Chapter 4
Economic Viability of Smart Pest Management Practices

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ABSTRACT

The integration of smart pest management practices is a significant shift in agricultural concepts, leveraging technology and data-driven approaches to address pest challenges efficiently. Traditional methods often impose financial burdens due to recurring costs, chemical use, and inconsistent outcomes. Smart pest management uses technologies like AI, IoT, and precision agriculture to optimize resource allocation, reduce chemical dependency, and enhance pest targeting precision. This chapter analyzes the economic viability of these practices, focusing on cost comparisons, returns on investment, and broader financial implications. Case studies demonstrate the benefits of adopting smart pest management in various agricultural settings. The chapter emphasizes the importance of policy support in fostering an environment conducive to the economic success of smart pest management. It advocates for a proactive approach, urging stakeholders to recognize the economic benefits and

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long-term sustainability of these innovative practices.

INTRODUCTION

Pest management is an approach that uses dislodging and preventive methods to reduce damage to crops, the environment, and human well-being (Bennett et al., 2021). Pest management includes protecting from the bacteria, insects, fungi, weeds, viruses, and vegetable animals of specially grown crops (Randall et al., 2013). Chemical pest control methods have been linked with negative impacts on ecosystems and biological control methods also negatively affect ecosystems but are less than the chemical methods (Way & Van Emden, 2000). Therefore, researchers are trying to find new ways in the current situation. As a result, researchers introduced intelligent pest management techniques combined with artificial intelligence, the Internet of Things, and precision agricultural techniques (Faust et al., 2008). These methods will be economically feasible and beneficial to the environment and the ecosystems. With this comprehensive discussion, we will review and show the economic viability of smart pest management techniques and how they will be beneficial compared with conventional pest management techniques (Abid et al., 2016).

COMPARATIVE COST ANALYSIS

Cost Comparison of Traditional vs. Smart Pest Management

Conventional pest methods have harmed the environment, are costly, and have drawbacks compared with modern techniques. Continued use of chemical pesticides makes terrible pests against pesticides and requires other methods or chemicals or more dosage (Rossi et al., 2019). Smart pest management techniques are cost-effective and effective for the target pest, incorporating real-time data collection, correct prediction, predictive analytics, and target intervention strategies (Smith & Johnson, 2019). Smart pest management techniques increase the output and reduce costs for farmers and prevent the directing the alternative methods for pest management (Wang et al., 2020). This intelligent pest management benefits consumers and farmers by providing efficient, economical, and environment-friendly pest control (Hassan et al., 2022).