

Weather-Based Agro-Advisory Services

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INTRODUCTION

Agriculture is one of the sectors most affected by weather variability. Crop production depends strongly on rainfall distribution, temperature, humidity, solar radiation, and other climatic factors. Unfavorable weather events such as droughts, floods, heat waves, and unseasonal rainfall can cause significant crop losses and economic hardship for farmers. Traditional farming decisions were mainly based on farmers' experience and local knowledge. However, increasing climate variability has created a need for scientific and timely information. Weather-Based Agro-Advisory Services provide farmers with accurate weather forecasts combined with crop-specific recommendations to support better decision-making. These services act as a bridge between meteorological information and agricultural practices. By using weather forecasts and scientific analysis, farmers can plan agricultural operations effectively, reduce production risks, and improve farm profitability.

2. Meaning and Definition of Weather-Based Agro-Advisory Services

Weather-Based Agro-Advisory Services refer to the scientific process of providing agricultural recommendations based on current and forecasted weather conditions.

Definition:

Weather-Based Agro-Advisory Services are location-specific agricultural advisories prepared by integrating weather forecasts, crop information, and expert knowledge to guide farmers in making timely decisions related to crop management.

These advisories include information on:

- ❖ Sowing and planting time.
- ❖ Irrigation scheduling.
- ❖ Fertilizer application.
- ❖ Pest and disease management.
- ❖ Weed control.
- ❖ Harvesting operations.
- ❖ Post-harvest management.

Weather-Based Agro-Advisory Services

Timely Weather Information • Smart Advice • Prosperous Farmers

WHAT WE DO





SMS

Mobile App

IVR

WhatsApp

BENEFITS TO FARMERS

- Timely information helps in decision making
- Reduces crop loss due to adverse weather
- Improves productivity and income
- Saves input costs (water, fertilizers, pesticides)
- Helps in better planning of farm operations
- Builds climate resilience and sustainability

EXAMPLES OF WEATHER-BASED ADVISORIES

Heavy Rain

- Ensure proper drainage in fields
- Postpone fertilizer application
- Provide support to standing crops

High Temperature

- Irrigate in the morning or evening
- Use mulching to conserve moisture
- Provide shade to livestock

Strong Winds

- Provide staking to tall crops
- Secure loose structures and shade nets
- Avoid pesticide spraying

Cold Wave / Frost

- Irrigate in the morning or evening
- Cover sensitive crops in night
- Avoid late evening irrigation

Thunderstorm / Lightning

- Postpone field operations
- Take shelter and ensure livestock safety
- Unplug electrical equipment

KEY INFORMATION PROVIDED

- Short & medium range weather forecast
- Rainfall alerts and warnings
- Temperature, humidity, wind speed, etc.
- Crop specific advisories
- Pest and disease alerts
- Irrigation and nutrient management advice
- Market information
- Livestock advisories

CROP COVERAGE



REACHING THE LAST MILE

Weather-based agro-advisories are delivered in local language through multiple channels to ensure timely and easy understanding.



OUR PARTNERS





RIGHT ADVICE, RIGHT TIME, BETTER YIELD, BETTER FUTURE.
 Be Weather Smart, Grow Prosperous.

Better Information • Better Decisions • Better Harvest • Better Tomorrow

3.

Need and Importance of Weather-Based Agro-Advisory Services

3.1 Climate Risk Management

Climate change has increased uncertainty in agricultural production due to irregular rainfall, rising temperatures, droughts, floods, and other extreme weather events. Weather-based agro-advisories help farmers prepare for adverse climatic conditions by providing timely information and suitable management recommendations. These services enable farmers to make better decisions regarding crop operations, irrigation, and protection measures. They reduce crop losses, improve preparedness for extreme weather events, and support the development of climate-resilient farming systems.

3.2 Improving Crop Productivity

Weather-based agro-advisory services improve crop productivity by helping farmers make

timely and scientific decisions based on weather forecasts. Proper planning of agricultural operations such as sowing, irrigation, and fertilizer application ensures better crop growth and resource utilization. Sowing under favorable soil moisture conditions improves germination, while applying fertilizers during suitable weather enhances nutrient efficiency. Weather-based irrigation scheduling helps meet crop water requirements, resulting in higher productivity and improved crop performance.

3.3 Efficient Resource Management

Weather-based agro-advisories support efficient management of agricultural resources by providing timely recommendations based on weather conditions and crop requirements. These services help farmers apply irrigation, fertilizers, and pesticides only when necessary, reducing wastage and improving input-use

efficiency. Proper resource management lowers production costs, conserves water, minimizes environmental pollution, and enhances farm profitability. Thus, agro-advisory services promote sustainable agricultural practices through better utilization of available resources.

3.4 Increasing Farmers' Income

Weather-based agro-advisory services help increase farmers' income by improving crop management decisions and reducing weather-related production losses. Timely recommendations enable farmers to select suitable crops according to climatic conditions, adopt appropriate management practices, and protect crops from adverse weather events. These services also help farmers improve market timing by planning harvesting and marketing activities according to weather conditions. As a result, productivity increases, production risks decrease, and overall farm profitability improves.

4. Components of Weather-Based Agro-Advisory Services

4.1 Weather Data Collection

Weather data collection is the foundation of Weather-Based Agro-Advisory Services. Accurate meteorological information is collected from various sources such as Automatic Weather Stations (AWS), satellite observations, radar systems, and weather monitoring networks. These systems continuously record important weather parameters, including rainfall, temperature, relative humidity, wind speed, and solar radiation. The collected data is analyzed to prepare location-specific agricultural advisories. Reliable weather information helps farmers make timely decisions related to sowing, irrigation, fertilizer application, pest management, and harvesting, thereby reducing climate risks and improving agricultural productivity.

4.2 Weather Forecasting

Weather forecasting provides information about expected weather conditions for upcoming days, helping farmers plan agricultural activities effectively. It is an

essential component of Weather-Based Agro-Advisory Services, as timely weather predictions support better crop management decisions.

Types of Weather Forecasts:

Short-Term Forecast: Provides weather predictions for 1–3 days and helps in immediate decisions such as irrigation, spraying, and harvesting.

Medium-Term Forecast: Covers 4–10 days and supports planning of major farm operations.

Long-Term Forecast: Provides seasonal climate predictions useful for crop selection and long-term agricultural planning.

4.3 Crop-Based Advisory Generation

Crop-based advisory generation involves combining weather information with scientific knowledge of crop requirements to provide specific recommendations to farmers. These advisories guide farmers in making timely decisions for different crop operations. For example, irrigation can be delayed before expected rainfall, pesticides should be applied during favorable weather conditions, and crops can be protected from frost or heat stress through suitable measures. Such recommendations improve crop management, reduce losses, and enhance productivity.

4.4 Dissemination of Advisories

Dissemination of agro-advisories ensures that timely weather-based information reaches farmers in an accessible and understandable manner. These advisories are delivered through various communication channels such as SMS alerts, mobile applications, radio, television, internet platforms, and social media. Farmer training programs and extension services also play an important role in explaining and implementing recommendations at the field level. Effective dissemination improves farmers' access to scientific information, enhances decision-making capacity, and promotes the adoption of climate-smart agricultural practices.

5. Major Applications of Weather-Based Agro-Advisory Services

5.1 Sowing and Planting Management

Weather forecasts help farmers determine the optimum time for sowing and planting operations. Timely sowing under favorable weather and soil moisture conditions improves seed germination, crop establishment, and overall plant growth. Weather-based recommendations reduce the risk of poor crop emergence caused by drought, excessive rainfall, or unfavorable temperatures. Thus, farmers can achieve better crop performance and minimize production losses through scientific sowing decisions.

5.2 Irrigation Management

Weather-based irrigation scheduling helps farmers apply water according to crop requirements and prevailing weather conditions. It prevents unnecessary irrigation during expected rainfall and ensures adequate moisture supply during dry periods. This approach saves water, improves water-use efficiency, and reduces crop stress caused by moisture deficiency. Efficient irrigation management supports higher productivity, lowers production costs, and promotes sustainable use of water resources.

5.3 Fertilizer Management

Weather-based agro-advisories guide farmers regarding the suitable time, method, and quantity of fertilizer application. Applying fertilizers under favorable weather conditions improves nutrient availability and uptake by crops. These recommendations reduce nutrient losses caused by rainfall, leaching, or volatilization. Efficient fertilizer management enhances crop growth, improves fertilizer-use efficiency, reduces input costs, and supports environmentally sustainable agricultural production.

5.4 Pest and Disease Management

Weather conditions significantly influence the occurrence and spread of insect pests and diseases. Agro-advisory services provide early warnings about possible pest outbreaks and recommend suitable control measures. Farmers

receive guidance on appropriate pesticide application timing based on temperature, humidity, and rainfall conditions. Weather-based pest management reduces unnecessary chemical use, minimizes crop damage, and promotes integrated and sustainable crop protection practices.

5.5 Harvest Management

Weather forecasts help farmers select suitable periods for harvesting and post-harvest operations. Harvesting during favorable weather conditions reduces moisture-related losses and improves product quality. Timely harvesting prevents damage caused by unexpected rainfall or adverse climatic events. Weather-based recommendations support safe drying, storage, and transportation of agricultural produce, thereby reducing post-harvest losses and improving farmers' economic returns.

6. Technologies Used in Weather-Based Agro-Advisory Services

6.1 Mobile Technology

Mobile technology has become an effective tool for delivering agricultural information directly to farmers. Mobile phones provide easy access to weather-based agro-advisories through SMS alerts, mobile applications, and voice messages. These services provide timely information about weather conditions, crop management practices, pest control, and market updates. Mobile-based communication improves farmers' decision-making ability, increases access to scientific knowledge, and supports the adoption of climate-smart agricultural practices.

6.2 Remote Sensing and Satellite Technology

Remote sensing and satellite technologies provide valuable information for monitoring agricultural and weather conditions over large areas. Satellite data helps assess crop condition, weather patterns, soil moisture status, and drought situations. These technologies support early identification of crop stress and enable better agricultural planning. By providing real-time information, remote sensing helps improve crop monitoring, resource

management, and decision-making in weather-based agro-advisory systems.

6.3 Artificial Intelligence (AI)

Artificial Intelligence (AI) plays an important role in improving the accuracy and effectiveness of agro-advisory services. AI-based systems analyze large volumes of weather, crop, and field data to provide scientific recommendations. Applications include crop selection advice, weather prediction, pest risk assessment, and decision support for farm management. AI helps farmers make timely decisions, reduce production risks, optimize resource use, and enhance agricultural productivity.

6.4 Internet of Things (IoT)

Internet of Things (IoT) technology enables real-time monitoring of agricultural fields through connected sensors and devices. IoT-based systems collect information related to soil moisture, temperature, humidity, and other field conditions. These technologies support smart irrigation control, efficient water management, and timely crop management decisions. Integration of IoT with weather-based agro-advisory services improves precision farming, reduces input wastage, and promotes sustainable agricultural production.

7. Benefits of Weather-Based Agro-Advisory Services

Weather-Based Agro-Advisory Services provide several benefits by helping farmers make timely and scientific decisions according to weather conditions and crop requirements.

1. Reduction in Climate Risks

These services help farmers prepare for climate-related challenges such as droughts, floods, heat waves, and storms. Timely warnings enable farmers to adopt protective measures and reduce crop losses.

2. Increased Productivity

Weather-based recommendations improve crop management practices such as sowing, irrigation, fertilizer application, and pest control, resulting in better crop growth and higher productivity.

3. Cost Reduction

Advisories help farmers avoid unnecessary use of water, fertilizers, and pesticides, reducing input costs and improving profitability.

4. Sustainable Agriculture

Efficient resource utilization promotes environmentally friendly and sustainable farming practices.

5. Improved Decision Making

Scientific weather information supports better farm planning and reduces uncertainty in agricultural operations.

6. Enhanced Farmer Confidence

Access to timely and reliable information improves farmers' ability to manage risks and adopt modern agricultural practices with greater confidence.

8. Weather-Based Agro-Advisory Services in India

In India, several government organizations, agricultural institutions, and digital platforms are actively involved in providing weather-based agro-advisory services to farmers. These services help farmers make timely decisions related to crop management, irrigation, pest control, and other agricultural activities.

India Meteorological Department (IMD)

The India Meteorological Department (IMD) provides weather forecasts and agricultural advisories through Agrometeorological Advisory Services (AAS). These advisories are prepared by integrating weather forecasts with crop and farming information to support farmers in different regions.

Krishi Vigyan Kendras (KVKs)

Krishi Vigyan Kendras play an important role in disseminating weather-based recommendations among farmers. They provide training, demonstrations, and extension support for effective adoption of advisories.

State Agricultural Universities

Agricultural universities develop location-specific and crop-specific advisories based on regional climate conditions, soil characteristics, and farming systems.

Digital Agriculture Platforms

Mobile-based digital platforms provide real-time weather information, crop advisories, and agricultural updates directly to farmers, improving accessibility and promoting climate-smart agriculture.

9. Challenges in Weather-Based Agro-Advisory Services

Despite the importance of Weather-Based Agro-Advisory Services, several challenges limit their effective adoption among farmers. Limited access to technology is a major issue, as many rural areas face poor internet connectivity and lack of digital devices. Low digital literacy among farmers creates difficulties in using mobile applications and online advisory platforms. Weather forecast accuracy can also affect the reliability of recommendations due to changing climatic conditions. Language barriers reduce understanding, making local language advisories necessary for better adoption. Additionally, many farmers have limited awareness about available agro-advisory services. Improving digital infrastructure, training, and awareness programs is essential for wider adoption.

10. Strategies for Improving Agro-Advisory Services

Improving Weather-Based Agro-Advisory Services requires strengthening technology, communication systems, and institutional coordination. Increasing the number of weather monitoring stations and improving forecast accuracy can provide more reliable information to farmers. Farmer training programs should be promoted to enhance understanding and adoption of advisories. Developing local language advisory systems will improve accessibility among rural communities. Digital agriculture platforms should be strengthened for faster information delivery. Integration of artificial intelligence (AI) and machine learning can improve prediction and decision support systems. Better collaboration between meteorological departments, agricultural institutions, and extension agencies is essential

for developing effective, location-specific, and farmer-friendly agro-advisory services.

11. Future Prospects

The future of Weather-Based Agro-Advisory Services is closely associated with digital agriculture and climate-smart farming. Advanced technologies such as artificial intelligence, drones, remote sensing, IoT sensors, and big data analytics will improve the accuracy and personalization of advisories. Future developments include real-time farm-specific recommendations, AI-based crop management, automated irrigation systems, predictive pest and disease warnings, and climate-resilient planning. These innovations will help farmers reduce risks, improve productivity, and achieve sustainable agricultural production.

CONCLUSION

Weather-Based Agro-Advisory Services are essential tools for modern agriculture, helping farmers make timely and scientific decisions based on weather conditions. They reduce climate-related risks, improve resource-use efficiency, increase productivity, and enhance farm income. Integration of digital technologies such as AI, remote sensing, mobile applications, and IoT has further strengthened the reach and effectiveness of these services. In the era of climate change, weather-based agro-advisories will play a vital role in promoting climate-smart agriculture, improving farmer resilience, and ensuring sustainable agricultural development.

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