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# EFFICACY OF AN AUTOMATIC MONITORING SYSTEM FOR PHYTOSANITARY RISK ASSESSMENT IN APPLE ORCHARDS

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The optimal solution in pest control is the application of integrated plant protection systems, which ensure the regulation of pest population density and maintain it at an economically harmless level with minimal negative impact on the environment. Thus, the number of treatments for pest control can be significantly reduced using integrated systems that are ecologically and economically justified.

This study evaluates the efficacy of an autonomous, online 4G digital pheromone trap system for pest risk analysis and phytosanitary decision support in apple orchards. Equipped with built-in digital cameras and AI-based image recognition software, the system enables real-time field detection, population density assessment, and flight dynamics analysis of the codling moth (*Cydia pomonella*).

The integrated online platform incorporates a weather monitoring and evaluation system with a 600-meter resolution, a phenology forecasting model, and the BioClass geographic information system (GIS) to identify pest economic damage thresholds across diverse spatial scales. Field tests demonstrated that the automated system achieves accuracy comparable to traditional "Delta" traps while significantly reducing labor and time inputs. Furthermore, the predictive models achieved a precision of 1 to 3 days for optimization of treatment timing.

The results confirm that this 4G digital trap system can be effectively utilized for online agro-ecological territory classification at the farm, regional, and national levels, providing forecasting stations and agricultural extension services with precise data to simulate and predict potential pest threats. Information from pest models can be used to simulate and predict the intensity and potential pest threat.

**Keywords:** pests, pheromones, monitoring, digital traps

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