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Application of Agromet Advisory Services in Climate-Resilient Agriculture

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INTRODUCTION

Jharkhand, a state in eastern India, is a highly agrarian region in which over 75% of the population lives on agriculture. The agricultural systems in the state are almost entirely rainfed, characterized by small landholdings, low productivity, and an intensive reliance on the monsoon. This renders the area highly susceptible to climate variability.

Over the last few years, Jharkhand has experienced irregular rainfall patterns, extended dry spells, increased temperatures, and an increasing number of extreme weather occurrences, such as unseasonal rains and heatwaves. These disruptions in climate have been gravely affecting agricultural productivity, food security, and rural livelihoods, especially for smallholder farmers who are deprived of real-time information and risk management instruments.

Against this background, Agromet Advisory Services (AAS) have proven to be an important intervention for supporting climate-resilient agriculture. Through providing location-based weather forecasts and agronomic advisories, these services enable farmers to make value-based decisions, mitigate climate-related risks, and adopt adaptive farming practices best suited to local conditions.

What are Agromet Advisory Services?

Agromet Advisory Services are scientifically-based decision-support tools that combine weather forecasting, agro-climatic information, and farm-specific advice for use in agriculture-related decision-making. In India, they have been made available through the Gramin Krishi Mausam Sewa (GKMS) programme, coordinated by the India Meteorological Department (IMD), in partnership with State Agricultural Universities (SAUs), Krishi Vigyan Kendras (KVKs), and State Agriculture Departments.

In Jharkhand, twice-a-week Agromet Advisory bulletins are prepared usually on Tuesdays and Fridays to provide timely advisory for regularly progressing agricultural operations. The bulletins are prepared in different agro-climatic zones of the state and also translated into regional languages to make them accessible.

Dissemination Modes in Jharkhand

For reaching a large and heterogeneous clientele, these advisories are released through various modes of communication such as: SMS notifications from the Kisan portal, which delivers real-time messages to enrolled farmers.

- ✓ All India Radio (AIR) and FM radio, which air advisories in local languages.
- ✓ Regional dailies, which carry weekly agromet columns.
- ✓ WhatsApp groups led by KVKs and farmer producer companies (FPOs), enabling peer-to-peer exchange.
- ✓ Loudspeakers in villages and extension workers at the village level, who assist in transmitting bulletins in tribal locations.

This multi-channel strategy makes advisories accessible even to marginal and illiterate farmers, improving their capacity to counter weather and crop-related problems.

Parts of Agromet Advisories

Every advisory bulletin contains a whole package of information meant to assist farmers in all walks of crop and animal husbandry. The major parts include:

Five-day Weather Forecast

Comprises forecasts of rainfall, temperature (minimum and maximum), humidity, wind speed, and direction, allowing farmers to schedule activities such as sowing, irrigation, and harvest.

Weather Alerts and Warnings

Offers advanced warnings of severe weather conditions like intense rain, hailstorms, frost, cold or heat waves, allowing farmers to take preventive action.

Crop-Specific Recommendations

Provides recommendations on best sowing times, irrigation plans, fertilization, and crop protection practices according to the prevailing weather and stage of crop growth.

Pest and Disease Management

Recommends control interventions at the right time for anticipated outbreaks of pests and diseases likely to occur under the existing weather conditions.

Livestock and Fisheries Management Tips

Provides tips on livestock health, shelter management against heat or cold stress, and fish pond water quality management.

Soil and Water Conservation Measures

Recommends methods like mulching, contour bunding, intercropping, and application of bio-fertilizers for soil moisture conservation and increasing resilience.

Climate change Challenges in Jharkhand Agriculture

Jharkhand agriculture is extremely exposed to climate variability owing to its largely rainfed farming systems, rolling terrain, and diverse but poor water-holding capacity of soils. A diverse set of climate-induced challenges has multiplied the risk to crop production and livelihoods in rural areas: The main monsoon onset has become increasingly unpredictable and late, heavily impacting the sowing windows for dominant crops such as paddy and pulses.

- ✓ Mid-season droughts in crucial growth phases have depleted soil moisture content, resulting in wilting, growth reduction, and yield loss.
- ✓ Recurrent droughts, especially in drought-prone areas like Palamu, Garhwa, and Chatra, cause crop failure and severe water shortage.
- ✓ Heat stress in reproductive phases, particularly rice, has resulted in sterility of spikelets and inadequate grain filling, besides affecting productivity.

The occurrence of pest and disease infestations has gone up as a result of variable humidity and temperature, mainly impacting paddy and pulses. Small and marginal farmers, who form the majority in the state, are least able to deal with these climatic uncertainties. Their relatively poor access to weather information, irrigation, and financial cushions renders climate services such as Agromet Advisory Services (AAS) of utmost importance for increasing their adaptive capacity.

Role of Agromet Advisory Services in Climate-Resilient Agriculture

Agromet Advisory Services have a crucial role to play in improving farmers' readiness, minimizing input losses, and informing climate-smart

choices. For Jharkhand, these services have resulted in improvements in resilience through the following mechanisms:

1. Facilitating Timely Sowing and Crop Planning

Agromet advisories offer precise and localized rainfall projections, along with soil moisture levels, allowing farmers to make informed sowing decisions at the right time. For example, farmers in Ranchi and Dumka districts were recommended to postpone paddy sowing in 2022 because of a late onset of the monsoon. Advisories also suggested the usage of short-duration and drought-resistant varieties such as Sahbhagi Dhan to counter the dangers of postponed rains and shortened seasons.

2. Optimizing Water Use

With predictions on rainfall and evapotranspiration intensities, AAS enables farmers to plan for shielding irrigation for crops like maize, pulses, and vegetables, thereby enhancing water use efficiency. During prolonged dry periods, advisories suggest practices like mulching, alternate furrow irrigation, and intercultural operations for soil moisture conservation and avoiding water stress.

3. Avoiding Crop Losses Due to Extreme Events

Early alerts issued by AAS enable farmers to take pre-emptive action against extreme weather, reducing losses in yield and inputs. During heavy rainfall, farmers are advised to drain water from paddy fields to prevent waterlogging. During hailstorm forecasts, advisories recommend preponing the harvest of vegetables or making arrangements for temporary shelters. Cold wave warnings contain recommendations for sheltering livestock and covering susceptible plants, lessening damage to crops and animals.

4. Directing Pest and Disease Management

Pest and disease outbreaks like blast and bacterial leaf blight in paddy, and pod borers in pulses, are frequent during humid conditions in Jharkhand. AAS provides timely intimation regarding pest/disease conducive conditions and suggests prophylactic spraying, disease resistance variety use, and roguing of infected crops to limit spread. Such timely action assists in limiting crop loss and pesticide abuse.

5. Livestock and Fisheries Support

AAS also involves advisories for livestock and fisheries management, which are underrated but essential for farming systems integration. Farmers receive temperature forecasts to alert them to fodder conservation, heat stress mitigation, and preparation of livestock shelters in extreme weather conditions.

For aquaculture, advisory guidelines suggest pond oxygenation and aeration during unexpected drops in temperature to avert fish killing.

Success Stories from Jharkhand

Positive impacts have been seen in some districts of Jharkhand following the implementation of Agromet Advisory Services:

Palamu District

During 2021, farmers took up SMS-based AAS alerts and were warned against planting paddy early because of an expected dry spell. Consequently, they skipped input losses and re-sowing expenses, saving time and money.

Hazaribagh District

Vegetable farmers in the area obtained timely advice on management of powdery mildew. By following prescribed measures, they achieved up to 30% fewer losses in crops, resulting in improved marketable yields.

Simdega District

Staggered planting of pulses was promoted by AAS recommendations, which enabled farmers to diversify risk and cope more easily with unpredictable rainfall. Improved crop resilience and stabilization of household food supplies were the result.

Challenges in Adoption of Agromet Advisory Services

Notwithstanding the proven advantages of Agromet Advisory Services (AAS) in improving climate resilience, various practical and systemic issues impede their large-scale adoption in Jharkhand: Low awareness of AAS remains a fundamental impediment, particularly in remote and tribal-dominated villages, as farmers remain unaware of the concept and value of such

advisories. Poor connectivity of mobile networks in hilly and forest areas limits the timely delivery of SMS-based advisories, denying farmers access to important weather and crop information.

Low literacy rates among older and tribal farmers hinder the proper utilization of text messages, with farmers finding it challenging to decipher technical information. There is a lack of last-mile extension support, and large portions of areas do not have active extension workers or infrastructure to support the interpretation and dissemination of AAS bulletins.

The advisories' content is usually not relevant to the traditional cropping patterns of tribal populations, like minor millet production and intercropping, making them less applicable and relevant.

Way Forward: AAS Strengthening in Jharkhand

To make Agromet Advisory Services more inclusive, accessible, and effective, the following strategic actions are necessary:

Localized Content Development

Advisories must be translated into local tribal languages like Santhali, Mundari, Kurukh, and Ho to encourage greater understanding and trust among farmers' communities. Localization needs to be aligned with regional cropping patterns and customary practices.

Community Champions and Peer Learning Models

AAS ambassadors must be trained among lead farmers, women's SHGs, and youth volunteers to spread advisories at the village level, clarify their applicability, and provide demonstration in local fields. Peer-to-peer dissemination increases credibility and acceptability.

ICT Infrastructure Strengthening

Investments in mobile towers, digital kiosks powered by solar, and community radio can bridge the gap of connectivity. Digital notice boards and voice message platforms can also be accessible to farmers who do not have a smartphone or know how to read.

Crop Insurance and Risk Management integration

AAS must be integrated with Pradhan Mantri Fasal Bima Yojana (PMFBY) to enable advisories to be utilized as part of a climate risk management framework. This would not only enhance claim assessments but also prompt farmers to adopt preventive measures.

Two-Way Feedback Mechanisms

Creating organized avenues for farmers' feedback via mobile surveys, WhatsApp groups, and ground-level interactions can help tailor the advisory content, keeping it context-specific, relevant, and reliable.

CONCLUSION

In Jharkhand's climate-vulnerable agriculture, Agromet Advisory Services are a vital support column towards improving resilience and adaptive capacity. Providing timely, localized, and actionable advisories on weather, crop husbandry, livestock management, and disaster preparedness, AAS enables farmers to take informed decisions that safeguard livelihoods and maintain food security.

But to unlock the full potential of these services, the last-mile delivery gap needs to be bridged, community ownership developed, ICT infrastructure invested in, and advisories adapted to the local socio-cultural and agricultural environment. The scaling up of AAS as a key part of climate-resilient agriculture in Jharkhand calls for a multi-stakeholder, community-led approach supported by robust institutional and policy frameworks.

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