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INNOVATIVE ECOLOGICAL SURVEILLANCE FRAMEWORK FOR EARLY DETECTION OF EMERGING CROP PEST RISKS

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Purpose: To develop an ecological surveillance framework for early identification of emerging crop pest risks using environmental indicators and field intelligence.

Materials and methods: A conceptual framework was designed integrating field scouting, ecological indicators, weather observations, biodiversity monitoring, farmer reporting, and spatial risk assessment to support preventive pest management.

Results: The framework enables earlier recognition of pest hotspots by combining ecological signals with continuous surveillance. It supports rapid decision-making, promotes biological control, minimizes indiscriminate pesticide use, strengthens resilience against invasive pests, and improves coordination among researchers, extension officers, and farmers. The proposed approach enhances ecosystem health while maintaining crop productivity under changing climatic conditions.

Conclusions: Ecological surveillance offers a practical pathway for sustainable plant protection by providing timely evidence for integrated pest management. Future validation under different agroecosystems will strengthen its application in national crop protection programmes.

Keywords: ecological surveillance; crop pests; early detection; resilience; agroecosystems.

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