Weather Intelligence

A Crucial Tool to Reduce Agribusiness Volatility

In December 2024, garlic farmers in Mandsaur, Madhya Pradesh, suffered significant losses due to unseasonal rains, with no access to real-time weather insights. In contrast, farmers in Maharashtra successfully protected their produce by leveraging weather forecasts. This highlights the crucial role of weather intelligence in India's agriculture, where unpredictable weather often leads to devastating losses. By utilizing weather data for timely decision-making, such as adjusting harvest schedules and protecting crops, farmers can minimize risk. This article by **Sahana Hegde** and **Abhijit Shinde** emphasizes how weather intelligence can help reduce post-harvest losses, increase efficiency, and build resilience in India's agricultural sector.

In December 2024, thousands of garlic farmers in Mandsaur, Madhya Pradesh, faced devastating losses when unseasonal rains ruined their produce. Without access to real-time weather insights, they were left helpless as their crops—worth lakhs of rupees—deteriorated. Meanwhile, in Maharashtra, Farmer Producer Organizations (FPOs) successfully preserved 400 tonnes worth ₹1.7 crore of produce by leveraging timely weather forecasts, minimizing their losses. This stark contrast highlights the critical role of weather intelligence—utilizing weather data and forecast to make informed decisions—in safeguarding India's agricultural sector.

India, the world's second-largest agricultural producer, generates approximately 330 million metric tonnes (MT) of produce annually. Agriculture contributes 18.3 per cent to the national GDP, underscoring its economic significance. Yet, post-harvest losses threaten to undermine this potential. A 2020–21 NABCONS (NABARD Consultancy Services) study estimated losses at 68.9 million MT, valued at ₹1.53 lakh crore, amounting to nearly 2.35 per cent of India's GDP.

Weather intelligence in market decisions

While reports focus on quantitative losses (weight discrepancies during storage and transport), qualitative losses—nutritional degradation, pest infestation, and moisture imbalances—often go unaccounted for. When these are considered, actual losses could be far higher.

Government initiatives have focused on infrastructure, mechanization, and food processing to curb post-harvest losses. However, the unpredictable nature of weather remains an overlooked challenge. Moisture levels, influenced by rainfall, humidity, and temperature, impact stored grains' quality and market value. Unseasonal weather events—such as sudden rains, cloud cover, or


Harvested crop

heatwaves—exacerbate losses, forcing farmers into distress sales at lower prices.

For instance, when bumper harvests coincide with favourable weather in certain regions, an oversupply floods the market, reducing prices. Conversely, extreme weather events create scarcities, driving up costs. Without access to weather intelligence, farmers remain vulnerable to these market fluctuations.

The role of weather in supply chain management cannot be overstated. Rainfall and humidity directly impact post-harvest handling, especially when crops are stored in open spaces or non-airtight bags. Even during transportation, exposure to unexpected weather conditions can deteriorate quality.

A recent incident at WOTR, an organization which focuses on the rejuvenation of rural ecosystems and building resilience of rural communities to climate change, reinforced how crucial weather intelligence is to mitigate such risks. On December 24, 2024, the WOTR Centre for Resilience Studies (WOTR's research arm) issued a rainfall advisory on the FarmPrecise platform (an agro-advisory app developed by WOTR), warning of potential rains across Maharashtra, Rajasthan, and Madhya Pradesh from December 26–29, 2024. At the time, five farmer producer companies (FPCs) from Jalna were actively procuring maize, with over 110 MT of produce stored in open fields—highly vulnerable to moisture damage. Recognizing the urgency, WOTR's market linkage team immediately coordinated with the FPCs, ensuring every single bag was covered before the rains arrived.

With price drops and panic selling looming, the team facilitated the timely movement of 377 MT of maize and soybean, valued at over ₹1.07 crore, securing better returns for farmers. This incident underscored a key lesson: real-time weather intelligence is not just about predicting the weather—it's about using that knowledge to take decisive action and minimize risk. This proves that integrating weather intelligence into supply chain operations is imperative. Real-time temperature and humidity monitoring in mandis, warehouses, and transit points can prevent losses. Additionally, accessible weather forecasts can empower farmers/FPCs to make informed decisions, such as adjusting harvesting schedules or utilizing proper storage solutions.

Despite advancements in meteorological technology, hyper-local weather forecasts remain a challenge in India's diverse climatic landscape. Currently, the most precise forecasts are available at district and block levels, with lead times of 3–4 days. While this provides valuable insights, it often falls


Utilizing weather information

short for long-term farm-level decision-making. Meanwhile, with their limited accuracy and broader spatial coverage, long-term forecasts further restrict their applicability at the field scale.

However, long-range forecasts exceeding a week can still be useful for broader planning—such as post-harvest logistics, procurement strategies, and transportation schedules. Strategic use of these forecasts can help optimize cold storage use, reducing spoilage of perishable goods.

Recognizing the link between weather and market prices, many farmers are actively tracking weather conditions beyond their immediate region. A tomato and chili farmer from Karnataka, for instance, follows weather updates across major production areas, assessing supply trends that impact pricing. By engaging in over 20 weather-related WhatsApp groups, he collaborates with fellow farmers to make informed marketing decisions.

However, access to weather intelligence at the individual farmer level remains uneven. This is where FPOs can play a transformative role. By collectively leveraging weather forecasts, FPOs can optimize regional decision-making—reducing risks, improving efficiency, and enhancing profitability for smallholder farmers.

Weather intelligence is not just a tool for loss prevention; it is essential for building resilience and sustainability in India's agricultural economy. To fully harness its potential, policymakers and market stakeholders must:

- Utilize available weather forecast information to make better decisions in post-harvest management
- Equip mandis and warehouses with real-time temperature and humidity monitoring systems
- Encourage FPOs to integrate weather data into their decision-making processes
- Enhance farmers' capacity to understand and utilize weather forecasts effectively, enabling better agricultural management despite forecast limitations.

In a sector where unpredictability defines livelihoods, weather intelligence offers a way to reduce agribusiness volatility. The question is no longer whether we should invest in weather-smart agriculture, but how quickly we can scale it to benefit millions of farmers nationwide.

As one farmer aptly put it: *"It's not just the accuracy of the forecast that matters, but how effectively we use it to minimize losses."* ■

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