event on 1st August.

Key recommendations included:

Dry spells

Use broad bed and furrow (BBF) or ridge and furrow systems to improve moisture conservation.

Apply organic mulches (crop residues, straw) to reduce evaporation losses.

Go for inter-cultivation/hoeing to break soil crust and reduce moisture loss.

Spraying of potassium nitrate (KNO₃) to improve drought tolerance.

Apply micronutrients (Zn, Fe, B) through foliar spray to reduce stress.

Heavy rainfall

Ensure quick drainage of excess rainwater.

Remove rotted leaves and fruits to check disease spread after rainfall event.

Spray copper-based fungicides / bio-fungicides after rain in vegetables

Avoid top dressing when soil is saturated

Postpone the sowing of vegetables.

Farmer Response and Field-Level Action

Farmers Name: Mr. Brajesh Kumar, **Village:** Jhariya, **District:** Ranchi

Crop(s): Radish & Paddy, **Crop type:** Vegetables.

Farmer carefully scheduled the sowing and planting of crops exactly when soil moisture and temperature conditions were optimal, as advised and optimized irrigation by applying water only, when necessary, based on rainfall forecasts, thereby saving both water and input costs. Fertilizer application was fine-tuned by using the right amount of nutrients at the right time to enhance plant growth and avoid wastage.

Pest and disease management was carried out proactively through the timely application of bio-pesticides and fungicides before conditions became favourable for outbreaks, as indicated by AMFU Ranchi. Additionally, harvesting operations were planned strategically to ensure crops were harvested ahead of adverse weather events such as storms or unexpected rainfall, thus safeguarding both yield and produce quality.

Outcome and Reported Benefits

Farmer was able to save their rice crops during the dry spell by following timely agro advisories issued by AMFU Ranchi. Additionally, the sowing of radish was appropriately rescheduled and carried out at the optimum time based on weather forecasts and advisories provided by AMFU Ranchi.

Reported economic benefit: ₹15,000/- per acre.



Fig. 37: Timely, advisory-guided farm operations helped farmer Brajesh Kumar achieve healthy radish production

2.11 Karnataka

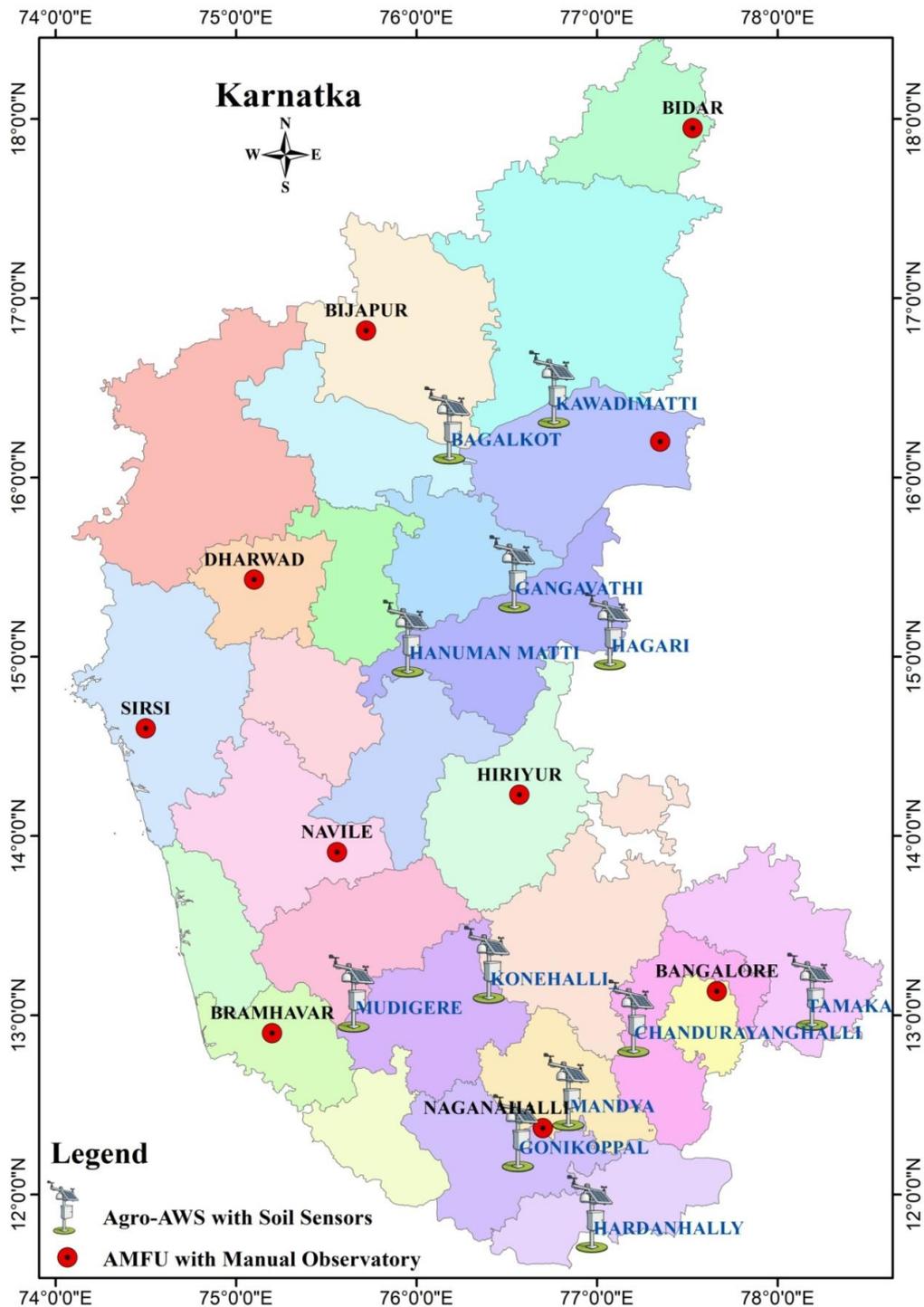


Fig. 38: Schematic map of Karnataka showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.11.1 Managing Soybean Production under High Rainfall Variability – AMFU, Bidar

Weather-Related Challenges during *Kharif* 2024

During 2025 *Kharif* season, farmers experienced heavy rainfall during August and September month respectively that has resulted in crop loss (wilting) mainly due to water stagnation in the low-lying area, increased risk of waterlogging led to deleterious effect on crop produce mainly the quality and yield.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Bidar has issued timely agrometeorological advisories from 1st August to 30th September, 2025 (heavy rainfall event).

Key recommendations included:

- Due to timely dissemination of Agro advisory in the month of August & September, farmers could be able to make decision related to harvest of their crops.
- Adoption of the Broad Bed and Furrow (BBF) method for soybean to conserve soil moisture during dry periods and facilitate drainage during excess rainfall.

Farmer Response and Field-Level Action

Farmer Name: Mr. Chandrasekhar Patil, **Village:** Halhipparga, **District:** Bidar

Crop(s): Soybean, **Crop type:** Oilseed.

The farmer has implemented the agromet advisories sent by AMFU, Bidar on real time. Timely interventions have aided farmers in saving their valuable crop during the dry spell and minimizing losses during heavy rainfall event. Adoption of Integrated Crop Management practices as per agro advisories attributed in enhancing performance during the *Kharif* season.

Outcome and Reported Benefits

Reported yield impact: Crop saved during dry spell and yield losses minimized during heavy rainfall.

Reported economic benefit: ₹10,000/- per acre.



Fig. 39: Farmer Chandrasekhar Patil mitigated soybean losses under dry spells and heavy rainfall events

2.11.2 Field-Level Adaptation of Arecanut and Paddy Crops to Erratic Monsoon Conditions in Coastal Karnataka – AMFU, Brahmavara

Weather-Related Challenges during April 2024

During *Kharif* 2024, intense and erratic rainfall during July-August resulted in waterlogging conditions, significantly threatening crop yield and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Brahmavara, issued timely agrometeorological advisories issued on November month for paddy and December to January months of 2024 and 2025

Key recommendations included:

- The farmer applied 1% Bordeaux mixture during June-July 2024, which effectively reduced the incidence of Koleroga disease.
- During forecasted dry spells, advisories on mulching and alternate sprinkler/drip irrigation helped conserve soil moisture and maintain crop health.
- Advance forecasts of heavy rainfall events enabled the farmer to postpone arecanut harvesting during December-January 2024-2025.

Farmer Response and Field-Level Action

Farmer Name: Mr. Shailesh Herle, **Village:** Chara, **District:** Udupi

Crop(s): Arecanut & Paddy, **Crop type:** Plantation and Cereals.

The farmer promptly followed the advisories, which helped safeguard the crop during heavy rainfall. Weather-based management practices improved overall crop performance in the *Kharif* season.

Outcome and Reported Benefits

Reported yield impact: Crop saved during heavy rainfall and yield losses minimized.

Reported economic benefit: Increased net income by at least 8-10% and ₹30,000/- acre.



Fig. 40: Advisory-guided postponement of arecanut harvesting helped minimize post-harvest losses by farmer Shailesh Herle

2.11.3 Climate-Based Decision Making for Green Gram Harvesting in Northern Karnataka – AMFU, Dharwad

Weather-Related Challenges during *Kharif* 2025

During the 2025 *Kharif* season, at the time of green gram harvesting (second week of August), farmers were advised to harvest crops that had reached the harvesting stage in advance. Due to continuous rainfall in August, crops that were not harvested in time were damaged, resulting in reduced quality of green gram produce.

Agromet Advisory Issued and Interventions Suggested: *Kharif* 2025

Key recommendations included:

- Timely interventions helped in saving the crop during the dry spell and minimizing losses during the heavy rainfall event.
- Improved crop management as per advisories contributed to enhanced crop performance during the *Kharif* season.

Farmer Response and Field-Level Action

Farmer Name: Mr. Shankareppa Hanchanal, **Village:** Hunashikatti, **District:** Dharwad/Gadag,

Crop(s): Green gram, **Crop type:** Pulses.

Outcome and Reported Benefits

Reported yield impact: Green gram crops were successfully harvested in advance, avoiding damage from continuous rainfall in August. Approximately 10 acres of crop were protected, yielding around 30 quintals of green gram.

Reported economic impact: Advance harvesting and advisory-based crop management helped the farmers secure an estimated ₹3,00,000/- to ₹3,50,000/- from the protected produce.



Fig. 41: Advisory-based management of sowing and spraying operations in green gram by farmer Shankareppa Hanchanal

2.11.4 Managing Sapota, Jackfruit and Pomegranate under Variable Monsoon Conditions – AMFU, Hiriyyur

Weather-Related Challenges during *Kharif* 2024

During the *Kharif* 2024 season, farmers in the Central Dry Zone of Karnataka under the jurisdiction of AMFU-Hiriyyur experienced highly erratic and uneven rainfall distribution, which significantly affected crop growth and farm operations.

Agromet Advisory Issued and Interventions Suggested: *Kharif* 2024

Key recommendations included:

- Early warning of rainfall deficit and dry spell periods enabled advance irrigation planning.
- Advance advisories prior to heavy rainfall events in August enabled farmers to prepare drainage arrangements.

- Adjustment of intercultural and spraying operations based on short-range rainfall probability forecasts.

Farmer Response and Field-Level Action

Farmer Name: Mr. Bharatesh Reddy D, **Village:** Karikere, **District:** Chitradurga

Crop(s): Jackfruit, Sapota & Pomegranate, **Crop type:** Horticultural crops.

Outcome and Reported Benefits

Reported yield impact: Forecast-based irrigation and timely drainage management helped avoid crop losses

Reported economic benefit: The yield of horticultural crops increased by 18-22%, and Sapota productivity improved and additional net income of approximately ₹ 35,000/- to ₹45,000/- per acre.



Fig. 42: Forecast-guided irrigation and drainage management helped farmer Bharatesh Reddy prevent crop losses

2.11.5 Mitigating Dry Spell Stress in Maize through Weather-Based Interventions – AMFU, Naganahalli

Weather-Related Challenges during November 2025

During November 2025, the farmer experienced no rainfall, leading to soil moisture stress in maize crops. The dry conditions threatened germination, vegetative growth, and yield potential, particularly in rainfed areas.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Naganahalli, issued advisories on 10th November 2025

Key Recommendations Included:

- Protective irrigation to maintain soil moisture for proper germination and vegetative growth.
- Application of mulch to conserve soil moisture and reduce evaporation.
- Foliar spray of Potassium Nitrate (KNO_3) and micronutrients to sustain crop growth under moisture stress.
- Regular weed management to reduce competition for limited soil moisture.
- Monitoring for pest and disease incidence, this can increase under stress conditions.

Farmer Response and Field-Level Action

Farmer Name: Mrs. Laxmi & Mr. Javarappa, **Village:** Naganahalli, **District:** Mysore

Crop: Maize, **Crop type:** Cereals.

The farmer implemented the advisory measures immediately. Protective irrigation and foliar sprays-maintained soil moisture and enhanced plant vigor. Mulching reduced moisture loss, and regular monitoring prevented pest damage.

Outcome and Reported Benefits

Reported yield impact: Maize crop survived the dry spell and achieved normal growth.

Reported economic benefit: Estimated ₹ 15,000/- to ₹18,000/- per acre saved by minimizing crop stress and potential yield loss.



Fig. 43: Adaptation Measures by Farmers Laxmi and Javarappa to Reduce Dry-Spell Stress in Maize and Fodder

2.11.6 Improving Paddy, Arecanut, and Black Pepper Productivity – AMFU, Navile

Weather-Related Challenges during 2024

Mr. Mruthyanjaya H., a progressive farmer from Hugadi village, Hosanagara taluka of Shivamogga district, cultivates Arecanut, Coconut, Black Pepper, and Paddy. In recent years, erratic rainfall, unseasonal weather events, dry spells, and pest and disease outbreaks adversely affected crop health, yields, and farm income.

Agromet Advisory Issued and Interventions Suggested

In March 2024, he enrolled under Agromet Advisory Services (AAS) of the Gramin Krishi Mausam Sewa (GKMS) scheme. Weather forecasts and crop-based advisories issued during the *Kharif*, 2024 season by AMFU, Navile, Shivamogga.

Key recommendations included:

Paddy Timely Sowing and Crop Protection:

- Using weekly weather forecasts, Mruthyanjaya adjusted paddy transplanting to avoid heavy rains, preventing seedling loss that affected non-adopting farmers.
- Yield improved by nearly 15%, with reduced input costs due to timely operations.

Efficient Irrigation and effective timing for spraying for Arecanut and Coconut: He applied recommended sprays like Bordeaux mixture for leaf spot and fruit rot during clear weather, effectively controlling diseases and improving crop management while reducing cultivation costs by 5-10%.

Outcome and Reported Benefits

Reported yield impact: Paddy yield increased by ~15%; disease losses in plantation crops were minimized.

Reported economic benefit: Net income increased by 15-20%, in a single season compared to non-advisory farmers.



Fig. 44: Climate-Informed Plant Protection Practices Adopted by Farmer Mruthyanjaya

2.11.7 Climate-Informed Management of Banana and Arecanut Crops under *Kharif* Monsoon Challenges – AMFU, Sirsi

Weather-Related Challenges during *Kharif* 2024

During the 2024 *Kharif* season, farmers experienced intense heavy rainfall events in July and August. This erratic weather conditions resulted in increased risk of waterlogging, posing a serious threat to crop yield and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Sirsi issued timely agrometeorological advisories in the month of July and August 2024.

Key recommendations included:

- Immediate removal of stagnated water during heavy rainfall events to prevent root damage and reduce the incidence of pest and disease outbreaks.
- As preventive measure advise was given to take the spray of Bordeaux mixture spray to Arecanut and Peeper.

Farmer Response and Field-Level Action

Farmer Name: Mr. Venkatraman Hegede, **Village:** Chavatti, **District:** Uttarakannada, **Crops:** Banana & Arecanut, **Crop type:** Cash & Plantation crop.

The farmer implemented the advisories in real time. Timely interventions helped in saving the crop during the heavy rainfall event. Improved crop management as per advisories contributed to enhanced crop performance during the *Kharif* season.

Outcome and Reported Benefits

Reported yield impact: Crop saved during heavy rainfall and yield losses minimized.
Reported economic benefit: ₹50,000/- per acre.



Fig. 45: Drainage Management Practices Adopted by Farmer Venkatraman Hegede to Mitigate Heavy Rainfall Impacts on Banana and Arecanut

2.11.8 Adaptive Weather-Based Farming Practices for Enhanced Returns – AMFU, Vijayapura

Weather-Related Challenges during *Kharif* and *Rabi* Seasons

During the 2024 *Kharif* season, Mr. Anil Jadav experienced erratic rainfall, prolonged dry spells, and occasional unseasonal showers that affected crop establishment and yields. The lack of timely weather information earlier resulted in sowing failures, pest outbreaks, and post-harvest losses.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Vijayapura has issued timely agrometeorological advisories on Heavy rainfall on 30th May 2024, 07th June 2024 and 24th September 2024.

Key recommendations included:

- Provide proper drainage channels to drain out excess water stagnated in field.
- Tie up of sugarcane leaves and provide support.
- Avoid plant protection measures for next 5 days.
- Don't allow livestock for grazing outside fields during thunderstorms & lightning.

Outcome and Reported Benefits

Crop saved during heavy rainfall and yield losses minimized was ₹ 50,000/- per acre by adopting weather-based advisories

Reported yield impact: Helped to overcome water lodging condition in onion and pigeon pea reducing crop failure loss 20%. Post-harvest losses in green gram were minimized.

Reported economic benefit: The yield of pigeon pea increased by 12-15%, and cotton productivity improved due to timely sowing and pest control.



Fig. 46: Drainage management by farmer Anil Jadav to prevent waterlogging damage in onion fields

2.12 Kerala

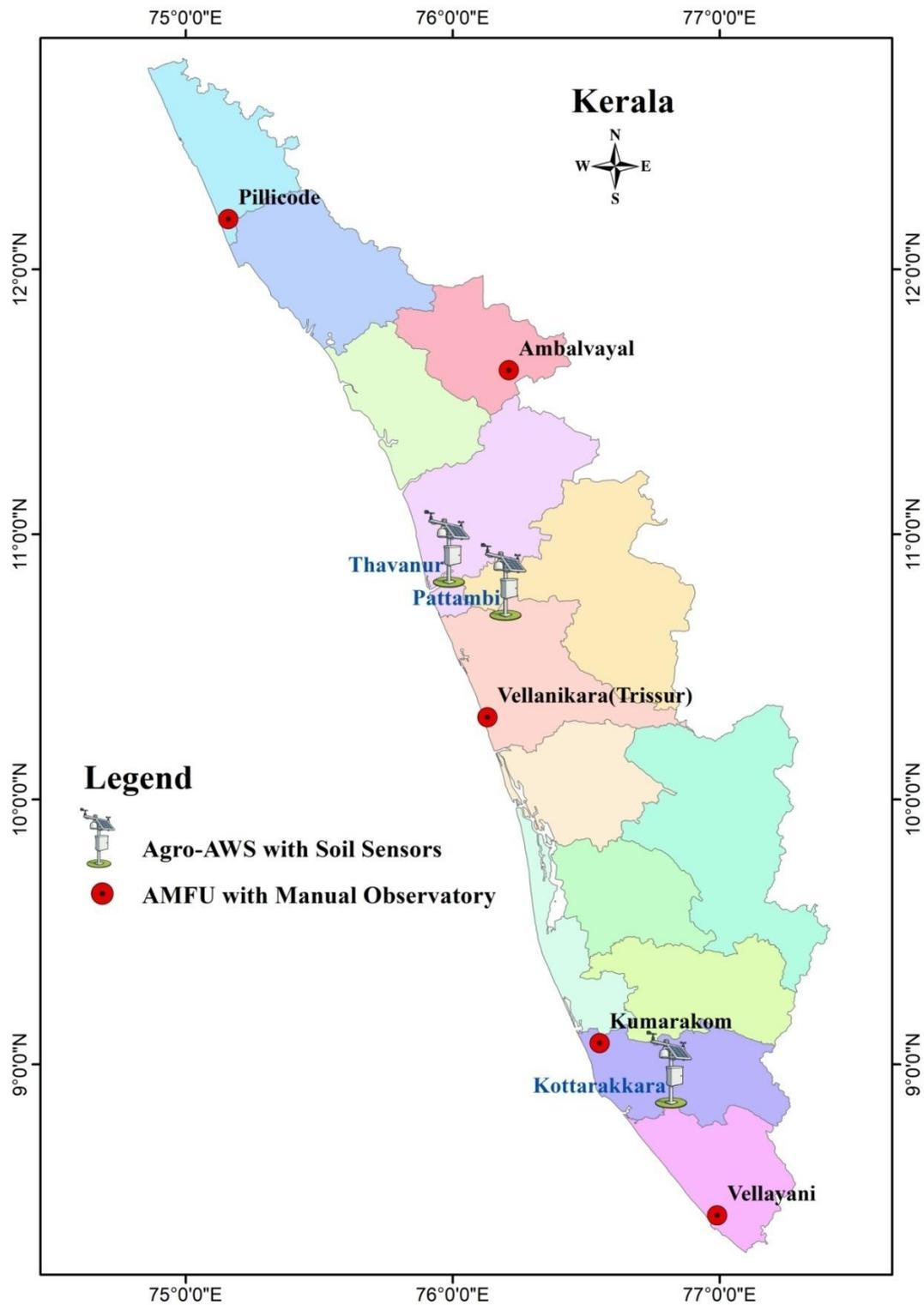


Fig. 47: Schematic map of Kerala showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.12.1 From Dry Spell to Blossom: A Coffee Farmer's Success in Wayanad – AMFU, Ambalavayal

Weather-Related Challenges during summer 2025

During the summer of 2025, Wayanad district experienced a prolonged dry spell, which posed a serious challenge for coffee cultivation. Coffee flowering is highly sensitive to soil moisture and weather conditions, and the absence of timely blossom showers can adversely affect flower initiation, fruit set, and ultimately yield. The dry conditions increased the risk of uneven flowering and reduced productivity.

Agromet Advisory Issued and Interventions Suggested

The RARS Ambalavayal Centre, under the Gramin Krishi Mausam Sewa (GKMS) project, issued a weather-based agromet advisory (AAB No. 17/2025–26) during summer 2025, highlighting dry spell conditions and advising timely irrigation for coffee plantations.

Key recommendations included:

- Provide irrigation for induction of flowering in coffee to compensate for the absence of natural blossom showers.
- Schedule irrigation operations based on forecasted weather conditions to ensure optimum soil moisture at the critical flowering stage.
- Avoid unnecessary irrigation to reduce water and input wastage.

Farmer Response and Field-Level Action

Farmer Name: Shri Sreeraman C., **Village:**Kuppamudi, **District:** Wayanad

Crop(s): Rice, Coffee, Banana, Arecanut & Pepper, **Crop type:** Plantation crop.

Acting promptly on the advisory issued by RARS Ambalavayal, the farmer carefully planned and implemented timely irrigation in his coffee plantation during the dry spell.

Outcome and Reported Benefits

Reported yield impact: Timely irrigation led to successful initiation of blossom showers, uniform flowering, better fruit set, and improved coffee yield.

Reported economic benefit: ₹ 11,000/- per acre.

2.12.2 Weather-Informed Crop Management to Protect Paddy Crop from Extreme Rainfall in Kottayam – AMFU, Kumarakom

Weather-Related Challenges during *Kharif* 2025

During the last week of May and the 3rd and 4th weeks of June 2025, the Kumarakom region experienced continuous and intense rainfall, leading to flood-like situations in low-lying agricultural fields. These persistent wet spells caused waterlogging, bund breaches, and crop stress, particularly affecting one-month-old paddy crops. The prolonged moisture-rich conditions also created a congenial environment for fungal diseases, posing a serious threat to crop survival and productivity.

Agromet Advisory Issued and Interventions Suggested

The Agromet Field Unit (AMFU), Kumarakom, issued timely weather-based advisories during the last week of May and the 3rd and 4th weeks of June 2025, focusing on managing excess rainfall conditions and minimizing crop damage.

Key recommendations included:

- Strengthening field bunds to prevent inundation. Ensuring proper drainage to remove excess water.
- Avoiding fertilizer application and spraying during continuous wet spells. Farmer Response and Field-Level Action

Farmer Name: Mr. Rams, **Village:** Kumarakom, **District:** Kottayam

Crop(s): Paddy, **Crop type:** Cereals.

During the last week of May and the 3rd and 4th weeks of June 2025, continuous heavy rainfall caused flood-like conditions in one-month-old paddy fields. Acting on GKMS agromet advisories, farmer Rams, along with fellow farmers, strengthened bunds and ensured effective drainage to prevent crop submergence. Timely planning of farm operations based on rainfall forecasts helped safeguard the crop, optimize input use, and reduce cultivation costs, while an on-field Automatic Weather Station provided continuous local weather updates to support decision-making.

Outcome and Reported Benefits

Reported yield impact: The paddy crop was successfully saved during extreme rainfall events in the last week of May and the 3rd and 4th weeks of June 2025.

Reported economic benefit: ₹30,000/- per acre.



Fig. 48: Farmer Rams' Use of Local Weather Advisory to Protect Paddy Crop from Heavy Rainfall

2.12.3 Managing Extreme Rainfall and Flooding in Rice: A Case Study from North Kerala – AMFU, Pilicode

Weather-Related Challenges during *Kharif* 2024

During July 2025, *Kharif* season, when rice crop is in flowering to grain filling stages extremely heavy rainfall events occurred. This abnormal weather condition resulted in flooding and crop damage in many places of northern zone of Kerala

Agromet Advisory Issued and Interventions Suggested

The AMFU, Parbhani, issued timely agrometeorological advisories on 17th July 2025.

Key recommendations included:

- Heavy rains may cause flooding in the lowlands.
- Heavy rainfall results in the flooding of the cropped field which damages the crop in the maturity stage. Open all the drainage channels in the fields.
- Transplanting and Fertilizer application may be postponed if very heavy rainfall is there. A buffer stock of seeds is preferred.
- Store the seeds in moisture free bags on wooden platforms in seed stores
- High winds cause lodging of the banana plants. Those vegetables in pandals will be damaged due to high winds. Shift the harvested produce in safer places or cover the produce with tarpaulin sheets in the fields.
- Provide mechanical support and propping to horticultural crops and staking to vegetables to avoid lodging.

Farmer Responses and Field-Level Action

Smt. Bijina K, Chengalayi in Kannur District: (A women farmer cum agri - entrepreneur who cultivates medicinal plants, vegetables and rice): Benefitted by GKMS through forecasts of rainfall, cloud coverage and temperature for crop selection, harvesting and drying during June to September and October to December 2025 (to the tune of 3 to 4 lakh rupees for the entire cluster).



Fig. 49: Climate-Informed Crop and Post-Harvest Management by Farmer Bijina K

Sri. Balakrishnan T K, Mayyil in Kannur District: (A progressive farmer and secretary to rice cultivator's cluster) could save rice crop (at grain filling stage of the crop in July 2025) from flooding at Mayyil in Kannur District whenever there are chances for heavy rainfalls, by opening drainage channels in advance due to the on-time IBF and advisories. Total crops saved area 652 ha (32,600q paddy to the tune of Rs. 39, 12,000/- or above for the cluster of farmers of the locality). Likewise multiple clusters in the districts of Kannur and Kasaragod are benefitted.



Fig. 50: IBF advisory–based drainage management by farmer Balakrishnan T. K. to protect rice from flooding

2.12.4 Improving Farm Productivity Supporting Climate-Resilient Mixed Farming in Thrissur District – AMFU, Thrissur

Weather-Related Challenges during *Kharif* 2024

During recent *Kharif* seasons, including 2024, farmers in Thrissur district experienced frequent extreme weather events, particularly undistributed and erratic rainfall. These conditions adversely affected vegetable crops and banana plantations, increasing the risk of pest and disease outbreaks, nutrient loss, and inefficient water use. Such climatic variability posed serious challenges to farmers practicing single-crop farming systems.

Agromet Advisory Issued and Interventions Suggested

Under the Gramin Krishi Mausam Sewa (GKMS) programme, Agromet Advisory Services (AAS) were issued regularly through the local Krishi bhawan and Kerala Agricultural University (KAU). The advisories focused on weather-based crop planning, pest and disease management, irrigation scheduling, and efficient use of farm inputs, particularly for vegetables and banana under mixed cropping systems.

Key recommendations included:

- Adoption of mixed cropping systems to reduce climate risk.
- Timely application of fertilizers and pesticides based on weather forecasts.
- Plant protection measures for vegetables as per AAS bulletins.
- Use of drip irrigation to reduce water usage and maintain crop health.
- Crop rotation involving banana and vegetables to maintain soil health.
- Dissemination of agromet advisories among fellow farmers for collective benefit.

Farmer Response and Field-Level Action

Farmer Name: Mr. Joseph K. V., **Village:** Kodassery, **District:** Thrissur

Crop(s): Nutmeg, Coconut, Arecanut, Mango, Rambutan, Vegetables & Banana, **Crop type:** Plantation, Fruits &Vegetables.

Mr. Joseph K. V., a progressive farmer and lead farmer of Kodassery Grama Panchayat, actively followed Agromet Advisory bulletins and implemented mixed farming to cope with extreme weather variability. He adopted weather-based plant protection measures in vegetables and optimized fertilizer and pesticide application as per advisories.

He also played a key role in disseminating AAS bulletins to more than 50 farmers through WhatsApp groups, emails, social media platforms, mobile applications, newspapers, and notice boards of 10 Krishi bhawans across Trissur district. His leadership ensured wider adoption of climate-resilient practices among local farmers.

Outcome and Reported Benefits

- Reduced input costs due to timely and need-based application of fertilizers and pesticides
- Improved crop productivity and income among both the farmer and associated farming community
- Efficient water management through drip irrigation
- Enhanced climate resilience through mixed cropping and crop rotation
- Mr. Joseph K. V.'s success highlights the critical role of Agromet Advisory Services in promoting climate-smart agriculture and strengthening farmer-to-farmer knowledge dissemination in Kerala.

2.12.5 Safeguarding Banana Cultivation from Monsoon Winds through Timely Agromet Advisories in Coastal Kerala - AMFU, Vellayani

Weather-Related Challenges during *Kharif* 2024

During the *Kharif* 2024 season, the banana crop of Shri Ravindran at Neyyattinkara, Thiruvananthapuram district, was severely affected by strong convective winds associated with monsoon thunderstorms. These high wind events occurred during the critical bunch formation stage, leading to snapping of pseudo stems under the weight of developing bunches. As a result, nearly 40% of the crop was damaged, causing substantial yield and income losses. Traditional farming practices did not provide any advance warning or suitable preventive measures against such weather extremes.

Agromet Advisory Issued and Interventions Suggested

After enrolling in the IMD–GKMS programme through AMFU Vellayani, Shri Ravindran started receiving bi-weekly weather-based agromet advisories through SMS and WhatsApp during the subsequent season (*Rabi* 2024–25). The advisories included advance alerts on monsoon thunderstorms and strong winds, along with crop-specific management strategies to minimize wind-related damage in banana plantations.

Key recommendations included:

- Advance alerts on thunderstorm activity and wind gust speed forecasts
- Timely propping of banana pseudostems to support developing bunches
- Use of windbreaks and bunch bagging to reduce mechanical damage
- Irrigation scheduling to avoid excess soil moisture that could increase lodging risk during high wind events

Farmer Response and Field-Level Action

Farmer Name: Shri Ravindran, **Village:** Neyyattinkara, **District:** Thiruvananthapuram

Crop(s): Banana, **Crop type:** Horticultural crop.

Based on the agromet advisories received from AMFU Vellayani, the farmer proactively implemented recommended measures during the *Rabi* 2024–25 season. He carried out timely propping of pseudostems, adopted windbreaks, ensured proper bunch protection, and followed advisory-based irrigation scheduling to reduce crop vulnerability during periods of strong winds.

Outcome and Reported Benefits

By following weather-based agromet advisories, banana crop losses were reduced from about 40% to less than 5%, with almost all bunches reaching full maturity. The farmer recorded a 30% increase in yield and an additional net income of ₹45,000, demonstrating the effectiveness of localized weather intelligence in building climate-resilient banana cultivation.

2.13 Madhya Pradesh

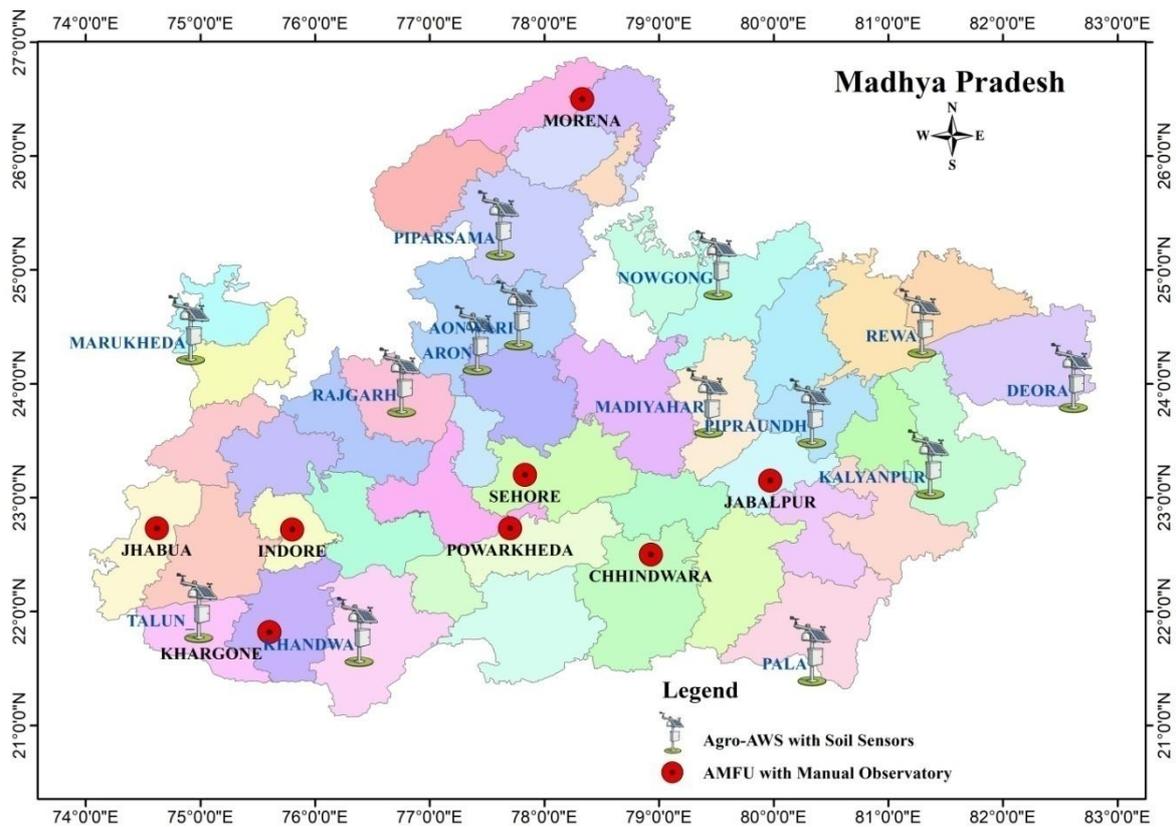


Fig. 51: Schematic map of Madhya Pradesh showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.13.1 Crop Protection during Heavy Rainfall Event in Maize (*Kharif* 2025) – AMFU, Chhindwara

Weather-Related Challenges during *Kharif* 2025

Forecasts of heavy cloud cover and heavy to very heavy July rainfall during *Kharif* 2025 led to waterlogging and higher stem and root rot risk; farmers were advised to postpone herbicide and nitrogen application until weather improved.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Chhindwara, issued timely agrometeorological advisories on 25th July (heavy to very heavy rainfall event).

Key recommendations included:

- Farmers are also advised ensure drainage arrangement in their field so as to avoid water logging caused due to heavy rains.
- Ensure proper drainage in maize fields to avoid waterlogging. Clean field drains if clogged.
- Avoid any field operations during strong wind or thunderstorm conditions.

Farmer Response and Field-Level Action

Farmer Name: Mr. Pradeep Wagh, **Village:** Chaurai, **District:** Chhindwara

Crop(s): Maize, **Crop type:** Cereals.

The farmer implemented the advisories in real time. Timely interventions helped in saving the crop during the heavy rainfall event. Improved crop management as per advisories contributed to enhanced crop performance during the *Kharif* season.

Outcome and Reported Benefits

Reported yield impact: Crop saved during dry spell and yield losses minimized during heavy rainfall.

Reported economic benefit: ₹ 10,000/- per acre.



Fig. 52: Advisory-based crop management by farmer Pradeep Wagh leading to higher maize yield

2.13.2 *Kharif* Crops from Dry Spells and Heavy Rainfall – AMFU, Jhabua

Weather-related Challenges during *Kharif* 2024

During the 2024 *Kharif* season, farmers experienced prolonged dry spells in second and third week of September followed by intense heavy rainfall events in last week of August and September.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Jhabua, issued timely agrometeorological advisories on 19th August, 10th and 24th September 2024 (heavy rainfall events) and on 13th September 2024 (dry spell conditions).

Key recommendations included:

- Adoption of the Broad Bed and Furrow (BBF) method or Ridge and Furrow planting method for soybean to conserve soil moisture during dry periods and facilitate drainage during excess rainfall.
- Immediate removal of stagnated water during heavy rainfall events to prevent root damage and reduce the incidence of pest and disease outbreaks.

Farmer Response and Field-Level Action

Farmer Name: Mr. Ramesh Soyada, **Village:** Waglawat, **District:** Jhabua

Crop(s): Soybean, **Crop type:** Oil seed.

Timely interventions helped in saving the crop during the dry spell and minimizing losses during the heavy rainfall event. Improved crop management as per advisories contributed to enhanced crop performance during the *Kharif* season.

Outcome and Reported Benefits

Reported yield impact: Crop saved during dry spell and yield losses minimized during heavy rainfall.

Reported economic benefit: ₹14,500/- per acre.



Fig. 53: Farmer Ramesh Soyada adopted advisories to mitigate dry spell and heavy rainfall impacts on soybean yield

2.13.3 Pearl Millet Crop Saved during *Kharif* 2024 – AMFU, Morena

Weather-Related Challenges during *Kharif* 2024

During the 2024 *Kharif* season, farmers experienced prolonged in regular rain fall in august and heavy rain fall events in September. These erratic weather conditions resulted in crop wilting, and increase risk of water logging, posing a serious threat to crop yield and quality.

Agromet advisory issued and Interventions Suggested

The AMFU, Morena, issued timely advisories on 02nd July 2024 and 10th September 2024 (Heavy rainfall event).

Key Recommendations included:

- Adoption bed and Furrow method in *Kharif* crops like pearl millet and pigeon pea to conserve soil moisture during dry periods and facilitate drainage excess rain fall.
- Immediate removal of stagnated water during heavy rainfall events to prevent root damage and reduce the incidence of pest and disease outbreaks.
- Adoption mulching in *Kharif* crops in case of lack of moisture, use mulching in *Kharif* crops so that moisture can be conserved.

Farmer Response and field level Action

Farmer Name: Mr. Girraj Mudgal, **Village:** Santha, **District:** Morena

Crop(s): Pearl Millet, **Crop type:** Cereals.

The farmer implemented the advisories in real time. Timely interventions helped the dry spell and minimizing losses during the heavy rainfall events. Improved the crop management as per advisories contributed to enhanced crop performance during the *Kharif* season.

Outcome and Reported Benefits:

Reported yield impact: Crop saved yield losses minimized during heavy rain fall.

Reported economic benefit: ₹ 12,000/- per hectare.



Fig. 54: Timely interventions by farmer Girraj Mudgal to mitigate heavy rainfall impact on pearl millet

2.13.4 Enhances Crop Productivity in Bundelkhand – AMFU, Tikamgarh

Weather-Related Challenges during 2024-25

During the 2024-25 season, farmers across Tikamgarh, Niwari, Chhatarpur, and Datia districts faced multiple weather-related challenges, including dry spells causing water and heat stress, heavy rainfall events leading to waterlogging, and disease incidence in crops such as Phytophthora blight in black gram and soybean. Vegetables, fruits, and pulses were particularly sensitive to fluctuations in temperature and rainfall, affecting crop growth and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Tikamgarh, issued biweekly agro advisories and IBF bulletins, along with weather forecasts and meteorological data for research purposes.

Key advisory interventions included:

- Guidance on irrigation scheduling to mitigate water and heat stress during dry spells.

- Recommendations for drainage management and removal of stagnated water to prevent root damage during heavy rainfall events.
- Timely harvest advisories to avoid quality deterioration due to untimely rains or wind.

Farmer Response and Field-Level Action

- Over 12,000 farmers actively received and implemented SMS advisories in real time.
- Adoption of advisories ensured effective crop protection during dry spells, waterlogging, and other extreme weather events.

Outcome and Reported Benefits

Reported yield impact: 10-15% increase across major crops.

Reported economic benefit: 2-5% reduction in overall cultivation costs due to improved input use and timely field operations.

2.14 Maharashtra

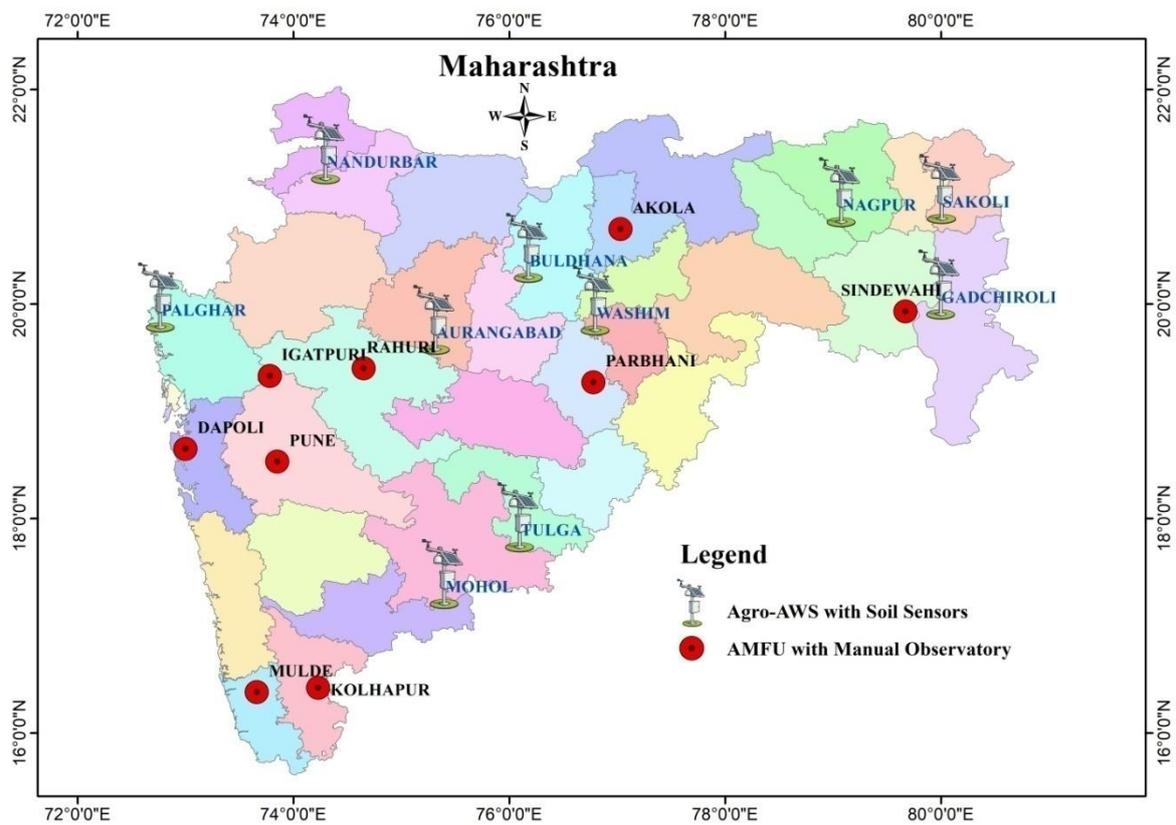


Fig. 55: Schematic map of Maharashtra showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.14.1 Impact of Timely Agrometeorological Advisories during Thunderstorms, Hail, and Gusty Winds –AMFU, Akola

During the Summer season 2025, farmers experienced thunderstorm with lightning and hailstorm, gusty winds (speed reaching 40-50 kmph) at one or two places with light to moderate rainfall on 1-3 April 2025, these erratic weather conditions resulted in serious threat to summer harvested crop yield and matured fruit quality and logging of some newly planted/young fruit plants during gusty windy weather (speed reaching 40-50 kmph).

Agromet Advisory Issued and Interventions Suggested

The AMFU, Akola, issued timely agrometeorological advisories on 28th March 2025, thunderstorm with lightning and hailstorm, gusty winds (speed reaching 40-50 kmph) conditions.

Key recommendations included:

- Immediately harvest of mature fruits & with safe storage to prevent from hailstorm
- Provided mechanical support to newly planted/young fruit plants to prevent from logging during gusty windy weather (speed reaching 40-50 kmph). Immediate removal of stagnated water to prevent root damage and reduce the incidence of pest and disease outbreaks.

Farmer Response and Field-Level Action

Farmer Name: Mr. Ramrao Mahadeo Nage, **Village:** Chandur, **District:** Akola

Crop(s): Orange, **Crop type:** Fruit crop.

The farmer implemented the advisories in real time. Timely harvesting helped in saving the fruit crop during the thunderstorm with lightning and hailstorm, gusty winds (speed reaching 40-50 kmph) conditions and minimizing losses of excess rainfall. Improved crop management as per advisories contributed to enhanced crop performance during the summer season.

Outcome and Reported Benefits

Reported yield impact: Fruit crop harvested timely before thunderstorm with lightning and hailstorm, gusty winds (speed reaching 40-50 kmph) conditions) with provided mechanical support to newly planted fruit crop and yield losses minimizing losses of excess rainfall.

Reported economic benefit: Total ₹78,400/- per acre.



Fig. 56: Timely harvesting by farmer Ramrao Mahadeo Nage mitigated thunderstorm damage in fruit crops

2.14.2 Weather-Responsive Harvesting: Securing Rice Yield against Very Heavy Precipitation Event – AMFU, Dapoli

Weather-Related Challenges during *Kharif* 2024

During the 2024 *Kharif* season, at the maturity stage of rice crop most of the rice fields were at harvesting stage. But during this period (September) rainfall received was 159.7 mm during 24 hours' window. There was possibility of lodging of matured rice and affected most of the upland and lowland paddy fields.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Dapoli, issued timely agrometeorological advisories on 28th September 2024
Period: 29/09/2024 to 03/10/2024.

Key recommendations included:

- Postpone the harvesting of rice.
- If it is not possible then harvest the matured rice varieties in the morning during clear weather (no rainfall) immediately.
- Store the harvested produce in a protected and safe place.

Farmer Response and Field-Level Action

Farmer Name: Mr. Dinkar Khair, **Village:** Khed, **District:** Ratnagiri

Crop(s): Rice, **Crop type:** Cereals.

Harvested the matured rice during clear weather (no rainfall) and immediately stored the harvested crop in a protected and safe place.

Outcome and Reported Benefits

- Saved crop from yield loss thereby saving 100% yield.
- Obtain of 600 kg Grain yield from 20 gunta areas due to adoption of advisory.
- Saved grain yield 600 kg x Rs. 23 = ₹ 13,800/-

2.14.3 Timely Rainfall Forecast Enables Strategic Spray Management and Saves Input Costs for Grape Vineyard – AMFU, Kolhapur

Weather-Related Challenges during *Kharif* 2023-2024

During the 2023-2024 farmers experienced rainfall during Last week of November month. The unseasonal rainfall increased pest and disease incidence.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Kolhapur, issued timely agrometeorological advisories on 21.11.2023 (Forecast of light rainfall in Palus tahsil of Sangli district) and on 25th, 26th and 27th November, 2023 light rainfall was received as per the forecast.

Farmer Response and Field-Level Action

Farmer Name: Mr. Sunil Hanumant Sutar, **Village:** Khatav, **District:** Sangli

Crop(s): Grape, **Crop type:** Fruits.

As per the block-level Agromet Advisory Bulletin (AAB) issued on 21.11.2023, rainfall was forecast for 26.11.2023 in Palus block. Subsequently, isolated rainfall was received in Palus tahsil on the forecasted date. During this period, Mr. Sutar was planning to spray insecticides in his grape vineyard. However, after carefully reading the rainfall forecast in the AAS bulletin, he decided to postpone the spray operation.

If the spray had been applied before rainfall, the insecticide would have been washed off, leading to ineffective pest control and unnecessary financial loss. By postponing the spray operation, Mr. Sutar saved approximately ₹5,000 on that single spray.

Outcome and Reported Benefits

Reported yield impact: The farmer was planning for spraying but by considering rainfall forecast he postponed the spraying and saved his input costs.

Reported economic benefit: ₹15,000/- per acre.

2.14.4 Mitigating Sunscald in Alphonso Mango: Managing Thermal Stress and Extreme Heat Wave Conditions in the Coastal Mulde Region – AMFU, Mulde

Weather-Related Challenges during March 2025

The maximum temperature at Agro-meteorological observatory, Mulde has been experiencing 37 degrees Celsius and heat wave like conditions are occurring in the periphery for the last 8 days, the large size oval fruits in the coastal areas of Alphonso Mango are getting scorched (Sunscald) due to intense sunlight.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Mulde, issued timely agrometeorological advisories 25/2025 on 28th March 2025 (heat wave conditions).

Key recommendations included:

To protect mango fruits from bright sunshine and to increase the size and weight of the fruits and to produce fruit without spots, cover the Alphonso fruits with 25x20 cm paper bags 1 month after fruiting, when the fruits are round to oval in shape.

Farmer Response and Field-Level Action

FarmerName: Mr Santosh Fatak, **Village:** Vijaydurg, **District:** Sindhudrg

Crop(s): Mango, **Crop type:** Fruit crop.

According to the Agromet Advisory given by AMFU, Mulde, Mr. Santosh Fatak adopted the easiest and cheapest technology to wrap the mango fruit with the help of 25x20 cm paper bags.

Outcome and Reported Benefits:

- Advisory based on heat wave forecast helps to cover the Alphonso mango in time increases the crop yield and brings more income to the farmer. Timely advisory from GKMS helps to take necessary action which minimizes the yield loss and increases the size of fruit by 25% to 30% and fruit becomes juicier and export quality” as well as no single fruit get sunscald due to heat wave and spongy tissue disorder reduces from 20% to 4% Mr. fatak said.

- Mr. fatak further inform that Normally, Mango fruits used to sell at ₹30,000/- Per ton, fruits from this bag technology attracts higher price of ₹70,000/- to ₹80,000/- per ton in the market.

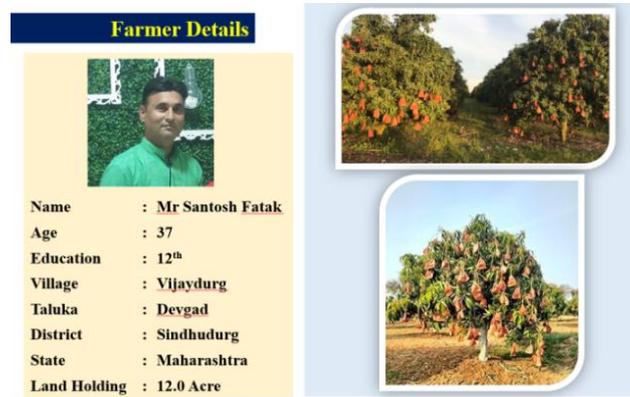


Fig. 57: Farmer Santosh Fatak’s timely intervention to mitigate heat wave effects on mango

2.14.5 Timely Advisory Protects *Kharif* Crops from Dry Spells and Heavy Rainfall – AMFU, Parbhani

Weather-Related Challenges during *Kharif* 2024

During the 2024 *Kharif* season, farmers experienced prolonged dry spells in August followed by intense heavy rainfall events in September. These erratic weather conditions resulted in soil moisture stress, crop wilting, and increased risk of waterlogging, posing a serious threat to crop yield and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Parbhani, issued timely agrometeorological advisories on 3rd August 2024 (dry spell conditions) and 22nd September 2024 (heavy rainfall event).

Key recommendations included:

- Protective irrigation during dry spell conditions and foliar spray of KNO₃ (Potassium Nitrate) as an alternative measure to sustain crop growth.
- Adoption of the Broad Bed and Furrow (BBF) method for soybean to conserve soil moisture during dry periods and facilitate drainage during excess rainfall.
- Immediate removal of stagnated water during heavy rainfall events to prevent root damage and reduce the incidence of pest and disease outbreaks.

Farmer Response and Field-Level Action

Farmer Name: Mr. Datta Sukhadeo Pund **Village:** Italapur, **District:** Parbhani

Crop(s): Cotton, **Crop type:** Cash crop.

The farmer implemented the advisories in real time. Timely interventions helped in saving the crop during the dry spell and minimizing losses during the heavy rainfall event. Improved crop management as per advisories contributed to enhanced crop performance during the *Kharif* season.

Outcome and Reported Benefits

Reported yield impact: Crop saved during dry spell and yield losses minimized during heavy rainfall.

Reported economic benefit: ₹20,000/- per acre.

2.14.6 Timely Advisory Protects Grape orchard from Rainfall – AMFU, Pune

Weather-Related Challenges during monsoon 2025

Mr. Goraksh Barawkar, progressive farmer from Pune district has grape orchard in Daund block of Pune district. He is the regular beneficiary of advisory through WhatsApp group. Right from land preparation to harvesting of the crop, he takes our advisories' help and weather forecast regularly which resulted in satisfactory yield. According to him, this year the yield was comparatively higher as compared to other farmers. He expressed his gratitude toward us for our contribution and advisories as he had benefitted by weather forecast for his spraying activity while rainfall was forecasted

Agromet Advisory Issued and Interventions Suggested

The AMFU, Pune, issued timely agrometeorological advisories on 02nd September, 2025 (rainfall event).

Key recommendations included:

- Due to cloudy and rainy weather, for the control of mealy bug, uproot the weeds in the orchard & maintain cleanliness in the orchard. Make use of yellow sticky traps and for chemical control spray with Buprofezin 25% SC 15ml or Lecanicilliumlecani

50gm + 50ml. milk mixed in 10 liters of water. (Temperature should be less than 30 degrees Celsius and humidity should be more than 65 percent).

- Spray when there are no rains.

Farmer Response and Field-Level Action

Farmer Name: Mr. Goraksh Barawkar, **Village:** Daund, **District:** Pune

Crop(s): Grape, **Crop type:** Fruit crop.

The farmer implemented the advisories in real time. Timely interventions helped in saving the crop spraying during the rainfall events minimizing losses during the rainfall event. Improved crop management as per advisories contributed to enhanced crop performance during the season.

Outcome and Reported Benefits

Reported yield impact: Crop saved during rainfall event by avoiding spraying.

Reported economic benefit: ₹10,000/- per ha.

2.14.7 Weather-Based Drainage and Management Strategies to Safeguard Crop Health from Persistent Heavy Rainfall Events in *Kharif* 2024 – AMFU, Rahuri

Weather-Related Challenges during *Kharif* 2024

During the 2024 *Kharif* season, farmers experienced prolonged heavy rainfall events. These erratic weather conditions resulted in soil moisture stress, crop wilting, and increased risk of waterlogging, posing a serious threat to crop yield and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Rahuri, issued timely Agrometeorological advisories on 15th July and 19th, 27th August, 24th November 2024 observe a heavy rainfall event.

Key recommendations included:

- Immediate removal of stagnated water during heavy rainfall events to prevent root damage and reduce the incidence of pest and disease outbreaks.
- Avoid the spraying and fertilizer application during warning period.
- Do avoid taking animals for grazing during the warning period.

Farmer Response and Field-Level Action

Farmer Name: Mr. Kiran Haushabapu Shinde, **Village:** Takali Miya, **District:** Ahmednagar

Crop(s): Sugarcane & Cotton, **Crop type:** Cash crop.

The farmer implemented the advisories in real time. Timely interventions helped in saving the crop during the heavy rainfall. Improved crop management as per advisories contributed to enhanced crop performance during the *Kharif* season.

Outcome and Reported Benefits

Reported yield impact: Yield losses minimized during heavy rainfall.

Reported economic benefit: ₹ 30,000/- per acre.



Fig. 58: On-farm measures by farmer Kiran Haushabapu Shinde reduced cotton yield loss during heavy rainfall

2.15 Manipur

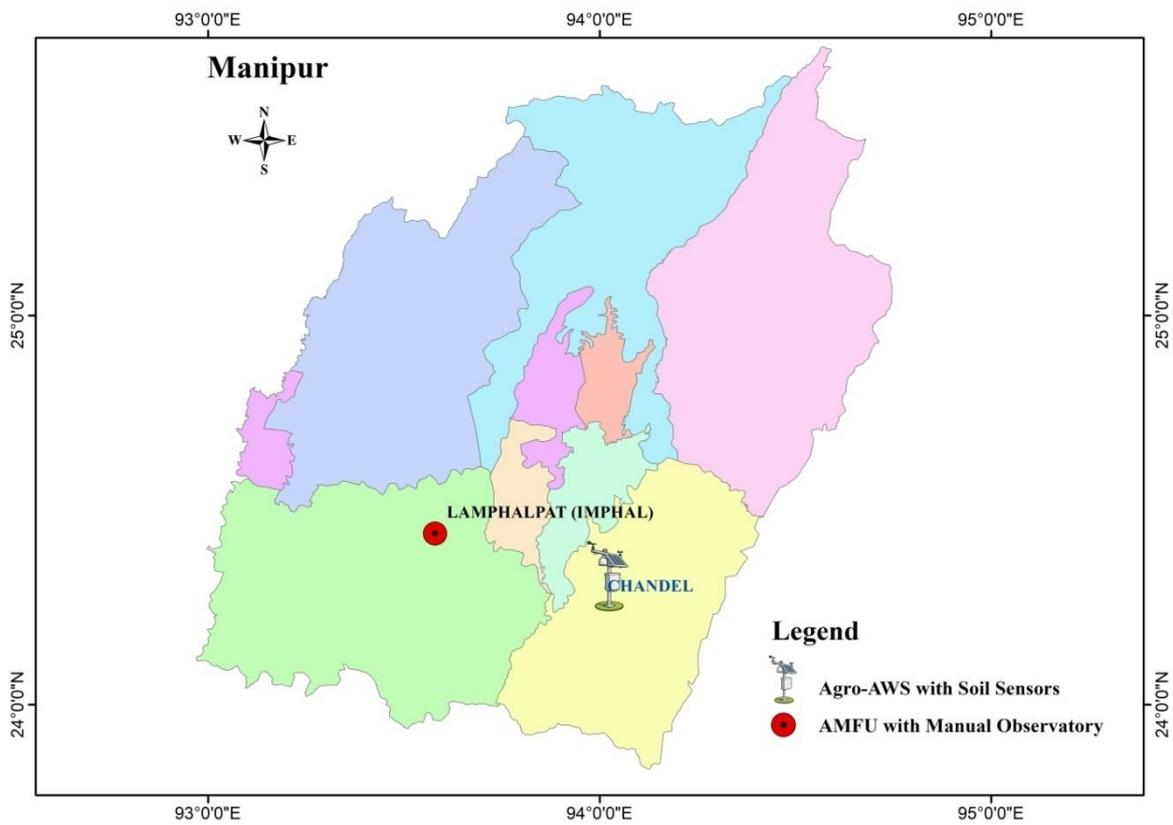


Fig. 59: Schematic map of Manipur showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.15.1 Advisory Protects *Kharif* Crops from Disease and Promotes Rainwater Harvesting - AMFU, Lamphelpat

Weather-Related Challenges

The farmer faced several interconnected risks that threatened the viability of his operation. His field was completely dependent on unreliable and erratic rainfall for his traditional, low-yielding paddy crop, which carried a high risk of crop failure due to rainfed dependence. Furthermore, the poultry component of his new Integrated Farming System (IFS) was susceptible to diseases, specifically Ranikhet, particularly during vulnerable periods, as highlighted by an advisory issued in April 2025. Finally, a forecast of light to moderate rains in late October 2025 posed a significant post-harvest risk to his mature *Kharif* rice crop, potentially leading to spoiled harvested heaps left in the open or a reduction in grain quality.

Agromet Advisory Issued and Interventions Suggested

The farmer was receiving information on all aspects of farming and weather from the Agromet Field Unit (AMFU) - Lamphelpat, which suggested key protective and management interventions.

In April 2025, the farmer received an advisory regarding Ranikhet Disease in poultry, which immediately necessitated focused Disease Management interventions for this vital component of his farm. Subsequently, in May 2025, a Rainwater Harvesting Advisory was issued, prompting crucial actions in Water Resource Management to address the farm's reliance on erratic rainfall. Finally, in October 2025, a critical weather forecast was provided, predicting no rain from October 25-27, followed by light to moderate rain from October 28-29. This forecast mandated immediate and strategic Post-Harvest Management to protect the mature *Kharif* rice crop from the risk of spoilage due to the impending rains.

Key recommendations included:

- Disease Prevention: Adopt measures against Ranikhet disease to secure poultry health.
- Water Conservation: Implement rainwater harvesting techniques to store water.
- Harvest timing: Harvest mature rice after the forecasted light to moderate rains (Oct 28-29, 2025).

Farmer Name: Mr. Pashel Lining **Village:** Modi, **District:** Chandel,

Crop(s): Rice & Horticultural, **Crop type:** Cereals & Cash crop.

The farmer began attending FAP programmes in 2025, leading to a transition from monocropping to an integrated system featuring high-yielding paddy and livestock. He successfully adopted advisories: securing poultry health against Ranikhet Disease in April, and implementing rainwater harvesting in May for water storage. Following a weather advisory, he protected his mature *Kharif* rice by harvesting it strategically after the rains, ensuring quality and preventing spoilage.

Outcome and Reported Benefits

Diversification drastically reduced field failure risk. Adopting the Ranikhet disease advisory secured poultry health. Rainwater harvesting provided crucial water for fishery and irrigation. Following the harvest advisory prevented spoilage and quality deterioration of the *Kharif* rice crop during late October rains. Reported economic the annual net income before the intervention was ₹ 59,400/-, which increased substantially after the intervention to ₹1,82,130/-. This reflects a significant net income increase of ₹ 1,22,730/-, clearly indicating the positive economic impact of the intervention on overall earnings.



Fig. 60: Advisory-based crop management by farmer Pashel Lining to protect rice during heavy rainfall at harvest

2.16 Mizoram

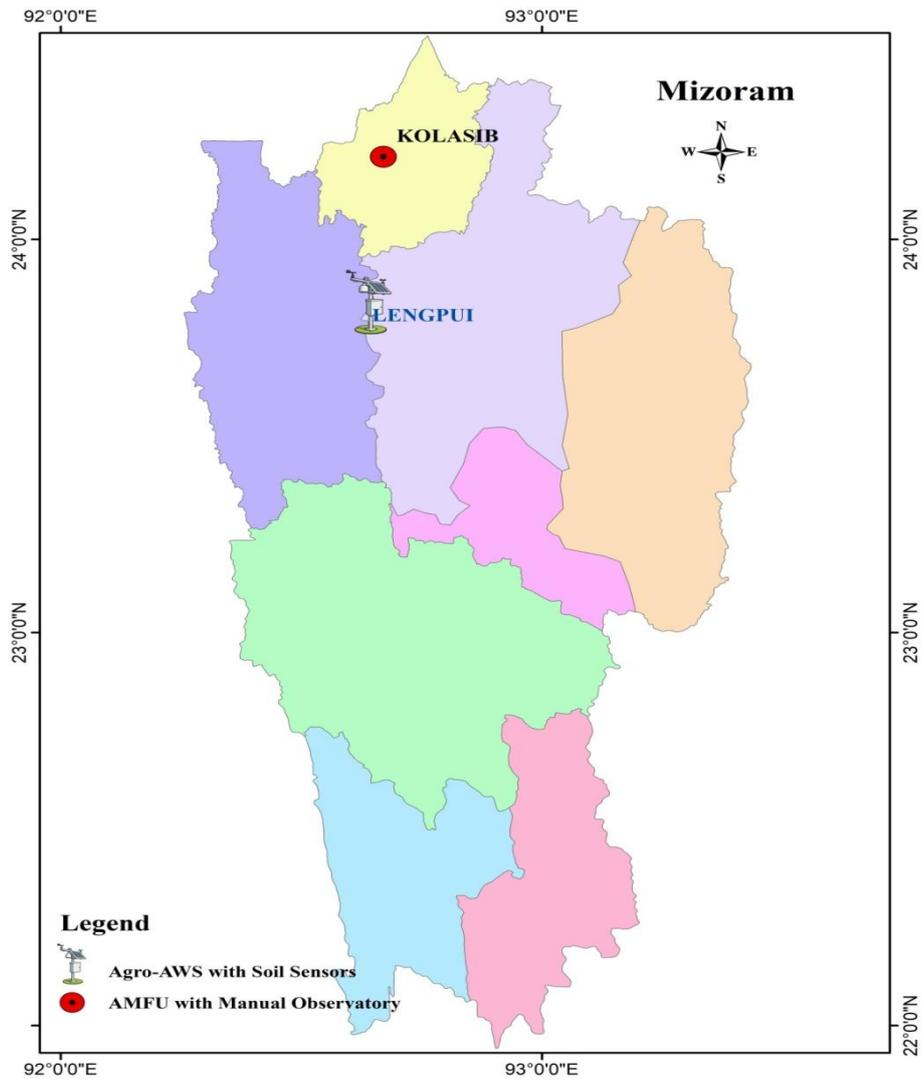


Fig. 61: Schematic map of Mizoram showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.16.1 Weather-Linked Fish Disease Management through Agro-Meteorological Advisory: A Case from Kolasib District, Mizoram – AMFU, Kolasib

Weather-Related Challenges during Season (Winter season, December 2018–January 2019)

During the second week of December 2018, low minimum temperatures (7.5–8.5°C) and reduced relative humidity (<50%) in Bukvannei village, Kolasib district caused severe cold stress in fishponds, leading to deteriorated pond ecology. Fish exhibited surface gasping, pale to necrotic gills, and fin and tail damage, resulting in a rapid rise in mortality to nearly 20%. These conditions triggered outbreaks of Branchiomycosis (Gill Rot) and Fin and Tail Rot, which are commonly associated with prolonged cold and dry winter weather.

Agromet Advisory Issued and Interventions Suggested

Based on medium-range forecasts indicating persistently low minimum temperatures (8–9 °C) and low relative humidity (<50%), AMFU, Kolasib issued fishery-specific agro-advisories on 24 and 28 December 2018, valid from the second week of December 2018 to the second week of January 2019. Disseminated through the AMFU Kolasib WhatsApp group and the Fishery Development Officer, Kolasib, the advisories warned of heightened risks of Branchiomycosis (Gill Rot) and Fin and Tail Rot and recommended pond liming, copper sulphate dip treatment, and medicated feed as preventive and curative measures.

Key recommendations included:

- *Gill Rot (Branchiomycosis)*: Under low temperature (<10 °C) and low humidity conditions, farmers were advised to disinfect ponds through liming with quick lime (CaO) at 50–100 kg/ha, preferably in the morning. Liming helps reduce fungal load, improve water pH, and enhance dissolved oxygen, creating unfavourable conditions for gill rot pathogens.
- *Fin and Tail Rot*: As cold stress lowers fish immunity, farmers were advised to control infections through copper sulphate dip treatment (CuSO₄ @ 2 mg/litre for 1–2 minutes) for affected fish and medicated feeding with tetracycline @ 10–15 mg/kg fish body weight for 3–5 days. These measures help control external infections, promote recovery, and restore normal feeding behaviour.

Farmer Response and Field-Level Action

Upon observing early disease symptoms, the farmer promptly followed the agrometeorological advisory issued by AMFU, Kolasib. Quick lime was applied at 50–100 kg/ha to disinfect the pond and stabilize water quality, while affected fish were treated with copper sulphate dip (2 mg/litre for 1–2 minutes). Medicated feed with tetracycline (10–15 mg/kg body weight) was administered for five days, resulting in reduced mortality, improved feeding response, and stabilization of pond health during the winter stress period.

Farmer Name: Mr. Lalsawma, **Village:** Bukvannei, **District:** Kolasib

Enterprise: Fish, Aquaculture – Indian Major Carps and Exotic Carps.

Outcome and Reported Benefits:

Following the advisory-based interventions, fish mortality was reduced from about 20% to below 5% within one week, while feeding activity recovered within two weeks. Clinical symptoms of Branchiomycosis and Fin and Tail Rot subsided within 10–12 days, preventing an estimated economic loss of ₹18,000–₹20,000 and resulting in near-total recovery of the fish stock.

A comparative analysis (2018–2020) showed that farmers adopting agrometeorological advisories incurred substantially lower losses than non-adopters. Losses due to Branchiomycosis and Fin and Tail Rot were reduced to 9.62–12.14% and 7.52–10.35%, respectively, among adopting farmers, compared to 26.34–45.62% and 26.34–35.74% among non-adopters. Overall, advisory adoption enabled farmers to save 62.24% of losses from Branchiomycosis and 72.15% from Fin and Tail Rot, highlighting the strong economic benefits of timely weather-based advisories.



Fig. 62: Cold stress management in fish by farmer Lalsawma through advisory-based dip treatments

2.17 Delhi

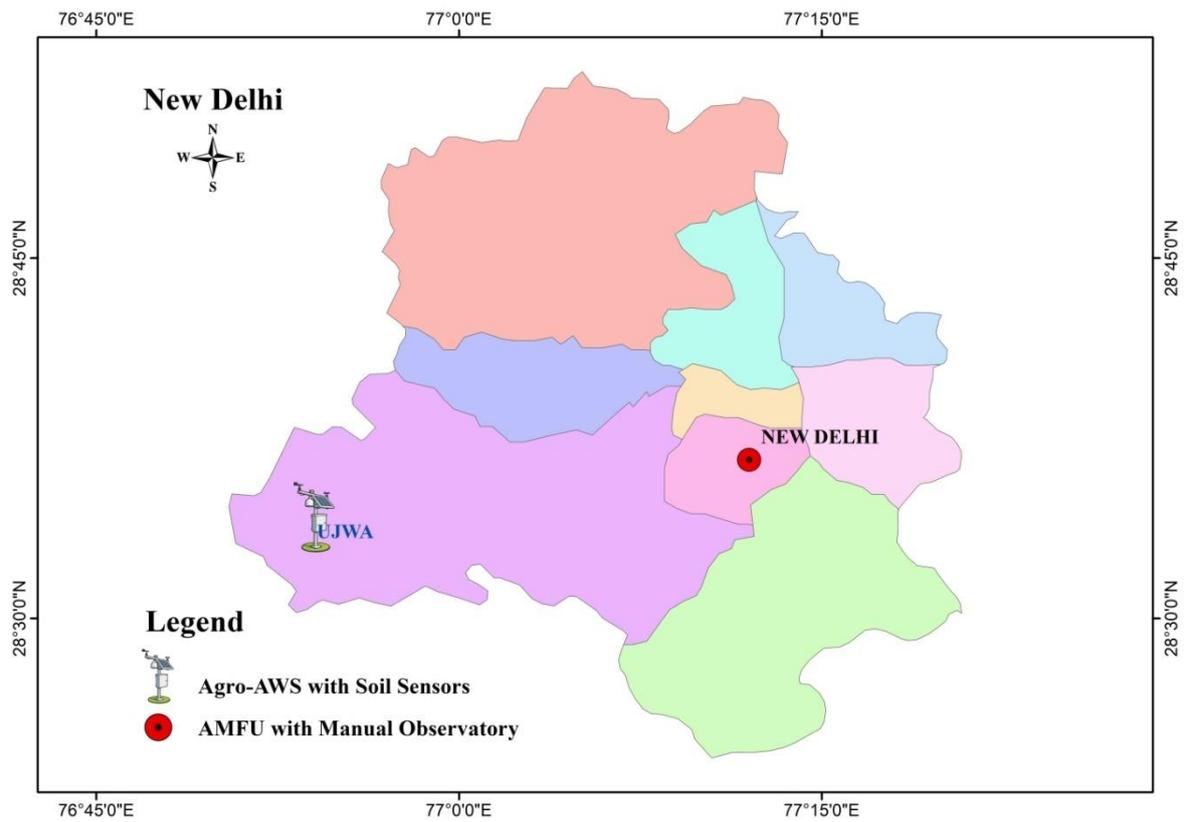


Fig. 63: Schematic map of Delhi showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.17.1 Precision Input Scheduling: Weather-Based Advisories Prevent Resource Wastage during January 2024 Rainfall – AMFU, New Delhi

Weather-Related Challenges during *Rabi* 2024-25

During the *Rabi* season of 2024, the India Meteorological Department (IMD) issued a rainfall forecast on 30th January 2024, indicating the likelihood of precipitation in the coming days. Based on this forecast, the Agrometeorological Field Unit (AMFU), New Delhi, disseminated timely advisories to farmers recommending the postponement of irrigation and the suspension of insecticide spraying in standing wheat and vegetable crops. Following these advisories, farmer Pritam Singh successfully avoided one scheduled irrigation and discontinued insecticide application for termite control in his wheat crop, resulting in a cost saving of approximately ₹5,000/- per acre during the season.

Agromet Advisory Issued and Interventions Suggested

AMFU, New Delhi, issued agrometeorological advisories on 30th January 2024,

Key recommendations included:

- Advising farmers to halt irrigation and spraying operations in standing wheat and vegetable crops in anticipation of the forecasted rainfall.

Farmer Response and Field-Level Action

Farmer Name: Mr. Pritam Singh **Village:** Nekpur, **District:** Bulandshahr

Crop(s): Wheat & Pea, **Crop type:** Cash crop.

The farmer responded promptly after rainfall events occurred on 31st January 2024 and 1st February 2024. By following the advisory, he saved irrigation schedule and avoided unnecessary insecticide spraying, thereby reducing the overall cost of cultivation. The farmer later contacted AMFU to express appreciation for the usefulness of such real-time advisories.

Outcome and Reported Benefits

Reported agronomic impact: One irrigation and insecticide spray avoided reduced cost of cultivation and improved resource-use efficiency.

Reported economic benefit: Approximately ₹5,000/- per acre.

2.18 Odisha

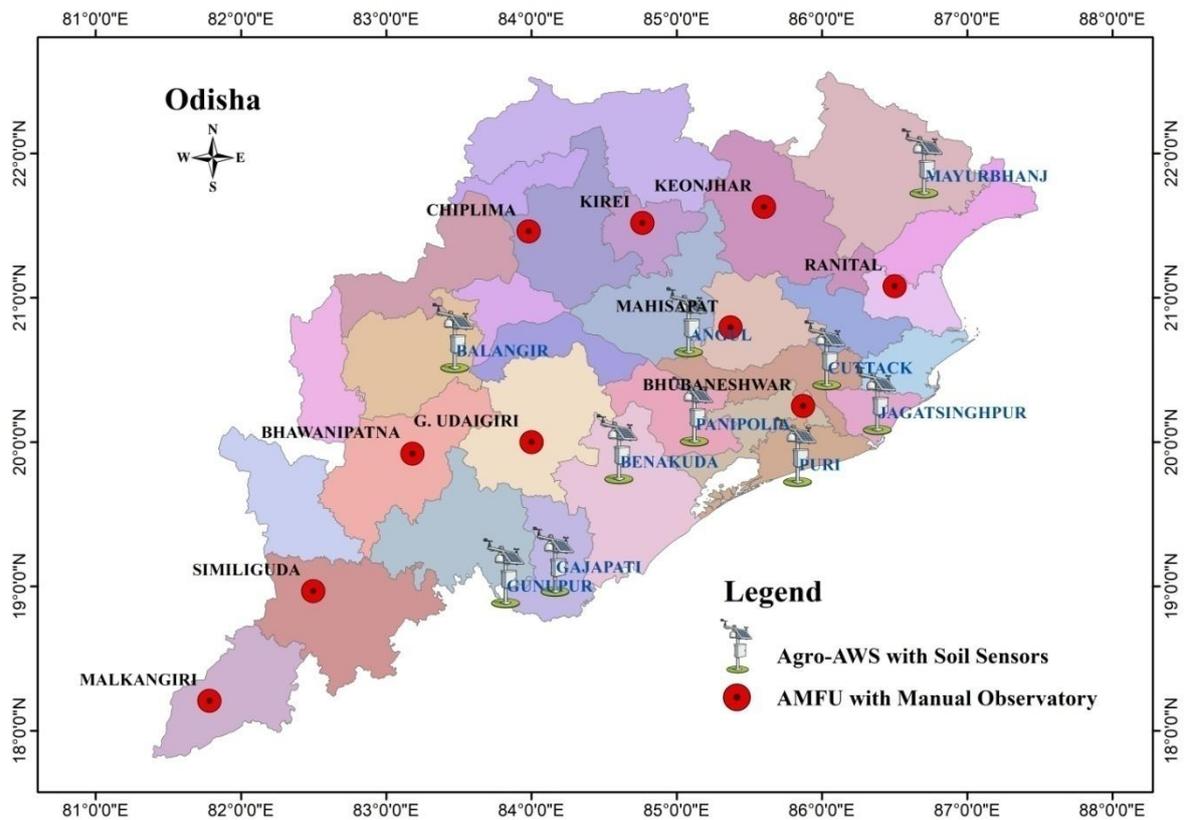


Fig. 64: Schematic map of Odisha showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.18.1 Timely Impact Based Forecast Helped Farmer to Save Cotton Crop from Heavy Rainfall in Kalahandi – AMFU, Bhawanipatna

Weather-Related Challenges during *Kharif* 2024

During the *Kharif* season of 2025, Kalahandi district experienced an episode of heavy to very heavy rainfall accompanied by thunderstorms and gusty winds during the last week of September. As per the Impact Based Forecast (IBF) issued by IMD on 26th September 2025, the district was expected to receive significant rainfall. Subsequently, 67.8 mm rainfall was recorded on 27th September 2025, posing a serious threat to standing crops, particularly cotton at the flowering to boll-opening stage, which is highly sensitive to excess moisture and strong winds.

Agromet Advisory Issued and Interventions Suggested

In response to the forecasted adverse weather, the Agromet Field Unit (AMFU), RRTTS, Bhawanipatna, under the Gramin Krishi Mausam Sewa (GKMS) programme, issued a Special Impact-Based Agromet Advisory (Special Bulletin-18). The advisory focused on minimizing rainfall-induced damage and managing post-rainfall stress in cotton crops.

Key recommendations included:

- Harvesting of fully opened cotton bolls before the onset of heavy rainfall
- Ensuring proper drainage in cotton fields.
- Withholding fertilizer and pesticide application during the rainfall period.
- Timely management of post-rainfall effects such as para wilt/sudden wilting using appropriate plant protection measures.

Farmer Response and Field-Level Action

Farmer Name: Mr. December Rana, **Village:** Borbhata, **District:** Kalahandi

Crop(s): Cotton, **Crop type:** Cash crop.

Mr. December Rana received the agromet advisory well in advance and acted promptly. Anticipating heavy rainfall, he harvested the fully opened cotton bolls before the rainfall event, thereby protecting the produce from rain-induced damage. Following the rainfall, wilting symptoms appeared in some cotton plants due to excess soil moisture. As per the advisory, he immediately applied cobalt chloride @ 10 mg per litre (10 ppm) on the affected plants. Additionally, he drenched the wilt-affected plants with copper oxychloride @ 25 g per

10 litres of water to prevent further crop loss. These timely interventions effectively arrested wilting and minimized damage.

Outcome and Reported Benefits

Due to advance warning and timely adoption of agromet advisories, the farmer successfully safeguarded his cotton crop from heavy rainfall damage and post-rainfall wilting. The timely harvesting of cotton bolls and effective disease management resulted in an estimated economic benefit of ₹15,000/- to ₹20,000/-, demonstrating the critical role of Impact-Based Agromet Advisory Services in reducing weather-induced crop losses.



Fig. 65: Cotton crop protection from heavy rainfall by farmer December Rana to reduce yield loss

2.18.2 Effectiveness of Weather-Based Agro-Advisories in Managing Unseasonal Rainfall Risks - AMFU, Bhubneshwar

Weather-Related Challenges during *Kharif* 2024

During the 2024 *Kharif* season, farmers experienced unseasonal rainfall events in December. These erratic weather conditions may result in lodging, stagnation of water, various infestation and vivipary germination posing a serious threat to crop yield.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Bhubaneswar, issued timely agrometeorological advisories on 21st - 26th December 2024 (unseasonal rainfall event).

Key recommendations included:

- Harvest the rice crop if 85 % grains are matured in a panicle and store in a safer place before rain.

- After receding of rainwater in case of lodging, tie the paddy plants in bundles and keep straight.
- Make provision for draining out excess rainwater in standing rice crop by making alleys (Pahi) and keep the drain ends open.
- Provide staking and make provision for drainage in Fruit crops.

Farmer Response and Field-Level Action

Harvest the rice crop and stored in a safer place before rain. Draining out excess rainwater in standing rice crop by making alleys (Pahi) and keep the drain ends open. In fruit crop provide staking and draining out excess rainwater.

Farmer Name: Sri Balabhadra Prasad Pati, **Village:** Sathilo, **District:** Khordha

Crop(s): Paddy & Banana, **Crop type:** Cereal & Plantation Crop.

The farmer implemented the advisories in real time. Timely interventions helped in saving the crop and minimizing losses during the rainfall event. Improved crop management as per advisories contributed to enhanced crop performance during the *Kharif* season. The unseasonal rain struck at a critical time, coinciding with the harvest of *Kharif* paddy. However, harvest before rain saved the crop.

Outcome and Reported Benefits

Reported yield impact: Crop saved during unseasonal rain and yield losses minimized.

Reported economic benefit: ₹23,000/- per acre.



Fig. 66: Farmer Balabhadra Prasad Pati protected crops during unseasonal rainfall to reduce yield loss

2.18.3 Timely Advisory Protects *Rabi* Crops from Hailstorm, Gusty wind and unseasonal Rain – AMFU, Chiplima

Weather-Related Challenges during *Rabi* 2024-25

During *Rabi* season (2024-25), farmers experienced prolonged dry spells in January and February months followed by erratic and unseasonal rainfall/hailstorm events in March–April months. These erratic weather conditions may negatively have impacted sowing schedules of some vegetable crops, crop development, and overall yield prospects for various crops. Rainfall during this period was beneficial for some crops like Maize, Paddy etc. but caused damage to Mustard and some *Rabi* crops which were at harvesting and drying stage especially during February and March month. Some farmers were able to avoid such type of damage because of early information regarding occurrence of rainfall.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Chiplima, issued timely agrometeorological advisories about occurrence of hailstorm-thunderstorm along with gusty wind speed on dated: -19.02.2025, 19.03.2025 and 01.04.2025.

Key recommendations included:

- Harvesting of matured crops before hailstorm occurred and keep it in safe places to avoid damage.
- Make provision for draining out excess water from field.
- Postponed sowing/planting/harvesting operations in fruit and vegetable crops.
- Avoid fertilizer/chemicals application in agricultural field.
- Provide mechanical support to horticultural crops & staking to vegetables to protect them from strong wind.

Farmer Response and Field-Level Action

Farmer Name: Mr. HrusikeshPardia, **Village:** Gamharipali, **District:** Bargarh

Crop(s): Tomato, **Crop type:** Vegetables.

Timely interventions helped in saving the crop from hailstorm and minimizing losses during the unseasonal rainfall event. Crop management through weather-based advisories contributed to enhanced crop yield and quality during the *Rabi* season.

Outcome and Reported Benefits

Reported yield impact: Crop saved during hailstorm and yield losses minimized during erratic and unseasonal rainfall.

Reported economic benefit: ₹16,000/- per acre.



Fig. 67: Farmer Hrusikesh Pardia minimized tomato crop losses during heavy rainfall

2.18.4 Agromet Advisory reduces pest, diseases and post-harvest losses of crops - AMFU, G.Udayagiri

During 2025 *Kharif* season, farmers experienced heavy rainfall during September & October. Crop like short duration paddy to be harvested escaped the losses like advisory not to harvest and if harvested to be kept in safer place.

Agromet Advisory Issued and Interventions Suggested

AMFU, G.Udayagiri issued agro-advisory on 28th October 2025

Key recommendation included:

- Delay in planting or harvesting operation helping to avoid Soil Compacting seed washout or spoilage of mature produce.
- After rain spray Emamectin Benzoate @ 80g/Acre to manage pod borer.
- After rain chance of attack of Armyworm in rice, spray 500 ml Chlorpyriphos 20 EC per acre.
- Excess moisture can damage roots of groundnut. Drain out excess water.
- Soil drenching with Plantomycin @ 1 g/l + Cpper Oxychloride @ 2g/l to manage bacterial wilting of Brinjal, Tomato &cauliflower Crops.
- Installation of Pheromone Trap @ 20 no's/ha & released of *T. chilonis* @ 50000 eggs/ha in every 10 days' interval manage fruit & Shoot Borer of Brinjal.

- There are chances of both fungal & bacterial disease like wilt & rotting due to heavy rain.

Farmer Response and Field-Level Action

Farmer Name: Mr. Krushna Gamanga, **Village:** Padasahi, **District:** Kandhamal

Crop(s): Turmeric, Brinjal, Cauliflower, Paddy, Groundnut & Arhar, **Crop type:** Vegetables, Cereals, Oil Seed & Pulses.

The farmer follows advisories and acts in time in their field during untimely rain. It reduces losses minimizing expenditure in crops during *Kharif* season.

Outcome and Reported Benefits

Crop saved by pest, diseases and post-harvest losses during untimely rain.

Reported economic benefit: ₹10,000/- per acre.



Fig. 68: Management of vegetable crops under untimely rainfall by farmer Krushna Gamanga to reduce post-harvest loss

2.18.5 Proactive Measures Shield Farmers' fields from Cyclone - "Dana" - AMFU, Keonjhar

Weather related challenges during *Kharif* 2024

The farmers of Keonjhar district of Odisha mostly grow paddy, maize, green gram and black gram during *Kharif* season. After the harvest, vegetables including tomato, chilli, brinjal, okra etc. are grown by the same farmer's community. But in the year 2024, Odisha faced the cyclone- "Dana" and its effect on 25th, 26th and 27th October 2024. The farmers of Keonjhar also faced this disaster but the consequence was surprising. The farmers those followed the agro advisories issued by Gramin Krishi Mausam Seva (GKMS) got the information before

the cyclone's landfall and followed the suggestions issued by GKMS Officials. This not only saved their produce but also helped them to take appropriate measures for its storage and helped others in the community.

Agromet Advisory Issued and Key-Interventions Suggested

The AMFU, Keonjhar, Odisha issued several agro-advisory bulletins days before the landfall of the cyclone. The AMFU also issued special bulletins specifically for the cyclone on 24.10.2024. This included the following agro advisories in both English and Regional (Odia) languages.

Key recommendation included:

- Harvest the produce and keep them at safe and dry places above some height from the ground level.
- Do not spray or apply any type of pesticides and fertilizers.
- Postpone the sowing of any crops.
- Make sure to clear the drainage channels if clogged or blocked.
- Provide mechanical support to the banana plants with bamboo and harvest the matured or 60-80% matured banana bunch.
- Keep the pumpkin fruits at some height to avoid direct contact with the water and soil.
- Protect the pumpkin fruits with some cover/ Plastic etc. to reduce the direct impact of rainfall.

Livestock:

- Move the cattle, goats, ducks, and poultry birds to a safer place.
- Keep food and water for the livestock for next 3-4 days.
- Regularly, have a watch on the animals during heavy rainfall and strong winds.

Farmer Response and Field-Level Action:

Farmers Name: Mr. Nabin Hembram, **Village:** Tikarpada, **District:** Keonjhar

Crop(s): Paddy, Tomato & Brinjal, **Crop type-** Cereals & Vegetables.

Nabin was in direct contact with the GKMS Officials and followed the issued advisory on time. This resulted him to take necessary steps to protect his crops from the adverse effect of the cyclone. Upon knowing about the calamity, he immediately provided support to the tomato plants and banana crops. He harvested the early matured paddy crops and made

efficient drainage channels as per the advisories. The early action taken by him helped him to store his produces and saved from the losses.

Outcome and reported benefits:

Nabin was very much happy for his timely intervention. Where the other farmers faced losses due to cyclonic winds and rainfall, Nabin did not make any losses and sell them to earn profit for his hard work. He reported that the economic benefit he made was almost ₹ 15,000/- to 18,000/- per acre.

Nabin Hembram, a farmer of Keonjhar district set an example for others in his panchayat. Right advisory at right time, follow-up and proactive measures and timely interventions made him fearless of the natural calamities. He thanked IMD and GKMS for providing correct information before time which resulted him to earn more profit. He also asked others to follow the scientific advisories issued and to work hard timely.

2.18.6 Timely Advisory Protects *Kharif* Crops from Heavy Rainfall - AMFU, Mahisapat

Weather-Related Challenges during *Kharif* 2024

During the 2024 *Kharif* season, farmers experienced heavy rainfall events during September. This extreme rainfall conditions may result in lodging, stagnation of water, soil erosion, Pest and disease outbreaks, and viviparous germination which threaten crop yield and quality significantly.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Mahisapat, issued timely agrometeorological advisories on 18th September 2024 (Heavy rainfall event).

Key recommendations included:

- Make provision for draining out excess water in standing crops by keeping drain ends open.
- Harvest the matured produce before rainfall and store them in a safer place.
- Withhold application of fertilizer and plant protection chemical application until rainwater recedes.
- Do proper field surveillance for pests and diseases regularly and take appropriate plant protection measures accordingly.

Farmer Response and Field-Level Action:

Drainage channel was made by farmer in the maize field. Harvesting of maize crop was done and shifted to a safer place before rain. Application of pesticide was withheld in Maize field. After rainfall field surveillance was done by the farmer for fall army worm in Maize.

Farmer Name: Sri Nilamani Rout, **Village:** Sankarpur, **District:** Dhenkanal

Crop(s): Maize, Paddy, Green gram, Black gram, Groundnut & Sweet Potato, **Crop type:** Cereals, Pulses & oilseed.

Dissemination of weather-based information well in advance helped the farmer to protect the crop from adverse weather conditions. Further, it helps to enhance his farm income or minimize his loss through adjusting their farm activities according to agro-met advisory service received in advance. Improved crop management as per advisories contributed to enhanced crop performance during the *Kharif* season.

Outcome and Reported Benefits

Reported yield impact: Crop saved during intense rain and yield losses minimized.

Reported economic benefit: ₹15,000/- per acre.



Fig. 69: Advisory-guided interventions helped farmer Nilamani Rout mitigate heavy rainfall-related yield losses in maize

2.18.7 Timely Advisory Protects Yellow Stem Borer in Rice - AMFU, Ranital

Weather-Related Challenges during *Kharif* 2025

During the *Kharif* season, rice farmers of Balasore district faced severe infestation of Yellow Stem Borer favourable weather conditions such as high humidity, intermittent rainfall and

cloudy weather prevailed during the vegetative to tillering stage of the crop, creating congenial conditions for rapid multiplication of the pest. The infestation resulted in dead heart symptoms during vegetative stage and white ear head formation at reproductive stage, leading to significant yield loss and economic concern among farmers.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Ranital issued timely agrometeorological advisories on 12/08/2025, 04/09/2025 & 16/09/2025 (Stem borer management).

Key recommendations included:

- Clipping of seedling leaf tips at the time of transplanting to remove egg masses.
- Installation of pheromone traps @ 5 traps per hectare for monitoring and mass trapping.
- Spray the seedling with Tricyclazole & plantomycin @1 gm/ litre of water to minimize the spread of disease & clip the seedlings to reduce the infestation of stem borer & other pests.
- If the damage of stem borer is observed above ETL i.e. 5% dead heart & 10% leaf damage respectively, soil application of Rynaxypyr 0.4 G@4 kg/acre or Flubendiamide 0.7 G 5kg/acre is advised.
- Collection and destruction of infested tillers showing dead heart symptoms.

Farmer Response and Field-Level Action

Farmer Name: Mr.Gajendra Behera, **Village:** Maitapur, **District:** Balaosre

Crop(s): Rice, **Crop type:** Cereals.

Due to timely advisory implementation and adoption of scientific pest management practices by farmer, Yellow Stem Borer infestation was effectively controlled. The rice crop showed healthy Tillering, reduced pest damage and normal panicle emergence during the *Kharif* season.

Outcome and Reported Benefits

Adoption advisories reduced dead heart and white ear incidence.

Reported economic benefit: ₹18,000/- per acre.



Fig. 70: Farmer Gajendra Behera's advisory-guided management reduced dead heart and white ear incidence

2.19 Punjab

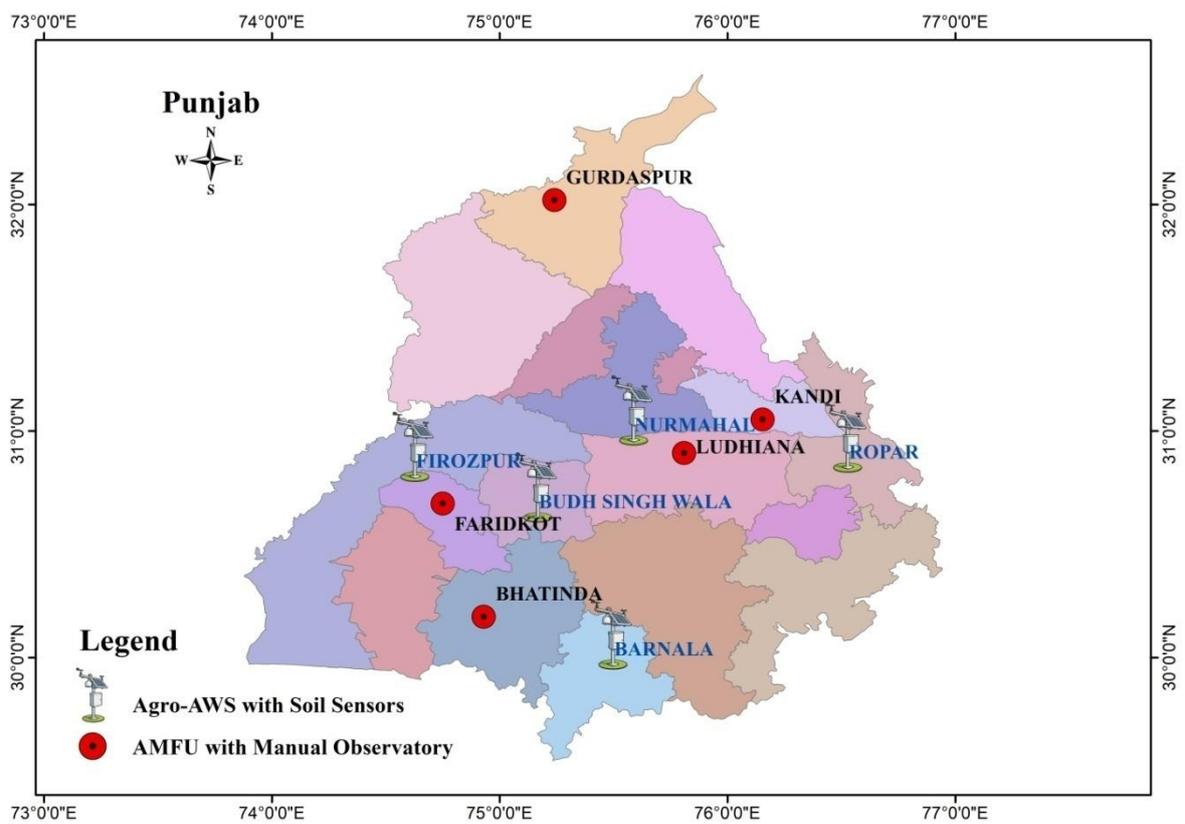


Fig. 71: Schematic map of Punjab showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.19.1 Mitigating the Synergistic Stress of Intense Winter Cold Waves and Soil Moisture Deficit through Targeted Agromet Advisories – AMFU, Ballawal

Weather-Related Challenges during *rabi* season

The *Rabi* 2022-23 was characterized by intense cold wave conditions during December and January where maximum and minimum temperature remained below normal for many days. The December, January and February were having deficit rainfall leading to more impact of low temperature on crops due to low soil moisture. During the grain filling, ripening and harvesting phases, the rainfall was above normal, the timely advisories for which resulted in reduction of crop losses.

Agromet Advisory Issued and Interventions Suggested

The farmer received regular advisories regarding cold wave; and forecast for rainfall on 13-01-2023, 13-03-2023 and 21-03-2023 during *Rabi* 2022-23

Key recommendations included:

- Sowing of crops by practising soil moisture conservation techniques i.e. ploughing in evening and planking in morning
- Light irrigations to save the crops from frost and low soil moisture stress.
- Delay in spray operations due to rainfall forecast
- Skipping irrigation due to rainfall as it may result in lodging of mature crops
- Drainage of stagnated water from fields to avoid pest and disease incidence
- Harvesting and storage of produce before the occurrence of rainfall events
- Regular monitoring of crops for the occurrence of yellow rust and aphid attack

Farmer Response and Field-Level Action

Farmer Name: Sh. Anantram Singh, **Village:** Jhandian, **District:** Ropar

Crop(s): Wheat & Raya. **Crop type:** Cereals & |Oil seed.

The success story of Sh. Anantram Singh highlights the crucial role of scientific weather forecasts and agro advisories in modern agriculture. Timely and accurate information enabled him to reduce risks, optimize inputs, enhance crop yield and quality, and improve overall farm profitability. His experience demonstrates that weather-based advisories are as essential as seeds and fertilizers for sustainable farming.

Outcome and Reported Benefits

- Water saving: 90 m³ of water per acre by skipping one irrigation
- Cost saving: ₹560 per acre in electricity and labour
- Input saving: 10–12% reduction in fertilizer, pesticide, and electricity costs
- Yield improvement: 15–20% increase compared to previous years
- Harvesting loss: No grain loss due to timely rainfall forecast

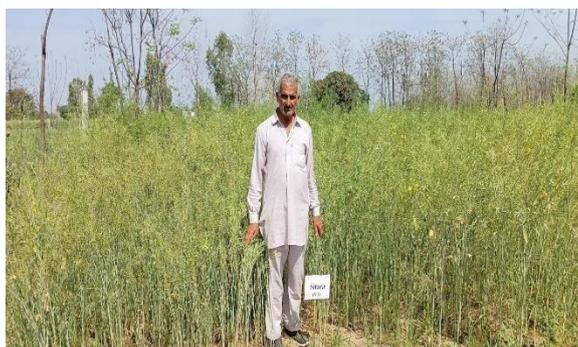


Fig. 72: Timely pre-rainfall harvesting helped farmer Anantram Singh mitigate mustard crop losses

2.19.2 Climate-Resilient Advisories Shield *Kharif* Crops from Dual Thermal and Moisture Stress – AMFU, Bathinda

Weather-Related Challenges during *Kharif* 2024

During the 2024 *Kharif* season, farmers experienced extreme heat wave conditions in May-June and dry spells during September-November month. Such heat stresses *Kharif* crops like rice and cotton, increases evapotranspiration which raises irrigation demand and pressure on groundwater, increased disease pressure, grain quality loss.

Agromet Advisory Issued and Interventions

Suggested The AMFU Bathinda, issued timely agrometeorological advisories on heat wave conditions (May-June) and dry spell conditions (September-December).

Key recommendations included:

- Timely sowing, short duration and heat tolerant varieties of cotton and rice.
- Light but frequent irrigations during heat wave conditions.
- Follow alternate wetting and drying method in rice.
- After rains spray fungicides only on symptoms.

- Promote micro-irrigation for cotton.

Farmer Response and Field-Level Action

Farmers name: Mr. Gurpreet Singh Sidhu, **Village:** Mehraj, **District:** Bathinda

Crop(s): Rice, Wheat, Maize, Mustard & Potatoes, **Crop type:** Cereals & vegetables.

By following the advisory services, he effectively protects his crops and ultimately enhances his yields. Mr. Sidhu's commitment to sustainable farming practices is evident in his decision to mix stubble into the soil rather than burning it, thus contributing to environmental conservation. Partnering with several progressive institutions, he emphasizes the importance of conserving natural resources and reducing environmental pollution.

Outcome and Reported Benefits

Reported yield impact: Crop saved during dry spell and yield losses minimized during heat stress.

Reported economic benefit: ₹12,000/- per acre.

2.19.3 Strategic Harvesting Based on Weather Forecast Saves Wheat Crop from Unseasonal Rain-Induced Waterlogging – AMFU, Gurdaspur

Weather-Related Challenges during *Rabi* 2024-25

During the 2025 *Rabi* season, farmers experienced rainfall at the time of harvesting of wheat crop. These erratic weather conditions resulted in waterlogging, posing a serious threat to crop yield and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU Gurdaspur issued timely agrometeorological advisories on 15th April, 2025.

Key recommendations included:

- Postpone the harvesting of wheat crop until predicted rainfall event had passed.
- Immediate removal of stagnated water during heavy rainfall events.

Farmer Response and Field-Level Action

Farmer Name: Mr. Ranjit Singh, **Village:** Kathiali, **District:** Gurdaspur

Crop(s): Wheat, **Crop type:** Cereals.

The farmer implemented the advisories in real time. Timely interventions helped in saving the crop during the rainfall event. This timely decision helped him to avoid post-harvest losses due to variable weather conditions. As a result, he successfully harvested wheat from their 8 acres of land. He credits these advisories for improving her preparedness and decision-making, particularly in managing extreme weather events.

Outcome and Reported Benefits

Reported yield impact: Crop saved during rainfall event and yield losses also minimized during this event.

Reported economic benefit: ₹25,000/- per acre.

2.20 Rajasthan

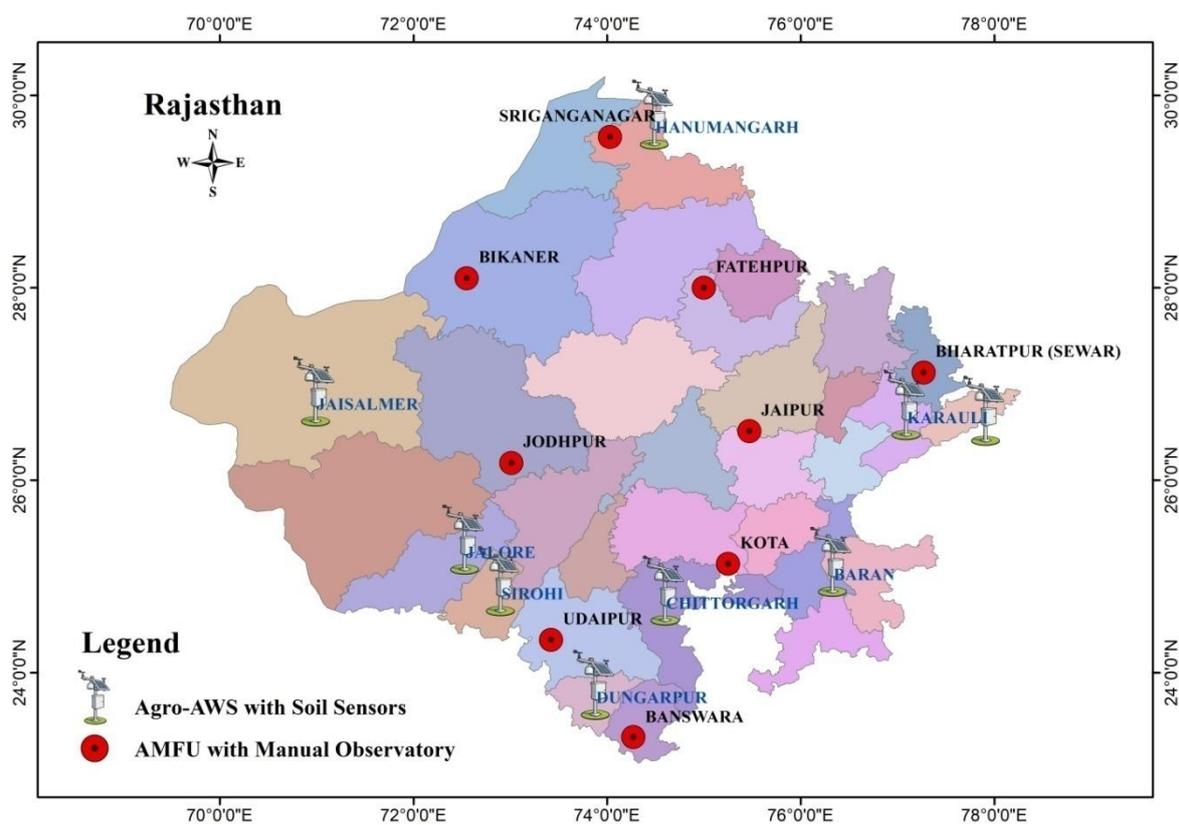


Fig. 73: Schematic map of Rajasthan showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.20.1 Navigating Extreme Weather Volatility: Managing the Transition from August Waterlogging to September Moisture Stress via Agromet Advisories – AMFU, Banswara

Weather-Related Challenges during *Kharif* 2025

During the 2025 *Kharif* season, farmers experienced intense heavy rainfall events in August followed by prolonged dry spells in September. These erratic weather conditions resulted in soil moisture stress, crop wilting, and increased risk of waterlogging, posing a serious threat to crop yield and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Banswara, issued timely agrometeorological advisories on 19th August 2025 (heavy rainfall event) and 23rd September 2025 (dry spell conditions)

Key recommendations included:

- In condition of Heavy rain /thunderstorm / lightening do not apply irrigation, spray of weedicides /insecticides and fertilizers.
- Only if excess rainfall occurs, postpone the intercultural operations for 2-3 days till field comes under condition Avoid irrigating crop, Drain excess water and hoeing-weeding after draining water to facilitate aeration
- For dry spell Conserve soil moisture by timely intercultural operations and mulching.
- Schedule protective / life-saving irrigation based on soil moisture status and ET demand.
- Postpone fertilizer and pesticide application until rainfall or irrigation is received to avoid losses.

Farmer Response and Field-Level Action

Farmer Name: Shri devi Lal mavi **Village:** Jatta Rawat ka Parada, **District:** Banswara
Crop(s): Maize, **Crop type:** Cereals.

The farmer implemented the advisories in real time. Timely interventions helped in saving the crop during the dry spell and minimizing losses during the heavy rainfall event. Improved crop management as per advisories contributed to enhanced crop performance during the *Kharif* season.

Outcome and Reported Benefits

Reported yield impact:

- Crop saved during dry spell and yield losses minimized during heavy rainfall.
- Avoided nutrient and pesticide loss worth approx. ₹12,500/- per hectare.
- Reduced input cost and improved crop resilience.
- Achieved 12–15% higher maize yield compared to previous years.
- Saved approx. ₹37,500/- in total on his 2.5 ha maize crop.



Fig. 74: Farmer Devi Lal Mavi protected crops from rainfall and dry spell stress using advisory-guided management

2.20.2 Resilience through Advisories: Managing the Transition from Mid-August Dry Spells to Early-September Flooding in Pulse Crops – AMFU, Fatehpur

Weather-Related Challenges during *Kharif* 2024

During the 2025 *Kharif* season, farmers experienced mild dry spells in first fortnight of August followed by intense heavy rainfall events in second fortnight of August and First week of September. These erratic weather conditions resulted in soil moisture stress, crop wilting, and increased risk of waterlogging, posing a serious threat to crop yield and quality. The cluster bean and mung bean crops suffered with poor flowering and seed setting

Agromet Advisory Issued and Interventions Suggested

The AMFU, Fatehpur-Shekhawati issued timely agrometeorological advisories on 22nd, 23rd, 24th August 2025(dry spell conditions) and 30th August 2025(heavy rainfall event).

Key recommendations included:

- Keeping in view of the rainfall during days, farmers are advised to make proper arrangements for draining excess rainwater from field.

- In the coming days, there is a possibility of cloudy weather with moderate to heavy rainfall. Try to conserve every drop of rain for the future.
- Immediate removal of stagnated water during heavy rainfall events to prevent root damage and reduce the incidence of pest and disease outbreaks.

Farmer Response and Field-Level Action

Farmer Name: Mr. Banwari lalsaini, **Village:** Garinda, **District:** Sikar

Crop(s): Mung bean, **Crop type:** Pulses.

The farmer properly implemented the advice provided by the Rural Agricultural Meteorological Service in Fatehpur-Shekhawati. The timely actions helped save the crops during the drought and minimized damage during heavy rains. Improved crop management based on the advice resulted in better crop yields during *Kharif* season.

Outcome and Reported Benefits

Reported yield impact: Crop saved during dry spell and yield losses minimized during heavy rainfall.

Reported economic benefit: ₹8,000/- per acre.



Fig. 75: Advisory-guided interventions helped farmer Banwari Lalsaini mitigate crop losses from drought and heavy rain

2.20.3 From Crop Loss to Successful Harvest: The Role of Agromet Advisories in Managing Extreme Rainfall Transitions during *Kharif* 2025- AMFU, Kota

Weather-Related Challenges during *Kharif* 2025

During the 2025 *Kharif* season, the early arrival of the monsoon prevented farmers from sowing other crops (soybeans, maize, black gram, etc.), and in areas where these crops had

already been sown, they were submerged and damaged due to excessive rainfall. Subsequently, farmers planted paddy crops, but heavy rains also occurred during the harvest season, posing a serious threat to crop yield and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Kota, issued timely agrometeorological advisories on 13th June 2025 (heavy rainfall event) and 24th and 28th October 2025 (heavy rainfall event).

Key recommendations included:

- Improve drainage: Create shallow drainage channels or ditches to quickly remove excess water from the fields.
- Select suitable crop varieties. Choose flood-resistant or short-duration varieties that can better withstand heavy rainfall or allow for harvesting before extreme weather events reach their peak. For example, the rice varieties can tolerate submersion for up to weeks.
- Insurance: Enrol in the Pradhan Mantri Fasal Bima Yojana (PMFBY) or similar regional schemes to provide a financial safety net against total crop failure.
- Weather Alerts: Use digital tools and apps (e.g., Mausam & Meghdoot) to monitor IMD forecasts and adjust irrigation or drainage schedules based on real-time alerts.

Farmer Response and Field-Level Action

FarmerName: Mr. Brijesh Kumar Nandwana, **Village:** Sultanpur, **District:** Kota

Crop(s): Rice, **Crop type:** Cereals.

The farmer followed the advice in a timely manner. The measures taken on time helped minimize the damage during the heavy rains. Improved crop management, as per the recommendations, led to better crop yields during the *Kharif* season.

Outcome and Reported Benefits

Reported yield impact: Based on information from the agricultural advisory service about the likelihood of excessive rainfall, a decision was made to plant the rice crop. Upon receiving information about heavy rainfall at harvest time, harvesting was postponed avoiding potential damage, resulting in reduced yield losses.

Reported economic benefit: ₹ 25,194/- per acre.

2.20.4 Adaptive Farm Management: Leveraging Agromet Forecasts to Stabilize Crop Health during the Erratic *Kharif* 2024 Season - AMFU, Jodhpur

Weather-Related Challenges during *Kharif* 2024

During the 2024 *Kharif* season, farmers experienced prolonged dry spells in August followed by intense heavy rainfall events in September. These erratic weather conditions resulted in soil moisture stress, crop wilting, and increased risk of waterlogging, posing a serious threat to crop yield and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Jodhpur issued timely agrometeorological advisories on 29th July to 21st August 2024 (dry spell conditions) and 29th August 2024 (heavy rainfall event).

Key recommendations included:

- Proper arrangement for moisture conservation in the field. To reduce evaporation from the top surface of the soil, cover the soil with weeds.
- Farmers are advised to make arrangement for drainage in standing *Kharif* crops.
- Avoid spray of insecticide and fungicide in crops.

Farmer Response and Field-Level Action

FarmerName: Mr. Surash Gadveer **Village:** Hiradesar, **District:** Jodhpur

Crop(s): Pearl millet, Green gram, Moth bean & Till, **Crop type:** Pulses.

The farmer implemented the advisories in real time. Timely interventions helped in saving the crop during the dry spell and minimizing losses during the heavy rainfall event. Improved crop management as per advisories contributed to enhanced crop performance during the *Kharif* season.

Outcome and Reported Benefits

Reported yield impact: Crop saved during dry spell, yield losses minimized, saved labour cost insecticide and fungicide chemical during heavy rainfall.

Reported economic benefit: ₹ 8,000/-to ₹10,000/- per ha.

2.20.5 Managing the Dual Threat of August Dry Spells and September Fall Armyworm (FAW) Outbreaks in Maize through Precision Agromet Advisories – AMFU, Udaipur

Weather-Related Challenges during *Kharif* 2024

Farmers of Udaipur District experienced prolonged dry spells in August followed by insect pest infestation of FAW in Maize in September. These erratic weather conditions resulted in soil moisture stress, crop wilting and insect pest infestation of FAW in Maize, a serious threat to crop yield and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Udaipur, issued timely agrometeorological advisories on 5th July, 2024 (to rainfall) dry spell conditions) and 6th August, 2024 (dry Spell). 13th September, 2024 (for Maize FAW infestation)

Key recommendations included:

- Where the sufficient moisture is available in the field farmers are advised to complete the sowing of maize. Improved varieties of maize: - Pratap QPM-1, HQPM-1, HQPM-5, PEHM-2 and Pratap hybrid maize-1, Pratap Makka-9, Pratap hybrid Makka-3. Before sowing seed should be treated with fungicide and P.S.B. or Azatobector.
- Keeping in the view of rainfall forecast in next few days, farmers are advised to proper management of drainage in standing crops and vegetable nurseries. Before spraying insecticides and weedicides, ensure that there is no rain for 3 to 4 hours. Otherwise postpone the spray.
- Foliar spray of Emamectin Benzoate 5 SG @ 0.4 g/l water should be done for the control of Fall Army Worm in maize. Spray should be done when sky is clear.

Farmer Response and Field-Level Action

Farmer Name: Mr. Mohan Lal, **Village:** Gogunda, **District:** Udaipur

Crop(s): Maize, **Crop type:** Cereals.

The farmer implemented the advisories in real time. Timely interventions helped in saving the crop during the dry spell and minimizing losses during the insect pest infestation.

Improved crop management practices as per advisories to enhanced crop performance during the *Kharif* season.

Outcome and Reported Benefits

Reported yield impact: Crop saved during dry spell and yield losses minimized during insect pest infestation.

Reported economic benefit: ₹11,500/- per acre.

2.21 Tamil Nadu

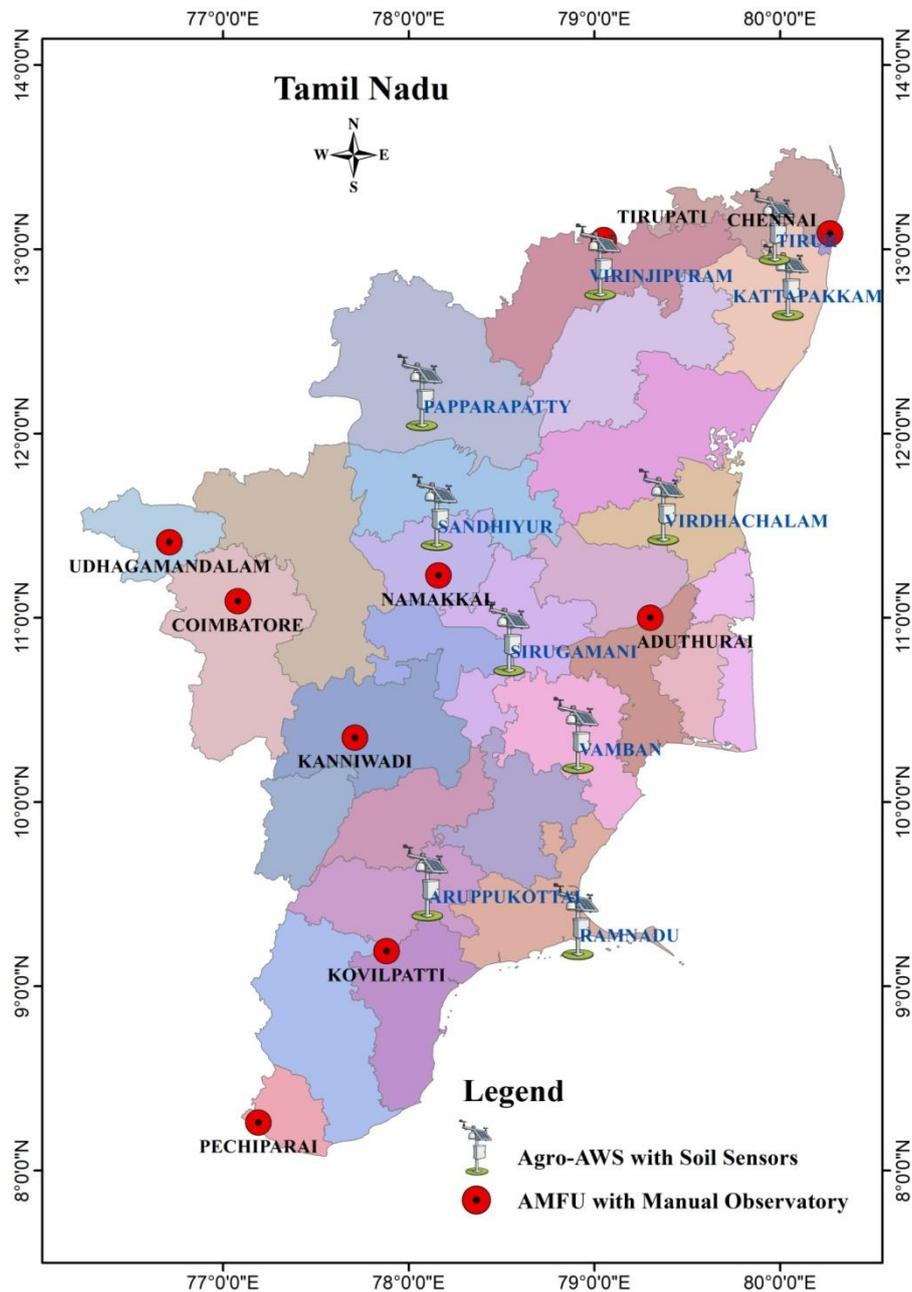


Fig. 76: Schematic map of Tamil Nadu showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.21.1 Smart Weather Advice Protects Cotton Crop during Intense Rainfall - AMFU, Aduthurai

Weather-Related Challenges during October to November 2025

During October to December 2025, farmers experienced intense heavy rainfall over a short duration. These erratic weather conditions resulted in severe water stagnation that could not be drained effectively, leading to excess soil moisture stress, crop rotting, and increased risk of waterlogging. Such conditions posed a serious threat to crop yield and crop survival.

Agromet Advisory Issued and Interventions Suggested

The Agro-Meteorological Field Unit (AMFU), Aduthurai issued a series of timely agrometeorological advisories on 21.10.2025, 22.10.2025, 24.10.2025, 12.11.2025, 19.11.2025, 20.11.2025, 24.11.2025, 25.11.2025, and 26.11.2025 in response to the heavy rainfall events.

Key recommendations included:

- Provision of adequate drainage facilities to all crops in view of the forecast of moderate to heavy rainfall over the Cauvery Delta Zone.
- Deepening of drainage channels and linking them with farm ponds to facilitate rainwater harvesting and quick removal of excess water.
- Postponement of irrigation, fertilizer, and pesticide applications during wet spells, along with ensuring effective drainage in cropped fields wherever necessary.
- Strengthening and expanding drainage facilities in waterlogged areas to prevent crop submergence.
- Providing support with wooden poles to trees and plants to prevent lodging due to rain and strong winds.

Farmer Response and Field-Level Action

Farmer Name: Mr. Kumbalingam, **Village:** Keelamaruthuvakudi, **District:** Thanjavur

Crop(s): Cotton, **Crop type:** Cash crop.

The farmer adopted the agro advisories in real time and implemented the recommended interventions promptly. Timely drainage management and protective measures helped safeguard the cotton crop during the heavy rainfall events. Improved crop management

practices, guided by the advisories, contributed to better crop performance during the samba season.

Outcome and Reported Benefits

Reported yield impact: The crop was successfully protected during periods of heavy and intensive rainfall. Yield losses were minimized, and timely application of inputs reduced overall input costs.

Reported economic benefit: ₹15,000/- per acre.

2.21.2 Armed to Combat Seasonal Occurrence of Sub Clinical Mastitis in North-eastern Agro Climatic Zone of Tamil Nadu - AMFU, Chennai

Weather-Related Challenges triggering the occurrence of sub clinical mastitis

Seasonal prevalence of sub clinical mastitis: From the study it was discernible that SCM had seasonal prevalence which shows spiking during rainy and winter season. The prevalence was higher in Cross bred cattle (78 %) than in native cattle.

Agromet Advisory Issued and Interventions Suggested

Field visits were conducted and field discussions were conducted to curtail sub clinical mastitis.

Detection of sub clinical mastitis

To have a preliminary study CMT (Californian Mastitis Test) was carried where a plastic paddle with four chambers of shallow cups was used to perform the test. Season wise advisory offered to the farmers: Twenty numbers of progressive dairy farmers were selected in each block, and they were trained on clean milk production and the management practices to prevent the occurrence of SCM – the causes, clinical signs, effect on udder tissues and milk production, other ill effects. Field level demonstration (FLD) and hands on training on clean milk production viz., cleaning of dairy cattle, disinfection and sanitation of shed, milking methods, cleaning of udder, wiping of udder.

Farmer Response and Field-Level Action

Farmer Name: Mrs. Sangeetha, **Village:** Avadi, **District:** Thiruvallur, **Livestock:** Crossbred dairy cattle.

Demonstration of the use the Post Milking Teat Dip solution immediately after milking and it prevent the entry of pathogen into the teat and prevent mastitis. Inputs with post milking teat dip (3.5 % Lactic acid), were distributed to selected dairy farmers.

Outcome and Reported Benefits

Reported yield impact: The farmers revealed that the milk production was increased with a larger impact on the keeping quality of milk of treated animal.



Fig. 77: Advisory-based post-milking teat dip by farmer Sangeetha increased milk production

2.21.3 Agro-Advisories Ensure Healthy Groundnut and Higher Income - AMFU, Coimbatore

Weather-Related Challenges during *Kharif*2024

During the *Kharif* season of 2024, groundnut farmers in Pollachi (South) block, Coimbatore district experienced highly variable weather conditions. The season was characterized by uncertain onset of rainfall, intermittent showers during early crop growth, and frequent rainfall spells during the mid-season, which increased the risk of weed infestation, fungal diseases such as *Cercospora* and Tikka leaf spot, and root rot. Additionally, rainfall events during the pod development and harvest stage posed challenges for timely irrigation scheduling and safe harvesting, potentially affecting yield and quality of groundnut produce.

Agromet Advisory Issued and Interventions Suggested

AMFU, Coimbatore, under the Gramin Krishi Mausam Sewa (GKMS), issued timely weather-based agrometeorological advisories throughout the crop season (May–September 2024). These advisories guided farmers on sowing, intercultural operations, disease management, irrigation scheduling, and harvesting, based on prevailing and forecasted weather conditions.

Key recommendations included

- Sow groundnut with seed treatment immediately after rainfall for uniform germination (14th–20th May 2024).
- Weed management using available soil moisture after rainfall (04th June 2024).
- Disease control: Spray Mancozeb for Cercospora and Tikka leaf spot; apply Trichoderma for root rot (23rd–30th July 2024).
- Irrigation management: Postpone irrigation during forecasted rainfall to avoid excess moisture (09th & 20th August 2024).
- Harvesting: Conduct timely harvest during dry weather to maintain pod quality and prevent losses (13th September 2024).

Farmer Response and Field-Level Action

Farmer Name: Mr. Palanisamy Annur, **Village:** Pollachi (South) block, **District:** Coimbatore, **Crop(s):** Groundnut, **Crop type:** Cereals.

The farmer followed the agromet advisories from Coimbatore AMFU in real time and implemented the recommended interventions promptly. Timely sowing, weeding, disease management, irrigation scheduling, and harvesting during dry periods helped safeguard the groundnut crop from weather-related risks. Adoption of these weather-based practices improved crop growth, minimized losses, and ensured better yield and quality during the *Kharif* season.

Outcome and Reported Benefits

Reported yield impact: Timely interventions and weather-smart practices helped achieve an increased yield of 160 kg/ha, ensuring healthy, disease-free, and well-developed groundnut pods.

Reported economic benefit: ₹15,600/- per hectare.

2.21.4 The Power of Proactive Farming Decisions: How Timely Agro-Advisory Saved a Paddy Crop and Boosted Profits - AMFU, Kannivadi

Weather-Related Challenges during *Kharif* 2024

During the 2024 *Kharif* season, the study area experienced intermittent spells of heavy rainfall accompanied by cloudy weather and high relative humidity. These conditions resulted in temporary waterlogging in paddy fields, particularly in low-lying areas, leading to excess soil moisture stress. Paddy crops at critical growth stages were vulnerable to root damage, nutrient leaching, and increased incidence of diseases under prolonged wet conditions. The erratic nature of rainfall during the season posed a significant risk to crop health, yield stability, and overall productivity.

Agromet Advisory Issued and Interventions Suggested

Agro-Meteorological Field Unit (AMFU), Kannivadi issued a timely weather-based agro-advisory bulletin on 22 November 2024 on heavy Rainfall.

Key recommendations included:

- Ensuring effective drainage by clearing field channels and repairing bunds to prevent water stagnation and facilitate smooth runoff.
- Avoiding the application of fertilizers, fungicides, and pesticides during rainy periods, as these operations are ineffective under wet conditions and may lead to nutrient losses.
- Applying a foliar spray of 0.5% urea and 0.5% zinc sulphate in fields affected by water stagnation to support crop recovery, improve nutrient uptake, and reduce excess moisture stress.

Farmer Response and Field-Level Action

Farmer Name: Mr. A. Murugan, **Village:** Silukkuvarpatti, **District:** Dindigul

Crop(s): Paddy, **Crop type:** Cereals.

The farmer, acting promptly on the advisory, setting up adequate drainage systems and applying the recommended foliar spray. These interventions proved to be highly effective. The crop was saved from the adverse effects of water logging and nutrient deficiency, resulting in a healthy and robust yield.

Outcome and Reported Benefits

Reported yield impact: By adhering to the agro-advisory, the farmer harvested 30 quintals of paddy and successfully prevented yield loss.

Reported economic benefit: ₹25,800/- per acre.



Fig. 78: Farmer A. Murugan used agro-advisories to prevent crop yield loss

2.21.5 Forecast-Based Advisory Helps Farmers Overcome Heavy Rainfall Challenges in *Rabi* Tapioca - AMFU, Namakkal

Weather-Related Challenges during *Rabi* 2024

During the *Rabi* season of 2024, farmers experienced unexpected heavy rainfall events in October. These erratic weather conditions led to crop rotting and wilting, affected seed germination, increased pest incidence, and created waterlogging conditions during the harvesting stage. Such adverse conditions posed a serious threat to crop yield and overall productivity.

Agromet Advisory Issued and Interventions Suggested

In response to the heavy rainfall event, the Agro-Meteorological Field Unit (AMFU), Namakkal, issued timely agrometeorological advisories on 15th October 2024, advising farmers to harvest crops at the earliest to minimize damage.

Key recommendations included:

- Adoption of proper drainage measures in cropped fields during heavy rainfall.
- Adjustment of sowing time to avoid coincidence with monsoon rainfall.
- Removal of stagnated water during heavy rainfall events to prevent tuber rot and reduce yield losses.

Farmer Response and Field-Level Action

FarmerName: Mr. S. Manikandan, **Village:** Bodinaikkanpatty, **District:** Namakkal

Crop(s): Tapioca, **Crop type:** Tuber crop.

The farmer regularly followed the agro-advisory services and implemented the recommendations in a timely manner. Prompt drainage management and early harvest helped protect the tapioca crop during heavy rainfall and significantly reduced yield losses at harvest.

Outcome and Reported Benefits

Reported yield impact: The crop was successfully saved during the harvesting stage, and yield losses were minimized despite heavy rainfall conditions.

Reported economic benefit: ₹46,400/- per acre.



Fig. 79: Drainage management and early harvest by farmer Manikandan mitigated heavy rainfall effects on tapioca crop

2.21.6 Weather-Smart Disease Management Saves Tea Crop - AMFU, Ooty

Weather-related challenges during *Kharif* 2024

During the *Kharif* season of 2024, farmers experienced prolonged rainfall during June–July, followed by episodes of heavy rainfall coupled with low temperatures during September–October. These erratic weather conditions led to increased waterlogging and created a highly favourable environment for the incidence of blister blight disease in tea, posing a serious threat to crop yield and quality. In carrot fields, excess soil moisture adversely affected crop growth and root quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Ooty, issued timely agrometeorological advisories on 6 and 7th June 2024 in view of heavy rainfall events, and on 9th September 2024 due to frost conditions.

Key recommendations included:

- Removal and destruction of infected leaves and shoots through pruning immediately after rainfall spells to reduce the primary inoculum load under humid conditions.
- Spray Hexaconazole @ 200 ml + Copper oxychloride @ 210 g/ha at 5-day intervals during periods of continuous rainfall and high humidity to prevent rapid disease spread.
- Spray Copper oxychloride @ 210 g + Propiconazole @ 200 ml/ha at 10-day intervals, particularly during June–September and October–November, when frequent rainfall and low temperatures favour blister blight infection.

Farmer Response and Field-Level Action

Farmer Name: Th. Balan, **Village:** Gudalur, **District:** The Nilgiris,

Crop(s): Tea, **Crop type:** Plantation Crop.

The farmer implemented the advisories promptly and accurately. Timely field-level interventions helped prevent crop damage during frost, continuous rainfall, and heavy rainfall events. Adoption of the recommended practices improved crop management and enhanced overall crop performance during the *Kharif* season.

Outcome and Reported Benefits

Reported yield benefit: Crop successfully protected from frost and prolonged heavy rainfall, with yield losses significantly minimised.

Reported economic benefit: ₹25,000/- to ₹30,000/- per acre.

2.21.7 Forecast-Based Interventions Protect Multi-Crop Farming Systems from Weather Extremes - AMFU, Pechiparai

Weather-related challenges during *rabi* 2025

During 2025, farmers in the region faced contrasting weather extremes, with dry spell conditions in February followed by heavy rainfall events in November. The prolonged dry spell caused soil moisture stress, adversely affecting sensitive crop stages such as pinhead berry formation in black pepper. Subsequently, heavy rainfall disrupted regular farm operations, particularly rubber tapping, and created high humidity conditions favourable for the incidence of pests such as coconut rugose spiralling whitefly and rice stem borer. These

weather-induced stresses posed a serious threat to crop productivity, continuity of farm activities, and overall farm income.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Pechiparai, issued timely agrometeorological advisories on 11th February 2025 in view of dry spell conditions and on 21st November 2025 due to a heavy rainfall event, to mitigate weather-related risks across multiple crops.

Key recommendations included:

Black pepper: During dry spell conditions, farmers were advised to apply basin mulching around pepper vines at the pinhead stage to conserve soil moisture and support healthy berry development.

Rubber: To continue latex tapping during heavy rainfall, farmers were advised to fix polythene rain guards above the tapping panel.

Coconut: Humid weather favoured rugose spiralling whitefly infestation. Farmers were advised to avoid insecticides, encourage natural enemies, and install yellow sticky traps coated with castor oil @ 8 traps per acre.

Rice: Weather conditions favoured stem borer attack. Farmers were advised to avoid chemicals and use biological control by releasing *Trichogramma japonicum* three times at weekly intervals starting 28 days after transplanting, along with installing pheromone traps @ 10–12 per hectare.

Farmer Response and Field- Level Action

Farmer Name: Th. A. Sasikumar, **Village:** Pechiparai, **District:** Kanniyakumari

Crop(s): Rubber, **Crop type:** Plantation crop.

The farmer implemented the advisories promptly and accurately. Adoption of the recommended rain guard technology enabled continuation of tapping operations even during heavy rainfall periods.

Outcome and Reported Benefits

Reported yield benefit: Rubber tapping continued uninterrupted during the rainy season, preventing income loss due to weather disruptions.

Reported economic benefit: ₹12,000/-per acre.



Fig. 80: Farmer Th.A. Sasikumar installed polythene rain guards to protect latex tapping during heavy rainfall

2.22 Telangana

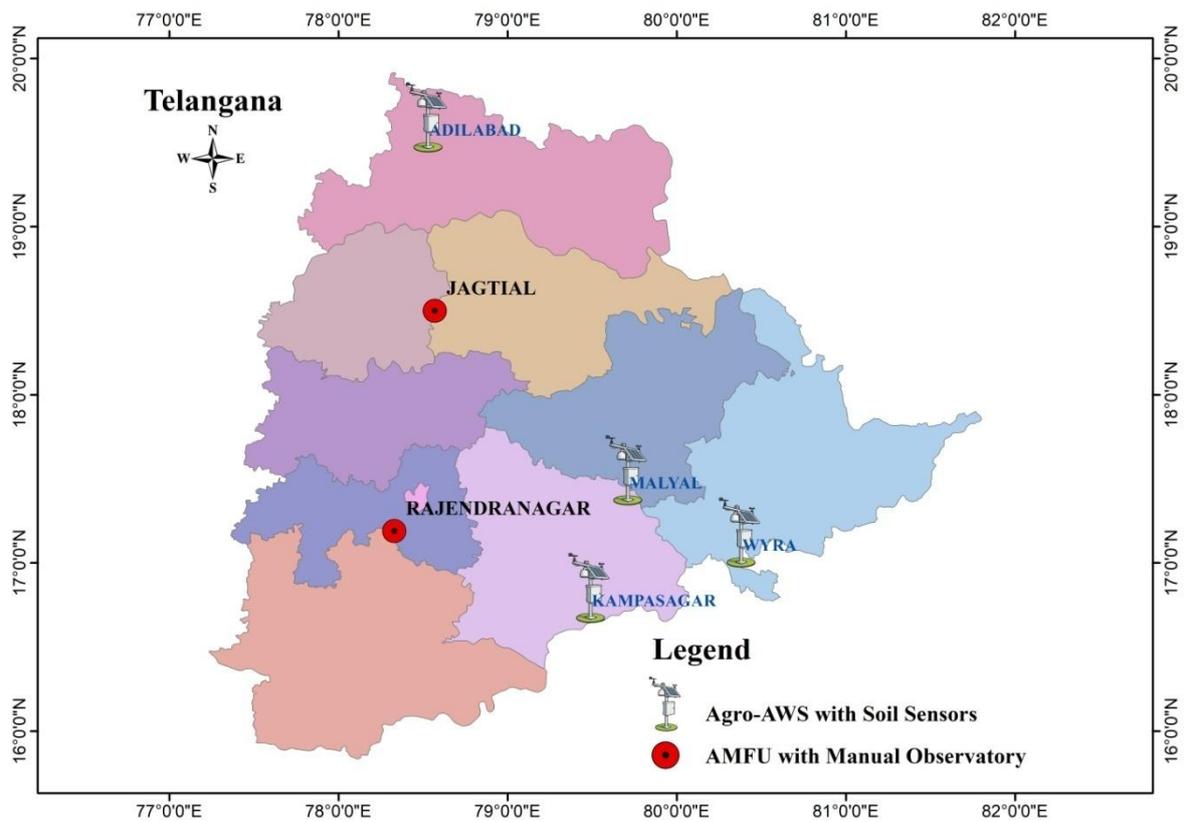


Fig. 81: Schematic map of Telangana showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.22.1 Timely Agro Advisory Prevents Premature Harvest and Safeguards Crops from Rainfall Events - AMFU, Hyderabad

Weather-Related Challenges during *Kharif* 2024

During *Kharif* 2024, Rangareddy district experienced intermittent rainfall events that posed a risk to rice crops at the grain-filling stage. Premature harvesting under such conditions could have led to yield and quality loss due to waterlogging, grain discoloration, or rotting, threatening both productivity and income for farmers.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Hyderabad, issued timely agrometeorological advisories from 14th to 31st May 2024 to alert farmers about rainfall events and guide crop management decisions.

Farmer Response and Field-Level Action

FarmerName: Mr. Suresh Reddy, **Village:** Gaddmallaiah, **District:** Rangareddy

Crop(s): Rice, **Crop type:** Cereal crop.

In January 2024, Reddy contacted AMFU-Hyderabad for guidance. Based on the location-specific forecast, he was assured of dry weather until June 2nd. Trusting the advisory, he delayed harvesting, allowing the rice crop to complete its grain-filling stage. This proactive decision ensured a successful harvest without any damage from rainfall.

Outcome and Reported Benefits

Reported yield impact: the farmer postponed harvesting to allow the rice crop to complete its grain-filling stage. As result, crop harvested successfully without any damage due to rains.

Reported economic benefit: ₹20,000/- per acre (₹40,000/- per 2 Acres of farmer field).

2.22.2 Timely Advisory Protects *Kharif* Crops from Sudden and Heavy Rainfall - AMFU, Jagtial

Weather-Related Challenges during *Kharif* 2024

During the 2024 *Kharif* season in Jagtial district, rice farmers faced several weather-related challenges, including delayed nursery sowing due to the late arrival of the monsoon, waterlogging in transplanted fields and sudden spells of intense and heavy rainfall during the reproductive stage of rice in September. These erratic weather conditions resulted in water stagnation in low-lying paddy fields, increasing the risk of lodging, nutrient leaching, and pest and disease incidence, thereby threatening rice yield and grain quality.

Agromet Advisory Issued and Interventions Suggested

The Agrometeorological Field Unit (AMFU), Jagtial, issued timely agrometeorological advisories on 26th June 2024 (sowing window based on optimum rainfall), 23rd July 2024 (precautions during transplanting), and on 30th August and 2nd September 2024 (heavy to very heavy rainfall events).

Key recommendations included:

- Advised farmers to undertake nursery sowing only after the receipt of optimum rainfall and to avoid premature sowing to ensure uniform germination and healthy seedling establishment.
- During transplanting, farmers were advised to maintain proper drainage channels to facilitate the quick removal of excess rainwater and prevent water stagnation in newly transplanted rice fields.
- In view of heavy to very heavy rainfall events, farmers were cautioned to ensure immediate drainage of excess and stagnated water from low-lying paddy fields to reduce the risk of lodging, root damage and nutrient losses.

Farmer Response and Field-Level Action

Farmer Name: Mr. Attineni Shankar, **Village:** Allipur, **District:** Jagtial,

Crop(s): Rice, **Crop type:** Cereals.

The farmer implemented the agromet advisories in real time. Timely interventions helped in protecting the crop during transplanting and minimizing losses during heavy rainfall events.

Outcome and Reported Benefits

Reported yield impact: The crop was successfully protected during intense heavy rainfall events, and yield losses were minimized.

Reported economic benefit: Saving of ₹6,500/- per acre was achieved due to reduced costs on nursery raising, labour and plant protection sprays.



Fig. 82: Farmer Attineni Shankar successfully protected crops during intense heavy rainfall

2.23 Uttar Pradesh

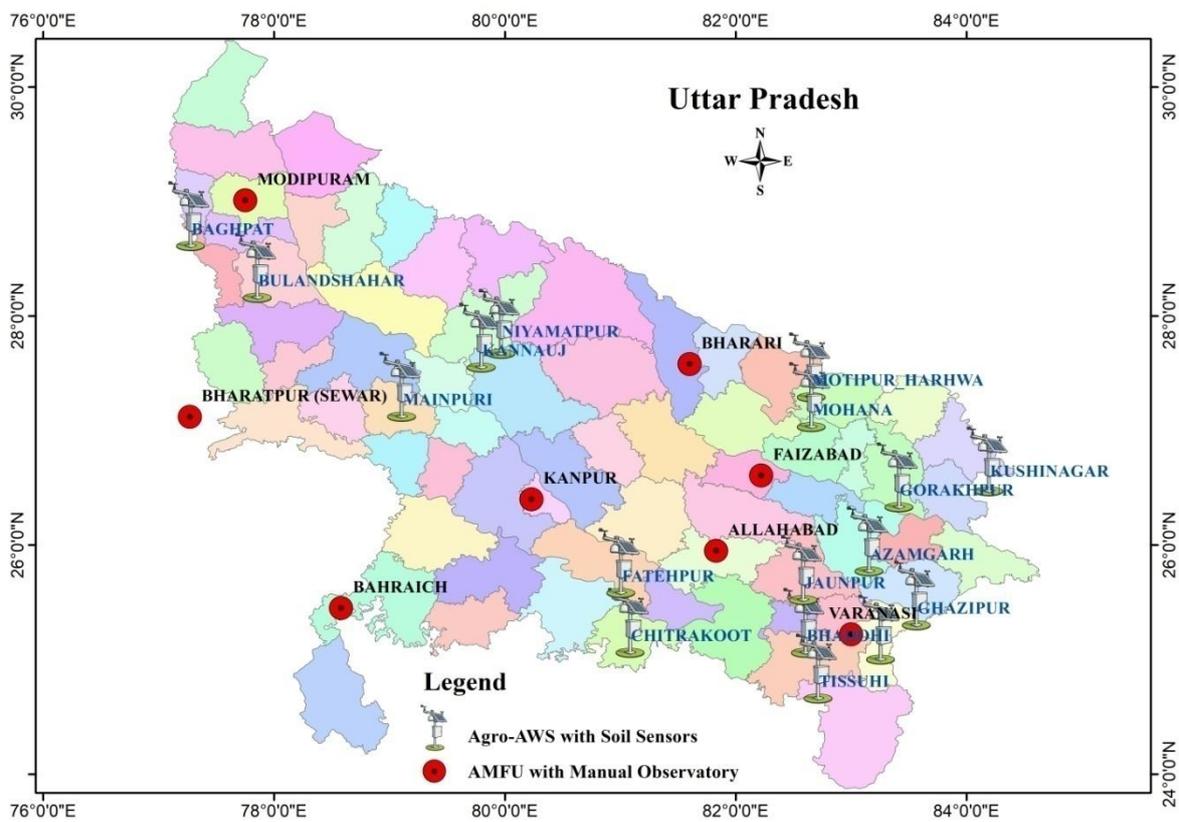


Fig. 83: Schematic map of Uttar Pradesh showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.23.1 Increased of income through agro advisory services through Agromet Field Unit (AMFU) under Gramin Krishi Mausam Seva Schem – AMFU, Bharari

Weather-Related Challenges during the year 2023-24

During the hole year of 2023-24 farmers faced some adverse weather conditions such as irregular rain fall, prolonged dry spells in the month of July, September, November and March-April, followed by intense heavy rainfall events in August. These erratic weather conditions resulted in soil moisture stress, crop wilting, and increased risk of water logging, posing a serious threat to crop yield and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Bharari, issued timely agro meteorological advisories on 21.03.2023, 25.07.2023 and 28.11.2023 (Rain fall at critical stages of irrigation in crop).

Key recommendations included:

- Protective irrigation during dry spell conditions to sustain crop growth.
- To reduce the use of ground water.

Farmer Response and Field-Level Action

Farmer Name: Shree Jagat singh, **Village:** Padri, **District:** Jhansi

Crop(s): Wheat Black gram and Ground nut, **Crop type:** Pulse, Cereal and Oil seed crop.

The farmer implemented the advisories in real time. Timely interventions helped in saving the crop during the dry spell and minimizing losses during the heavy rainfall event. Improved crop management as per advisories contributed to enhanced crop performance during the year 2023-24.

Outcome and Reported Benefits

Reported yield impact: Crop saved during dry spell and yield losses minimized during heavy rainfall.

Reported economic benefit: ₹61,970/- per acre.



Fig. 84: Farmer Jagat Singh protected the wheat crop during a heavy rainfall event

2.23.2 Strategic Agromet Advisory Interventions for Mitigating the Impact of Heavy Rainfall Events on Agricultural Operations during Zaid and *Kharif* 2024 – AMFU, Faizabad

Weather-Related Challenges during the crop period.

During the *Zaid* and *Kharif* seasons of 2024, the region faced significant meteorological volatility characterized by sudden and intense heavy rainfall events. These erratic conditions occurred at critical junctions of the cropping cycle, leading to severe soil moisture saturation, increased risk of waterlogging, and physical damage to standing crops.

Agromet Advisory issued and interventions suggested

AMFU-Faizabad, Ayodhya issued weather based Agro-advisories timely on *Kharif* season Narendra Urd-1 variety was sown in 1 ha area by the farmer on 10th August 2024.

Key recommendations included:

- Plant populations were optimum and good aeration in the crop stand which reduced susceptibility of pest and disease.
- Farmers were advised to stop all irrigation operations in view of forecasted rainfall.
- Farmers were advised to ensure proper drainage in crop fields, particularly for maize, pulses, oilseeds and vegetables.
- Opening of field channels and drainage outlets was recommended to remove excess rainwater.
- Maintenance of bunds and draining excess standing water after rainfall in case of rice.
- Harvesting of mature crops was advised to be postponed during rainfall forecast.

Farmer Response and Field-Level Action

Farmer Name: Sri Vijay Tiwari, **Village:** Bharahukhata, **District:** Ayodhya

Crop(s): Urd bean, **Crop type:** Pulses.

The timely Agromet Advisories issued by AMFU-Faizabad, Ayodhya during extreme weather events helped farmers to:

- Save on irrigation, labour and insecticide costs.
- Reduce crop losses due to waterlogging and nutrient leaching.
- Improve decision-making related to farm operations and enhance climate resilience at the field level.

Outcome and Reported Benefits

- Forecasting was used for sowing, spraying and harvesting of crop which helped the farmer in timely crop management. The farmer adopted measures based on our forecasts have been benefitted in the terms of saving of spray, prophylactic spray before attack of disease, timely harvesting of field by ₹25,000/ha.
- The traditional broadcast crop yields an average 10-12q/ha, while by adopting this package of technologies farmer could harvest 18q/ha with reduced inputs cost. The better yield and reduced input cost of ₹5,000/ha only led to an overall net profit of ₹1, 24,200/ha against total income of ₹1, 29,200.
- Thus, timely dissemination of District level forecast and their successful adoption of package of technologies have been made a reality in better results in Urd bean Production.

2.23.3 Enhancing Farm Profitability through Weather-Smart Advisories: Mitigating Heavy Rainfall Impacts in Zaid and Kharif 2024 – AMFU, Kanpur

Weather-Related Challenges during Zaid and Kharif 2024

Weather-based agro-advisory services helps in mitigating the adverse impacts of heavy rainfall during Zaid & Kharif 2024, improving farm profitability and sustainability. The advisories were disseminated to farmers through established communication channels to minimize weather-related risks and optimize farm operations.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Kanpur, issued timely agromet advisories on 25th, 28th June, 05th August and 17th September 2024 during heavy rainfall events, farmers saved on labour, irrigation and cost of insecticide spraying.

Key recommendations included:

- Farmers were advised to stop all irrigation operations in view of anticipated rainfall.
- Farmers were advised to ensure proper drainage in crop fields, particularly for maize, pulses, oilseeds and vegetables.
- Opening of field channels and drainage outlets was recommended to remove excess rainwater within 24–48 hours.
- **Rice:** Strengthening of bunds and draining excess standing water after rainfall.
- **Maize & Pulses:** Immediate drainage to avoid root rot and wilting.
- **Vegetables:** Repair of ridges and furrows; close monitoring for fungal diseases.
- Harvesting of mature crops was advised to be postponed during rainfall events.

Farmer Response and Field-Level Action

Farmer Name: Ram Niwas Mishra, **Village:** Saibshu, **District:** Kanpur Nagar

Crop(s): Maize, Rice and Jowar, Hybrid maize, Black gram & green gram **Crop type:** Pulses.

The timely agromet advisories issued by AMFU, Kanpur during heavy rainfall events helped farmers to save on irrigation, labour and insecticide costs. Reduce crop losses due to waterlogging and nutrient leaching. Improve decision-making related to farm operations. Enhance climate resilience at the field level.

Outcome and Reported Benefits

Reported yield impact: Crop yield losses minimized during heavy rainfall.

Reported economic benefit: ₹36,000/- per ha.



Fig. 85: Farmer Ram Niwas Mishra minimized crop yield losses during heavy rainfall

2.23.4 Strategic Agromet Interventions: Protecting Wheat from Unseasonal Hailstorms and Minimizing Input Losses in *Kharif* Crops – AMFU, Modipuram

Weather-Related Challenges during *Rabi*2025 & *Kharif* 2025

During time of harvesting of wheat possibility of unseasonal heavy rain with hailstorm in the month of April 2025 and in *Kharif* 2025 season in the month of August at the time of irrigation and fertilizer apply and pesticide/ insecticide/ weedicide spray.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Modipuram, issued timely agrometeorological advisories on 8th and 11th April 2025 (unseasonal heavy rain with thunderstorm, gusty wind and hailstorm).

Key recommendations included:

- Due to strong winds, standing crops may fall and harvested crops may scatter, causing huge loss to the produce. Farmers are advised to tie the harvested crops in bundles and store them in a safe place.
- If the harvested crop is in the field, cover it with a collected polythene sheet or store it in a safe place.
- In case of waterlogging, drain off excessive rainwater from standing crops.
- Harvest the crop after the current spell of rain and store the harvested crops in a safe and high place.
- Shift the produce to a safe place such as a threshing floor or covered shed.
- Ensure proper drainage in the field to avoid waterlogging in standing crops.

Farmer's Name: Urmila Chaudhry, **Village:** Sega jagatpursegna, **District:** Bulandshahar

Crop(s): Wheat, Rice and Sugarcane, **Crop type:** Cereals and cash crop.

Due to weather forecasts, when it was time for wheat harvesting and there was a possibility of rain and hail, we harvested the wheat in advance with the help of the forecast. The wheat that was not yet ready for harvesting was withheld and harvested later. This helped us greatly, and our entire crop was saved.

Outcome and Reported Benefits

A savings of about ₹1,000/- on electricity is possible for a 4 hectare farm if the tube well runs for 25 hours. This demonstrates the significant financial benefit of using accurate weather

forecasts to avoid unnecessary irrigation at time of harvesting timely advisory issued saved ₹2,000/bigha in wheat crop.

Reported economic benefit: ₹1,00,000/-

2.23.5 Agromet Advisory Interventions for Mitigating Waterlogging by Intense Rainfall and High Humidity during *Kharif* 2025 – AMFU, Prayagraj

Weather-Related Challenges during *Kharif* 2025

During *Kharif* 2025, farmers experienced intense rainfall events during July–August, coupled with high humidity, lead to waterlogging, crop lodging, and increased incidence of pests and fungal diseases in cereals, pulses, and vegetables.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Prayagraj issued timely agrometeorological advisory on 17th June 2025 (heavy rainfall event).

Key recommendations included:

- On days with heavy rain, waterlogging in fields can harm crop roots, reduce the effectiveness of pesticides and fertilizers, spoil harvested produce, and cause soil erosion and nutrient loss.
- Farmers should drain excess water promptly, especially from paddy nurseries and vegetable plots, delay irrigation and chemical applications during heavy rains, strengthen bunds to prevent runoff, maintain clean field drains, and store harvested grains and produce in dry, covered, elevated places to prevent moisture damage.
- To minimize losses, farmers should stake or support tall crops, prune dead branches to reduce the risk of breakage, reinforce protective structures, and, if feasible, harvest mature produce early.

Farmer Response and Field-Level Action

Farmer Name: Mr. Umesh Patel, **District:** Prayagraj,

Crop(s): Tomato & Chili, **Crop type:** Vegetable crop.

When the advisory of the week was released and he saw that heavy rain is predicted in the upcoming week he called us regarding transplanting of tomato and chili to main field from nursery and to proceed with transplanting of rice seedlings from nursery.

Outcome and Reported Benefits

- Timely transplanting of chili and tomato to the main field he was able to sell the vegetables in the nearby mandi and get a good price, before the fall of Chilli and Tomato price in the subsequent weeks.
- Reported economic benefit: ₹20,000/- per acre.



Fig. 86: Advisory-guided adaptive farm management helped farmer Umesh Patel mitigate heavy rainfall-induced crop damage

2.23.6 Weather-Responsive Harvesting: Securing Rice Yield against Extreme Monsoon Precipitation via Agromet Advisories – AMFU, Varanasi

Weather-Related Challenges during the *Rabi* Season 2025

Prolonged cold spells accompanied by persistent fog during January–February 2025 adversely impacted the growth and development of *Rabi* crops. Reduced solar radiation under foggy conditions slowed flowering and tuber initiation in potato. Towards the late *Rabi* period (February–March), several chilli-growing areas under experienced above-normal temperatures and low rainfall. Exposure to heat stress during the fruit development stage negatively affected fruit set, size, and overall yield potential.

Agromet Advisory Issued and Interventions Suggested

The major recommendations were: The Agrometeorological Field Unit (AMFU), BHU, Varanasi issued timely agrometeorological advisories on 7th February 2025 in view of cold wave and fog conditions. Subsequently, on 8th February 2025, field visits were

conducted to farmers' fields to provide crop-specific guidance for potato, pea and chilli crops.

For Potato: Light irrigation was advised during evening hours to reduce the impact of cold and frost stress. Farmers were recommended to ensure proper field drainage to avoid waterlogging under foggy and humid conditions. Prophylactic spray of recommended fungicides was suggested to prevent early and late blight under cool and moist weather. Harvesting of mature crops was advised to be avoided during extreme cold and foggy conditions.

For Chilli: Apply light irrigation in the evening to maintain soil moisture and reduce cold injury. Avoid overwatering in foggy conditions to prevent waterlogging and root rot.

Field Observations and Farmer Actions:

Farmers Name: Yogendra Kumar Singh, **Village:** Khanpur, **District:** Mirzapur

Crop(s): Potato and Chilli, **Crop type:** Vegetable Crops.

The farmers followed the advisories in real time for potato, pea and Chilli crops. Timely interventions helped protect the crops during the cold wave and foggy conditions, minimizing potential losses. Improved crop management based on the advisories contributed to better crop growth and performance during the *Rabi* season.

Outcomes and Benefits Observed:

Reported yield Impact: Crops were protected during the cold wave and foggy conditions, helping to minimize potential yield losses.

Reported economic benefit: Farmers reported additional income of ₹30,000/- per acre from potato, ₹25,000/- per acre from pea and ₹25,000/- per acre from Chilli due to timely implementation of advisories.



Fig. 87: Farmer Yogendra Kumar Singh implemented advisory-based interventions to reduce heavy rainfall-induced yield losses in chilli

2.24 Uttarakhand

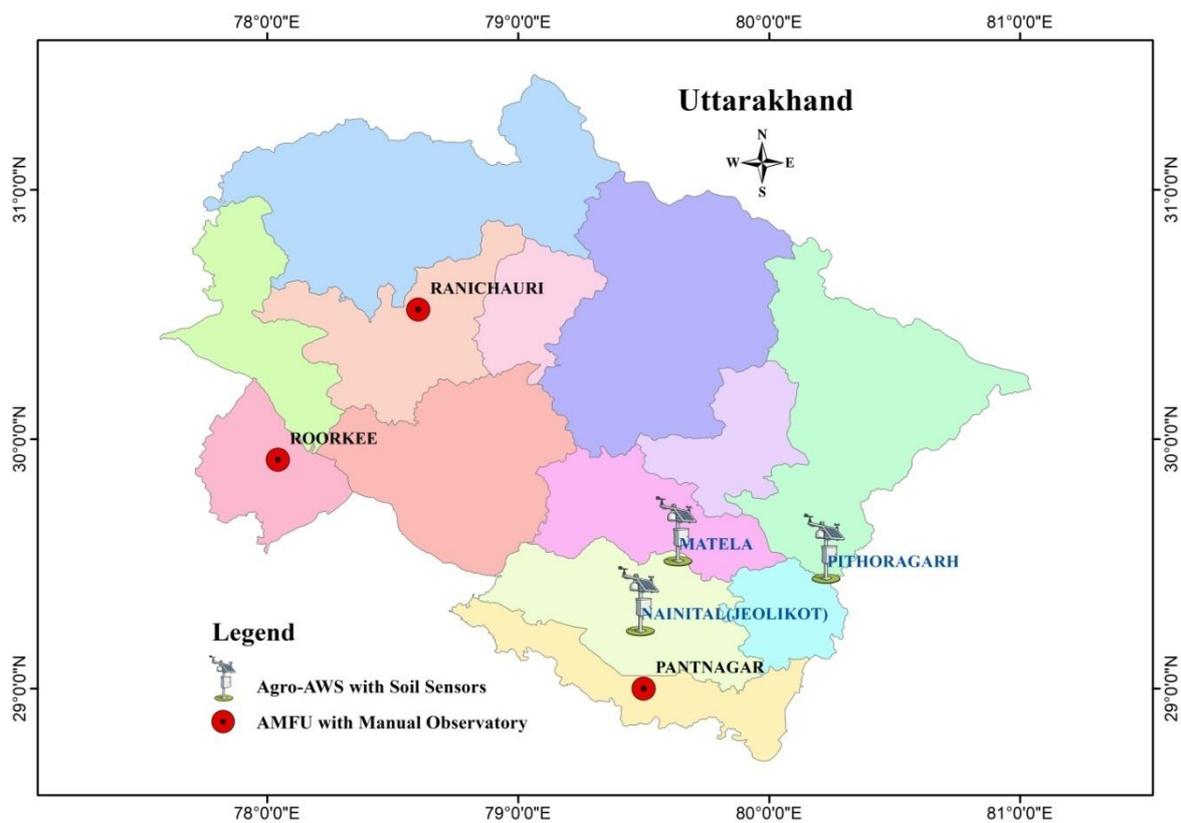


Fig. 88: Schematic map of Uttarakhand showing Agro-AWS with soil sensors and AMFUs cum manual observatories.

2.24.1 From Forecast to Field Action: Saving Wheat Crop Hailstorm Damage through Agromet Advisory in Nainital District of Uttarakhand- AMFU, Pantnagar

Weather-Related Challenges during *Kharif* 2024

During the month of April, the Gaulapar region of Nainital district experienced episodes of rainfall, thunderstorms, lightning, and hailstorms, which posed a serious threat to standing and harvested wheat crops. Such extreme weather events can lead to lodging, grain damage, and post-harvest losses if timely precautions are not taken.

Agromet Advisory Issued and Interventions Suggested

India Meteorological Department (IMD) predicted the occurrence of rainfall, thunderstorms, lightning, and hailstorm events. Based on these forecasts, AMFU, Pantnagar issued timely forecast-based agrometeorological advisories through SMS, WhatsApp groups, and the Meghdoot App on Tuesdays and Fridays, warning farmers about possible crop damage and suggesting preventive actions.

Key Recommendations Included

- Advance harvesting of mature wheat crops before the occurrence of adverse weather.
- Protection of harvested produce from rainfall and hailstorm damage.
- Proper scheduling of farming operations such as sowing, irrigation, chemical application, and harvesting based on weather forecasts.
- Regular monitoring of weather updates and advisories disseminated through official platforms.

Farmer Response and Field-Level Action

Farmer Name: Devendar Singh Bisht, **Village:** Gaulapar, **District:** Nainital

Crop(s): Wheat, **Crop type:** Cereal crop.

Mr. Devendar Singh Bisht, a progressive farmer and recipient of the “Progressive Farmer Award” at the Kisan Mela held from 24th –27th March 2022 at GBPUAT, Pantnagar, regularly follows agromet advisories issued on Tuesdays and Fridays. Upon receiving warnings related to rainfall, thunderstorms, lightning, and hailstorms, he promptly harvested the mature wheat crop and ensured safe storage of harvested produce. He also disseminated the weather information and advisory messages among nearby farmers in his village, encouraging them to take timely preventive actions.

Outcome and Reported Benefits

As a result of timely and accurate weather forecasts and agromet advisories, Mr. Bisht successfully saved his wheat crop grown over 18 bigha area from potential weather-induced losses. Additionally, nearby farmers in his village were able to safeguard wheat crops covering 10–12 acres by acting on the same advisories. The regular use of agromet advisories helped minimize crop losses, improve decision-making, and enhanced farmers' confidence in weather-based agricultural planning.



Fig. 89: Timely harvesting helped farmer Devendar Singh Bisht mitigate heavy rainfall-induced wheat losses

2.24.2 Agromet Advisories Help Farmer Minimize Weather-Induced Losses in Wheat Crop –AMFU, Roorkee

Weather-Related Challenges during *Rabi* 2024

During the *Rabi* season of 2024, farmers in Bhagwanpur block of Haridwar district experienced significant weather-related challenges. A prolonged dry spell prevailed during January, coinciding with the critical growth stages of wheat and causing moisture stress. Additionally, unseasonal rainfall and adverse weather conditions were forecast during the harvesting period, increasing the risk of lodging, grain quality deterioration, and harvest losses.

Agromet Advisory Issued and Interventions Suggested

The Agrometeorological Field Unit (AMFU), Roorkee, under the Gramin Krishi Mausam Sewa (GKMS) project, continuously monitored weather conditions and issued timely agrometeorological advisories. These advisories warned farmers about prolonged dry conditions during crop growth and possible rainfall events during harvesting, enabling them to plan farm operations in advance.

Key Recommendations Included

- Efficient scheduling of irrigation during the prolonged dry spell to prevent moisture stress.
- Avoidance of unnecessary irrigation during anticipated rainfall periods.
- Advancing or postponing wheat harvesting based on short-range weather forecasts.
- Ensuring proper field drainage to minimize damage from unseasonal rainfall.
- Adoption of safe drying and storage practices to prevent post-harvest losses.

Farmer Response and Field-Level Action

Farmer Name: Shri Ravi Kiran Saini, **Village:**Bhagwanpur, **District:** Haridwar

Crop(s): Wheat, **Crop type:** Cereal crop.

Shri Ravi Kiran Saini actively followed the agromet advisories issued by AMFU Roorkee. He adjusted irrigation schedules during January to maintain adequate soil moisture and postponed wheat harvesting during forecasted rainfall periods. Once favourable weather conditions were indicated, he completed harvesting promptly and adopted recommended post-harvest drying and storage practices.

Outcome and Reported Benefits

Reported yield impact: Wheat crop on 2 hectares was successfully protected from adverse weather and harvesting losses were significantly reduced.

Reported economic benefit: Substantial reduction in weather-induced losses and improved net returns through timely farm operations.

2.25 West Bengal

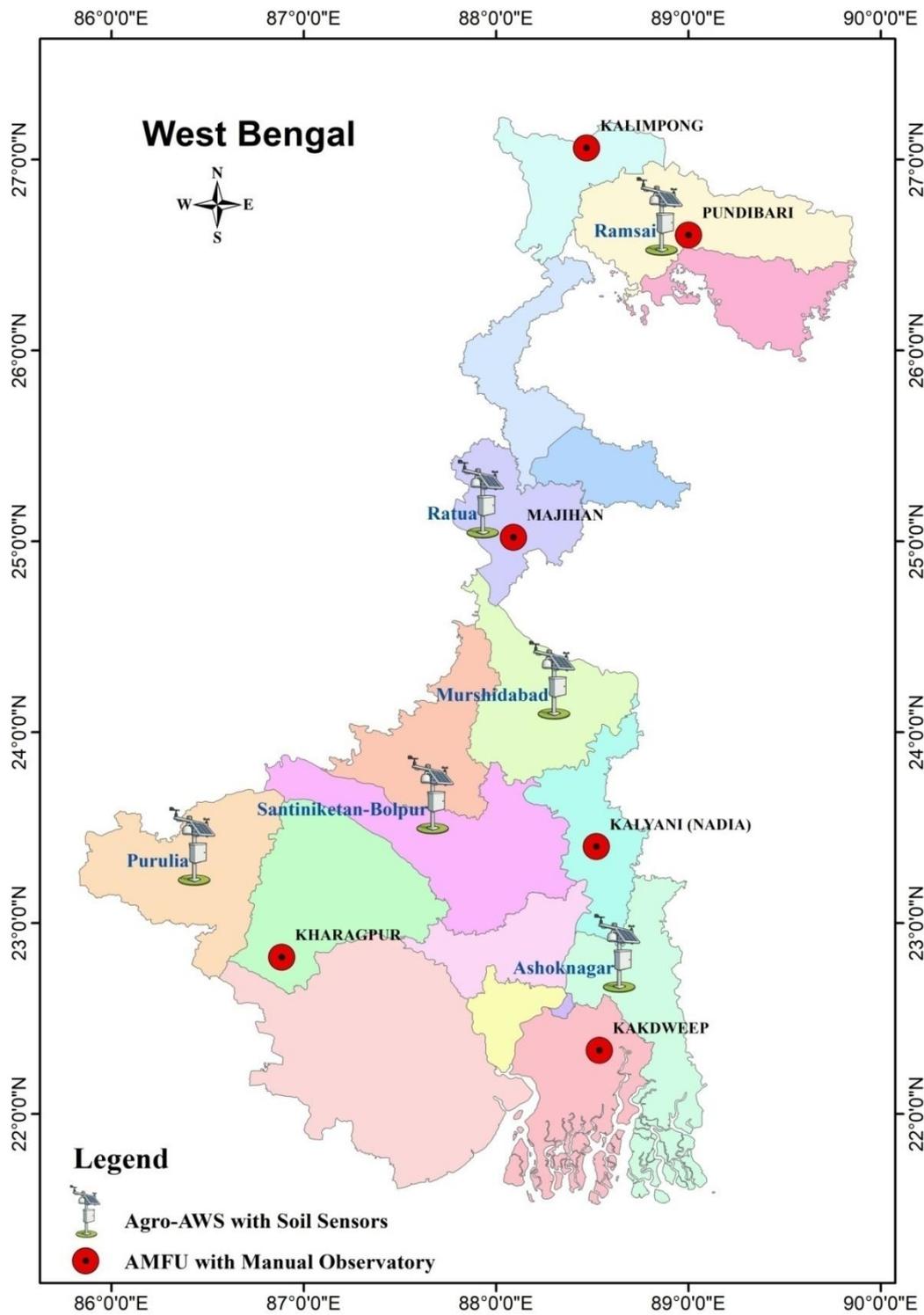


Fig. 90: Schematic map of Uttarakhand showing Agro-AWS with soil sensors and AMFUs cum manual observatories

2.25.1 Timely Advisory Protects Boro Paddy from Cold Injury – AMFU, Kakdwip

Weather-Related Challenges during *Rabi* 2025-26

During the 2025-26 *Rabi* season, farmers experienced prolonged low temperature followed by intense morning fog events in December 2025 and January 2026. These erratic weather conditions resulted in root rot of seedlings in seed bed and main field, zinc deficiency and blast disease, posing a serious threat to crop yield and quality.

Agromet Advisory Issued and Interventions Suggested

The AMFU, Kakdwip, issued timely agrometeorological advisories from 2nd week of December to 1st Week of January (low temperature conditions).

Key recommendations included:

- Protective cover of transparent polythene sheet over seed bed just after sowing as an alternative measure to reduce low temperature stress.
- Keep the seed bed dry after sprouting of seeds and apply straw ash to conserve heat.
- After 3–4 days of sowing, irrigation should be given only through the drainage channels to keep the soil soft, avoiding direct irrigation on the seedbed.
- For standing seedlings, a minimum water layer should be maintained, and irrigation should be applied only when hairline cracks appear on the seedbed soil.
- Regular field observation was advised. If seedlings appeared whitish, farmers were advised to apply Gypsum @ 3–4 kg per bigha and Zinc sulphate @ 1.5 kg per bigha.
- To prevent blast disease, farmers were advised to remove morning fog and dew by gently stirring the seedlings with a bamboo stick.
- About 7 days before uprooting seedlings for transplanting, a light dose of urea along with one fungicide and pesticide was advised to strengthen seedlings, prevent lodging due to strong northern winds and reduce the incidence of pest and disease outbreaks.

Farmer Response and Field-Level Action

Farmer Name: KartickKar, **Village:** Akshaynagar, **District:** South 24 Parganas,

Crop(s): Boro paddy, **Crop type:** Cereal crop.

The farmer implemented the advisories in real time. Timely interventions helped in saving the seedlings from cold injury during the prolonged low temperature condition and

minimizing losses during *Rabi* season. Improved crop management as per advisories contributed to enhance crop performance during the *Rabi* season.

Outcome and Reported Benefits

Reported yield impact: Seedlings saved from cold injury and cost of cultivation minimized as no damage of seedlings noticed and no spraying required.

Reported economic benefit: ₹5,000/- per bigha.



Fig. 91: Farmer Kartick Kar saved paddy seedling from cold stress

2.25.2 Cyclone “Montha” (October, Last Week): Timely Weather Advisories Prevent Crop and Livelihood Losses - AMFU, Pundibari

Weather-Related Challenges during Cyclone “Montha”

During the last week of October 2025, Cyclone “Montha” affected North Bengal, causing heavy to very heavy rainfall from 30.10.2025 to 02.11.2025 in the districts of Cooch Behar, Jalpaiguri, and Alipurduar, along with the hilly regions of Darjeeling and Kalimpong. Continuous rainfall led to flooding in river-side areas and severe waterlogging in non-riverine agricultural fields, posing a major risk to standing rice and vegetable crops.

Agromet Advisory Issued and Interventions Suggested

The Agrometeorological Field Unit, Pundibari (AMFU) issued Impact-Based Forecast (IBF) bulletins on 28th, 29th, and 31st October, along with regular agromet bulletins on 28th and 31st October and 4th November, highlighting location-specific warnings for heavy to very heavy rainfall. These advisories enabled advance preparedness and mitigation at the field level.

Key recommendations included:

- Creation and maintenance of effective drainage channels to remove excess water.
- Delay in sowing of cabbage and cauliflower where sowing had not been completed.
- Immediate harvest of nearly matured Leafy vegetables.
- Maintain proper drainage channel and immediate harvest of Chilli from field.
- Keeping cattle safely housed, avoiding grazing near riverbanks

Farmer Response and Field-Level Action

Farmer Name: Jobayed Anarul Islam, **Village:** Sakunibala, **District:** Cooch Behar

Crop(s): Rice, Cabbage & Cauliflower, **Crop type:** Cereal and Vegetable crop.

The farmer immediately created proper drainage channels in Rice field. The farmer delayed the sowing of Cabbage and Cauliflower. Kept the cows and goats in safe shelter. He also informed others about the advisories to protect their crops.

Outcome and Reported Benefits

Reported yield impact: Crop saved during dry spell and yield losses minimized during heavy rainfall.

Reported economic benefit: ₹10,000/- to ₹12,000/- per acre for crops.

3. Farmers' Feedback Analysis

Under the Gramin Krishi Mausam Sewa (GKMS), bi-weekly weather-based Agromet Advisory Services (AAS) are generated and disseminated to support farmers in planning and executing weather-sensitive agricultural operations. These advisories are periodically reviewed and evaluated to improve their relevance, accuracy, and usability, while also addressing the evolving requirements of farmers under changing weather and climate conditions. The present analysis examines the effectiveness of AAS and identifies operational gaps based on structured feedback collected from farmers across different agro-climatic regions of the country during the period 2020–2025.

Data were collected using a random sampling approach to ensure representation of major agro-climatic zones, dominant cropping systems, and diverse farm categories. The survey was implemented through the nationwide network of 130 AgroMet Field Units (AMFUs) during both Kharif and Rabi seasons. In addition, farmer interactions conducted during Farmer Awareness Programmes (FAPs) were used to supplement the survey responses. This multi-channel approach helped capture both quantitative and qualitative insights, providing a comprehensive understanding of advisory reach, accessibility, and practical usefulness at the field level.

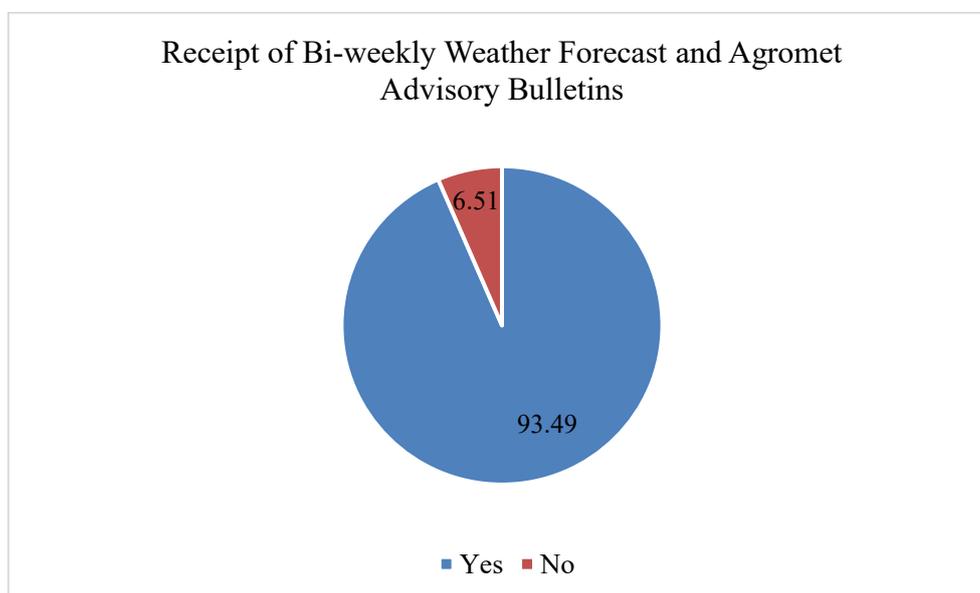


Fig. 92: Farmers Response on receiving AAB

The findings indicate a high level of penetration of agromet services among farming communities. About 93.49% of respondents reported receiving bi-weekly weather forecasts and Agromet Advisory Bulletins, while only 6.51% indicated non-receipt of such information. The widespread receipt of advisories reflects the effectiveness of existing

dissemination mechanisms and increased awareness among farmers regarding the importance of weather-based information for agricultural decision-making.

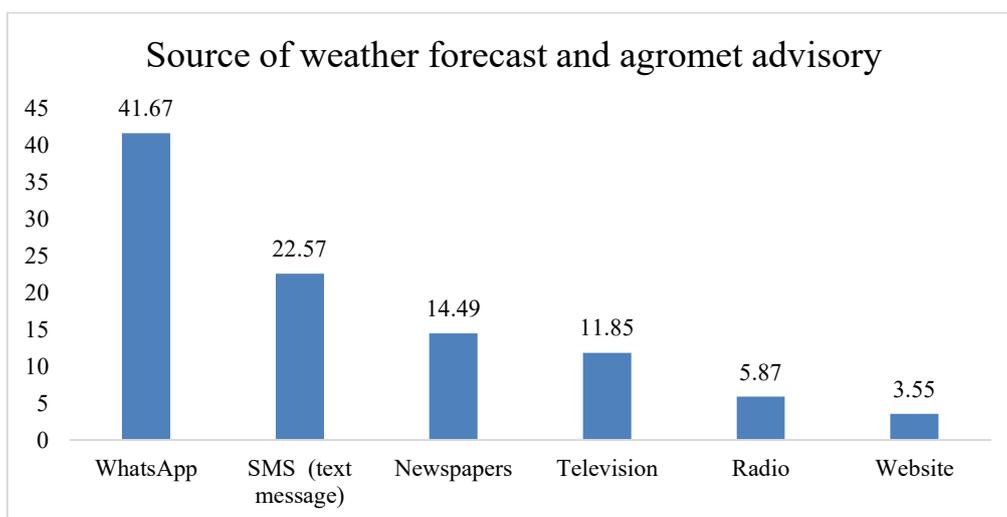


Fig. 93: Farmers' Preferred Communication Platforms for Receiving AAS

Analysis of dissemination channels revealed a clear preference for mobile-based communication. WhatsApp emerged as the most widely used platform (41.67%), followed by SMS services (22.57%). Traditional media such as newspapers and television together accounted for nearly one-fourth of advisory access, while radio and direct access through the IMD website were reported by 5.87% and 3.55% of farmers, respectively. These findings highlight the increasing role of mobile platforms in delivering timely and actionable agricultural information, consistent with earlier studies that reported widespread acceptance of mobile-based agri-advisory services among Indian farmers (Kansiime et al., 2019). At the same time, television continues to remain an important source of farm information due to its combined audio-visual impact, as also observed in regional and international studies (Nayak & Rai, 2014; Hassan et al., 2011).

To understand farmers' priorities regarding weather information, respondents were asked to identify the most important weather parameters influencing their farm operations. Rainfall-related information emerged as the most critical, with 25.99% of farmers ranking rainfall forecasts as most important and 17.09% emphasizing heavy rainfall warnings. Wind forecasts were highlighted by 37% of respondents, reflecting their importance for activities such as pesticide spraying and crop protection. Thunderstorm-related events, including hailstorms, squalls, and lightning, were considered important by 12.43% of farmers. Temperature extremes also influenced decision-making, with 10.63% and 7.30% of farmers identifying high and low temperature forecasts, respectively. Cloud cover and relative

humidity were noted as important by 7.12% and 7.45% of respondents, indicating their relevance for disease incidence and irrigation planning.

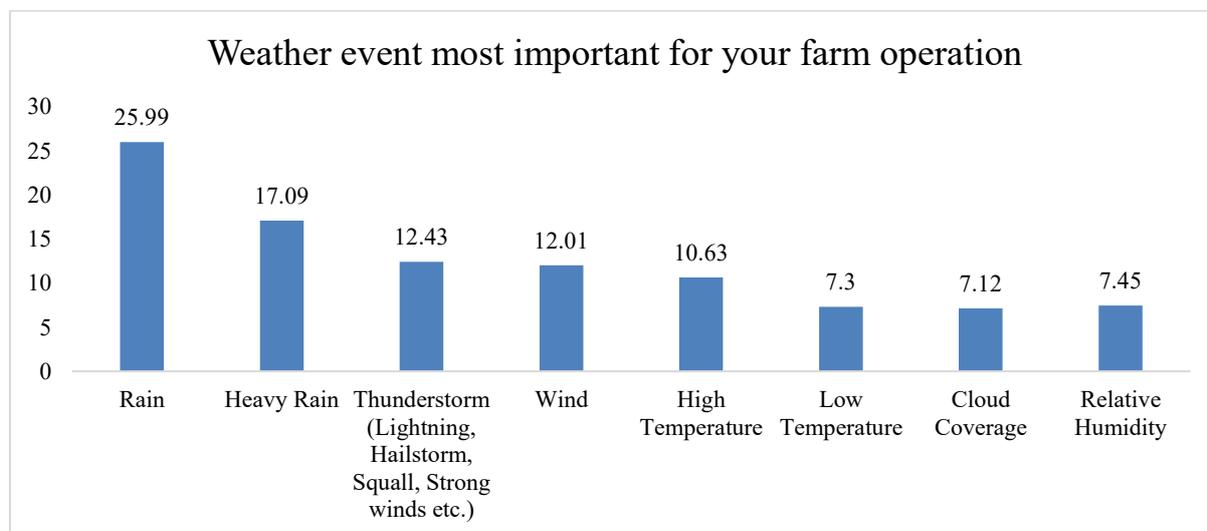


Fig. 94: Weather Parameters Considered Most Important by Farmers

The survey further examined how farmers use weather forecasts and agromet advisories for specific agricultural operations. The results show that more than two-thirds of farmers relied on weather information for critical decisions related to sowing, transplanting, harvesting, irrigation scheduling, and fertilizer and pesticide application. About 10.77% of farmers used advisories for post-harvest operations, including storage and transportation of produce. These findings are consistent with earlier research indicating that weather information is most frequently applied to input management, crop protection, irrigation planning, and harvest scheduling (Singh & Chattopadhyay, 2019).

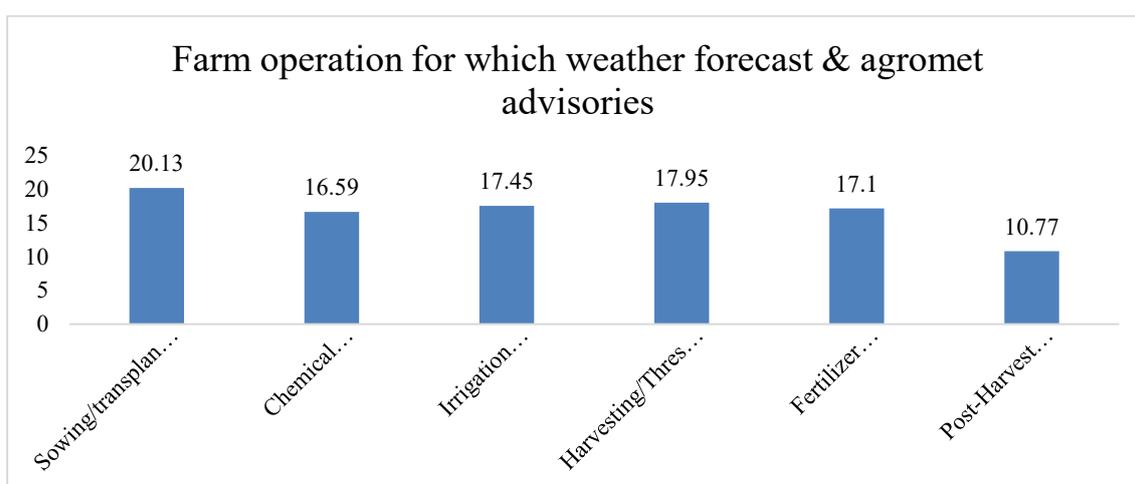


Fig. 95: Use of Agromet Advisories for Farm Operations

Farmers were also asked about their preferred time slots for receiving weather forecasts and advisories through broadcast media. The evening time slot (06:00–07:00

PM) was identified as the most suitable, followed by the morning hours (07:00–09:00 AM). Midday hours between 12:00 noon and 05:00 PM were least preferred, likely due to peak fieldwork activities. Similar preferences for evening broadcasts have been reported in studies conducted in Africa and South Asia, highlighting the importance of aligning dissemination schedules with farmers’ daily routines (Hampson et al., 2014).

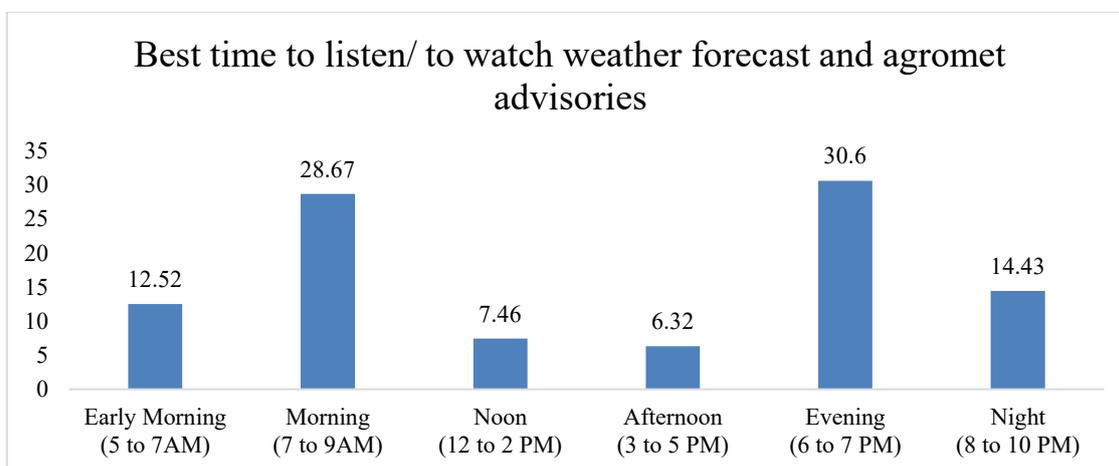


Fig. 96: Preferred time for receiving AAS by Farmers

Assessment of overall satisfaction levels revealed a high degree of confidence in agromet advisory services. About 52.64% of farmers reported being satisfied, while 40.90% indicated high satisfaction with the advisories. Only 6.45% reported partial satisfaction, and none of the respondents expressed complete dissatisfaction. The high satisfaction levels reflect the perceived usefulness of advisories in supporting timely farm decisions and reducing weather-related risks.

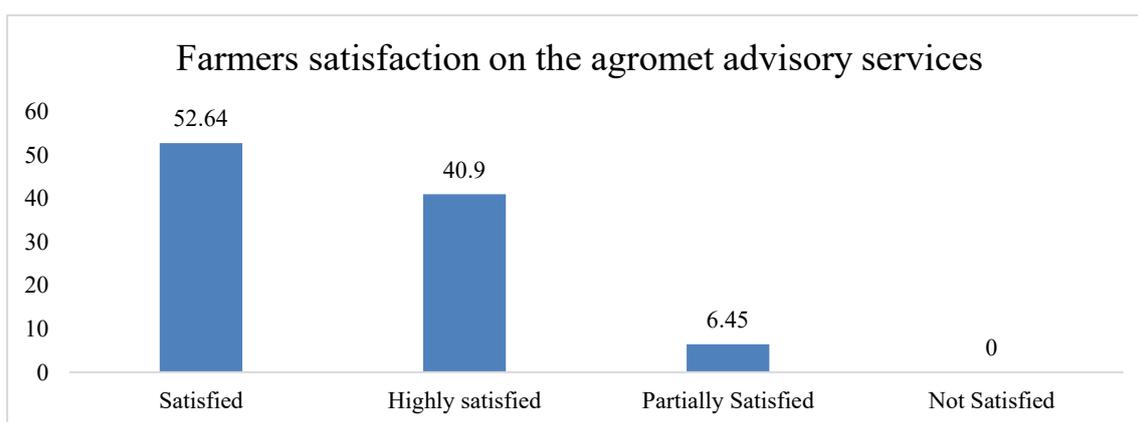


Fig. 97: Farmer Satisfaction Levels with GKMS Advisory Services

In conclusion, these findings align with national-level impact assessments, including studies by the National Council of Applied Economic Research (NCAER), which reported that nearly 94% of farmers benefitted from weather-based advisories through avoided losses

or increased income by adjusting key farm practices in response to weather forecasts (NCAER, 2020). Overall, the feedback analysis clearly demonstrates the growing relevance and effectiveness of GKMS-based Agromet Advisory Services in supporting informed farm decision-making. The evidence highlights improvements in productivity, reduced input costs, enhanced preparedness for extreme weather events, and high levels of farmer satisfaction. The insights generated through this assessment provide a strong empirical basis for refining advisory content, strengthening digital dissemination strategies, and guiding policy and strategic interventions aimed at promoting sustainable and climate-resilient agriculture in India.

4. Conclusion

The Gramin Krishi Mausam Sewa (GKMS) has evolved into a critical national agrometeorological service, addressing the growing challenges posed by weather variability and climate extremes to agricultural production in India. By systematically translating weather forecasts into location- and crop-specific advisories, GKMS supports farmers in making timely and informed decisions throughout the crop production cycle. This approach has played a significant role in reducing weather-induced crop losses, improving input-use efficiency, and promoting sustainable agricultural practices, particularly among small and marginal farmers across diverse agro-climatic regions.

The effectiveness of GKMS is strongly anchored in its robust institutional framework and decentralized operational structure. Close collaboration among the India Meteorological Department (IMD), State Agricultural Universities, ICAR institutes, IITs, and State Governments ensures that advisories remain scientifically sound while being tailored to local farming conditions. The nationwide network of 130 Agromet Field Units (AMFUs) plays a pivotal role in interpreting weather forecasts in relation to local crops, soil conditions, and crop growth stages, thereby enhancing advisory relevance, credibility, and adoption by farmers.

Recent advancements under GKMS further strengthen its relevance in the context of increasing climate uncertainty. The introduction of Panchayat-level weather forecasts since October 2024 marks a major step toward hyper-local agrometeorological services, enabling village-level planning and preparedness. Integration with digital governance platforms such as e-GramSwaraj, Meri Panchayat, e-Manchitra, Mausamgram, and community-based networks including Krishi Sakhis and Pashu Sakhis has improved last-mile connectivity and supported decentralized decision-making at the grassroots level.

Continuous engagement with farmers through feedback mechanisms, awareness programmes, and systematic documentation of success stories has contributed to the ongoing refinement of advisory services and strengthened trust among farming communities. Evidence from farmer feedback and field-level experiences clearly demonstrates tangible benefits in terms of yield improvement, reduced input costs, and minimized crop losses during adverse weather events.

Overall, GKMS represents a farmer-centric, science-based, and outcome-oriented agrometeorological service that contributes significantly to strengthening the resilience of Indian agriculture. Continued emphasis on improving forecast accuracy, expanding hyper-

local services, advancing impact-based advisories, and deepening farmer engagement will remain essential to addressing future climate challenges and sustaining agricultural livelihoods.

5. Way Forward

The India Meteorological Department is progressively transforming its agrometeorological services into a more analytical, technology-driven, and farmer-focused system, in alignment with national priorities and initiatives such as Mission Mausam of the Ministry of Earth Sciences (MoES). The long-term objective is to strengthen agromet services to support climate-resilient agriculture, optimize natural resource use, and ensure food and livelihood security in the face of increasing climate variability.

Central to this vision is the delivery of high-resolution, hyper-local weather forecasts capable of anticipating extreme events such as heatwaves, droughts, cold spells, and unseasonal rainfall. This will be achieved through the integration of advanced numerical weather prediction models, improved downscaling techniques, artificial intelligence and machine learning applications, enhanced satellite observations, expansion of Doppler Weather Radar networks, and strengthening of dense ground-based observation systems. Together, these advancements are expected to substantially improve forecast accuracy, lead time, and spatial specificity.

These improved forecasts will be closely linked with agriculture-specific alerts and advisories, enabling farmers to manage weather-related risks more effectively and align farm operations with crop growth stages. In this context, the Weather Information Network and Data System (WINDs) programme of the Ministry of Agriculture and Farmers' Welfare will complement IMD's observational infrastructure by strengthening panchayat-level monitoring and supporting the delivery of hyper-local advisories under GKMS.

IMD also envisages the modernization of agrometeorological advisory services into digital, AI-enabled decision-support platforms. These platforms will provide personalized guidance on irrigation scheduling, pest and disease management, fertilizer application, and crop selection through mobile applications such as Mausam and Meghdoot, messaging services, interactive voice response systems, and regional-language voice interfaces. Integration of real-time weather data with crop growth and risk models will enable in-season yield outlooks, risk assessments, and scenario-based recommendations, supporting precision agriculture and efficient resource use.

By 2047, IMD aims to further strengthen its monitoring and prediction capabilities so that significant weather events are detected and communicated well in advance, thereby reducing uncertainty and enhancing preparedness across spatial scales. Through sustained institutional collaboration, technological innovation, and continuous learning, IMD's agrometeorological services are expected to evolve into an integrated, impact-oriented system that enhances agricultural resilience, supports informed decision-making, and positions India as a global leader in agricultural climate services.

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Voices from the Field

This compendium presents farmers' experiences and feedback on IMD's Agrometeorological Advisory Services. It underscores the role of accurate, location-specific weather and crop advisories in supporting farm planning, reducing weather-related risks, and improving productivity. Drawn from diverse agro-climatic regions, it reflects the growing field-level impact of agromet services in promoting informed and climate-resilient agriculture in India.



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