

“Web or Mobile Based Advisory for Pest Identification and Management of Insects”

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Abstract- Insect pests significantly reduce agricultural productivity and cause economic losses to farmers. Correct identification of pests and timely application of suitable management practices are essential for effective crop protection, but farmers often lack immediate access to expert advisory services. To overcome this challenge, this project proposes a web or mobile-based advisory system for pest identification and management in agricultural crops. The system enables users to identify insect pests through crop and symptom selection or by uploading pest images using AI-based recognition. It uses a structured pest database to provide integrated pest management recommendations, helping farmers make informed decisions, reduce improper pesticide use, and promote sustainable agricultural practices.

Keywords- *Insect Pest Identification, Pest Management, Web-Based Advisory, Artificial Intelligence, Smart Agriculture, IPM.*

I. INTRODUCTION

Agriculture is the backbone of many developing economies, including India, and plays a crucial role in ensuring food security and rural livelihoods. However, agricultural productivity is severely affected by insect pests, which cause significant yield losses and economic damage every year. According to agricultural studies, insect pests alone are responsible for a substantial percentage of crop loss, especially in food and cash crops. Effective pest management largely depends on the accurate identification of insect pests and timely adoption of appropriate control measures.

In traditional farming practices, pest identification and management decisions rely heavily on farmers' experience or periodic visits by agricultural experts. In many rural and remote areas, access to expert advisory services is limited, delayed, or costly. As a result, farmers often apply pesticides indiscriminately, leading to increased production costs, pest resistance, environmental pollution, and health hazards. This highlights the urgent need for an accessible, reliable, and timely pest advisory system.

Recent advancements in information and communication technology (ICT), web applications, mobile platforms, and artificial intelligence have opened new opportunities for transforming agricultural advisory services. Web and mobile-based systems can deliver real-time information to farmers, while image processing and AI techniques can assist in automated pest identification. Such digital advisory systems can act as decision-support tools, bridging the gap between farmers and agricultural experts.

This research proposes a web or mobile-based advisory system for pest identification and management of insect pests in

agricultural crops. The system enables users to identify insect pests through crop and symptom selection or by uploading pest images for AI-based recognition. A structured database provides detailed pest information and integrated pest management recommendations. The proposed approach aims to reduce crop losses, minimize indiscriminate pesticide use, and promote sustainable agricultural practices through technology-driven solutions.

II. LITERATURE REVIEW

In recent years, several studies have focused on the use of information and communication technology (ICT) to support agricultural advisory services, particularly in pest identification and management. Traditional pest management systems mainly depend on manual field inspection and expert consultation, which are time-consuming and often inaccessible to small and marginal farmers. To overcome these limitations, researchers have explored web-based, mobile-based, and intelligent decision support systems.

X and Y developed a web-based insect pest management system for soybean crops, which provided pest identification and management recommendations through an online interface. Their study demonstrated that web-based advisory platforms can effectively support farmers by offering timely and accurate pest-related information. Similarly, mobile-based pest surveillance and advisory systems have been implemented in several regions to disseminate pest alerts and control measures using mobile phones, proving useful in large-scale agricultural monitoring.

With advancements in artificial intelligence, image processing and machine learning techniques have been increasingly applied to pest identification. Several researchers have proposed convolutional neural network (CNN) models to classify insect pests based on images captured using WEB. These AI-based systems showed promising accuracy and reduced the dependency on human experts. However, most existing solutions are limited to specific crops or regions and require large datasets for high accuracy.

Despite these advancements, there is still a need for an integrated system that combines web or mobile accessibility, pest databases, and intelligent image-based identification in a single platform. The proposed research aims to address these gaps by developing a comprehensive advisory system that provides easy pest identification and integrated pest management recommendations, supporting sustainable and technology-driven agriculture.

III. PROBLEM STATEMENT AND OBJECTIVES

A. Problem Statement

Insect pests are one of the major causes of yield loss in agricultural crops. Farmers often face difficulties in correctly identifying insect pests and selecting appropriate management practices at the right time. Limited availability of agricultural experts, lack of real-time advisory services, and insufficient technical knowledge lead to excessive or improper use of pesticides. This results in increased production costs, pest resistance, environmental pollution, and health risks. Existing pest advisory systems are either manual, region-specific, or lack intelligent identification capabilities. Therefore, there is a need for a reliable, accessible, and intelligent web or mobile-based advisory system that can assist farmers in pest identification and management.

B. Objectives of the Study

The main objectives of this research are:

- To develop a web or mobile-based advisory system for insect pest identification.
- To provide crop-specific pest information and damage symptoms.
- To recommend integrated pest management (IPM) strategies.
- To enable image-based pest identification using AI techniques.
- To support timely decision-making and reduce indiscriminate pesticide usage
- To promote sustainable and technology-driven agricultural practices

C. Proposed System and Methodology

The proposed system is designed as a digital decision support platform that assists users in identifying insect pests and obtaining suitable management recommendations. The system follows a modular architecture consisting of user interaction, pest identification, database management, and advisory generation.

Initially, the user accesses the system through a web or mobile interface and selects the affected crop along with visible symptoms, or uploads an image of the insect pest. In manual mode, the system searches the pest database to identify possible pests related to the selected crop and symptoms. In image-based mode, the uploaded image is preprocessed and analyzed using an artificial intelligence model trained to classify insect pests.

Once the pest is identified, the system retrieves detailed pest information from the database, including pest characteristics, damage symptoms, and recommended integrated pest management practices. The advisory is then displayed to the user in a simple and understandable format. This methodology ensures accurate pest identification, timely advisory delivery, and improved crop protection using modern information and communication technology.

IV. SYSTEM ARCHITECTURE AND DESIGN

A. Architecture Overview

The system architecture consists of the following layers:

1. User Interface Layer:

Provides web/mobile access for crop selection, symptom input, and image upload.

2. Application Server Layer:

Handles user requests, processes data, calls AI modules, and generates advisory.

3. Database Layer:

Stores pest information, crop details, damage symptoms, and management strategies.

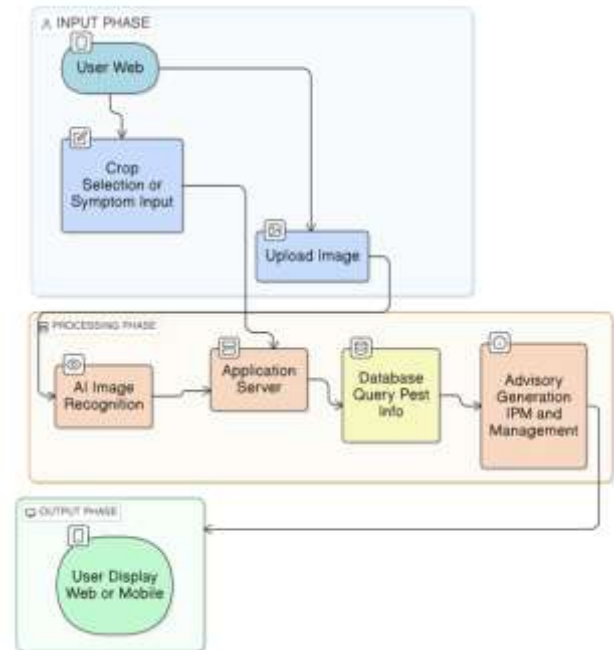
4. AI / Image Recognition Module (Optional):

Uses CNN or deep learning models to identify pests from uploaded images.

5. Advisory Generation Layer:

Compiles pest description, damage symptoms, and IPM recommendations for display.

Workflow Diagram:



V. IMPLEMENTATION AND TECHNOLOGIES USED

Component	Technology	Purpose
Frontend	HTML, CSS, JS	User interface and responsiveness
Backend	Python Flask	Business logic, request handling
Database	MySQL	Store pest and crop information
AI / Image Model	TensorFlow / Keras, OpenCV	Automatic pest identification
Deployment	Localhost	Run the system for user access

VI. RESULTS AND DISCUSSION

Manual Pest Identification:

Crop	Symptoms	Identified Pest	Management Recommendation
Rice	Yellowing and drying	Brown Planthopper	Use resistant varieties, apply Imidacloprid
Wheat	Leaf curling and sticky	Aphids	Spray neem oil or Thiamethoxam
Cotton	Holes in bolls	Bollworm	Use pheromone traps, spray Spinosad

AI-Based Identification:

Uploaded Image	Predicted Pest	Advisory Displayed
Brown Planthopper Image	Brown Planthopper	Use resistant varieties, apply Imidacloprid
Aphid Image	Aphids	Spray neem oil or Thiamethoxam

VII. CONCLUSION AND FUTURE SCOPE

Conclusion:

The project provides a practical, user-friendly **web/mobile advisory system** for pest identification and integrated management. It reduces dependency on experts, minimizes improper pesticide use, and promotes sustainable agriculture. By combining database lookup and AI-based image recognition, it ensures timely and accurate pest advisory services.

Future Scope:

The proposed web and mobile-based pest advisory system has significant potential for further enhancement and expansion. In the future, the **pest database can be expanded** to cover multiple crops and regions, ensuring wider applicability for farmers across different agricultural zones. The **AI-based pest identification model** can be improved with larger and more diverse datasets to achieve higher accuracy and reliability. Additionally, integrating **weather-based pest prediction features** can help forecast pest outbreaks and provide timely preventive advisory to farmers. Developing a **mobile application with offline capabilities** will enable users in rural areas with limited internet connectivity to access advisory services. Incorporating **multi-lingual support** will make the system more accessible to farmers speaking different regional languages. Furthermore, the system can include **analytics on historical pest data** to offer predictive insights, helping farmers make informed decisions and adopt proactive pest management practices, thereby promoting sustainable agriculture.

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