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A context-sensitive adaptive framework for managing sowing delays in rice–wheat systems

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Abstract

Timely sowing is a critical determinant of productivity in rice–wheat systems (RWS) across the eastern Indo-Gangetic Plains (EIGP) of India. Planting delays and climate extremes act as a foundational production constraint. Despite the extensive reach of multi-channel advisories to the farmers, most of the existing advisories remain static and based on blanket advisory frameworks. Consequently, they fail to reflect the complex interplay of monsoon variability, resource constraints, and management options that influence real-world farming decisions. We developed a pilot study to send optimum planting date advisory through a mobile app (AgDay). The framework of this dynamic advisory system was created using the integration of ground data, geospatial and crop simulation model. We tested it with 190 farmers in 2023–24 by sending advisories on the optimum planting dates and establishing field trials to ascertain yield gain and found an approximately 1.4 $^{t}/_{ha}$ system level yield gain. The shift from static to dynamic decision support enabled selected farmers to optimise system productivity. Furthermore, keeping our findings as a baseline, we intend to explore the complexity of determining where, why, and what can be possible to modify planting dates that has impeded progress. The current study intends to address a context-sensitive, integrated decision-support framework that identifies climate adaptive intervention pathways to enhance the rice-wheat productivity. A diagnostic research through remotely sensed data, ground level information and scenario-driven analytics will be carried out to understand the farm-level barriers in the region. By integrating binding constraints such as weather variability, agro-management practices and resource limitations, we seek to create a framework to minimise losses and enhance system resilience. This enhanced platform will serve as a theory of change for climate-adaptive agricultural advisory systems in monsoon-dependent regions.

Keywords: Climate-adaptive advisory, Indo-Gangetic plains, remote sensing, rice-wheat systems, simulation model, system yield

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