International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Agrocare AI - Intelligent Crop Planning, Risk Analysis & Disease Detection Platform Using Artificial Intelligence

Sasikala P[1], Madhumitha S[2], Praveen PR[3], Ranjith S[4]

[1]Assistant Professor, Department of Computer Science Sri Shakthi Institute of Engineering and Technology Coimbatore, India
[2,3,4]Department Of Computer Science Sri Shakthi Institute of Engineering and Technology Coimbatore, India

ABSTRACT

AgroCare AI is a web-based intelligent farming support platform designed to assist farmers in making data-driven cultivation decisions using artificial intelligence and real-time agricultural insights. Unlike traditional farming advisory systems that rely only on static information, AgroCare AI integrates multiple smart modules such as crop suitability analysis, disease detection, yield prediction, resource planning, and market price monitoring within a unified dashboard. The system is built using a modern web architecture with a responsive frontend, AI-enabled backend services, and machine learning models for predictive analysis. It supports image-based crop disease detection, real-time weather monitoring, and market price visualization to help farmers understand crop conditions and market trends effectively. A key contribution of AgroCare AI is the integration of an intelligent recommendation system and a Farm Health Score, which evaluates overall cultivation performance by combining yield predictions, disease risks, and resource efficiency. By emphasizing usability, practical farming insights, and AI-driven decision support, AgroCare AI bridges the gap between traditional agriculture and digital smart farming technologies, enabling farmers to monitor crops, manage resources, and improve productivity through a simple and accessible platform".

I. INTRODUCTION

"Agriculture is a crucial sector that supports food production and the livelihood of millions of people. However, farmers often face challenges such as unpredictable weather, crop diseases, inefficient resource usage, and fluctuating market prices, which can reduce crop productivity and profitability. With advancements in technology, Artificial Intelligence (AI) can help address these issues by providing data-driven insights and smarter decision-making tools for farmers".

AgroCare AI is a web-based intelligent farming support platform designed to assist farmers in planning and managing cultivation effectively. The system integrates AI-powered features such as crop suitability prediction, yield estimation, disease detection, resource planning, and market price analysis. It also provides real-time weather updates, cultivation alerts, and a Farm Health Score to evaluate overall crop performance. Through a simple and user-friendly dashboard, AgroCare AI enables farmers to monitor crop conditions, receive recommendations, and make informed decisions to improve productivity and reduce agricultural risks. In this exploration of AgroCare AI, we journey through the evolving landscape of smart

agriculture where technology meets traditional farming knowledge.
It represents a step toward digital transformation in agriculture, empowering farmers with intelligent insights, timely recommendations, and data-driven decision-making. AgroCare AI encourages farmers to rethink how they plan cultivation, monitor crop health, manage resources, and improve productivity through the power of artificial intelligence and modern technology.

II. LITERATURE REVIEW

2.1 Smart Agriculture Using Artificial Intelligence (Liakos et al., 2018):

Liakos and colleagues explored the use of Artificial Intelligence and machine learning techniques in modern agriculture for crop monitoring, disease detection, and yield prediction. Their study highlighted how AI can improve agricultural productivity by analyzing environmental and crop data efficiently. AgroCare AI builds upon these concepts by integrating multiple AI-driven modules such as crop suitability prediction, yield estimation, and risk assessment to support intelligent farming decisions. [1]

2.2 Crop Prediction Using Machine Learning Techniques (Khan et al., 2020):

Khan examined how machine learning algorithms can be applied to predict suitable crops based on soil properties, rainfall, and temperature conditions. The research emphasized that predictive models can help farmers select the most appropriate crops for specific environmental conditions. AgroCare AI adopts similar predictive techniques to recommend optimal crops and provide cultivation guidance based on real-time agricultural inputs. [2]

2.3 Plant Disease Detection Using Deep Learning (Ferentinos, 2022):

Ferentinos studied deep learning models for automatic plant disease detection using crop leaf images. The research demonstrated that convolutional neural networks can accurately identify multiple crop diseases from visual data. AgroCare AI applies a similar approach by allowing farmers to upload crop images and receive AI-based disease identification with treatment suggestions. [3]

2.4 AI-Based Agricultural Decision Support Systems (Sharma et al., 2023):

Sharma explored AI-driven decision support systems that assist farmers in crop planning, risk analysis, and resource management. The study highlighted how integrating environmental data with machine learning improves farming efficiency. AgroCare AI follows this approach by combining crop prediction, risk assessment, and resource planning modules within one intelligent platform. [4]

2.5 Smart Agriculture Market Analysis Using Data Analytics (Yadav et al., 2024):

Yadav analyzed the role of data analytics in monitoring agricultural market prices and trends. The research emphasized that visual price analysis helps farmers make better selling decisions. AgroCare AI incorporates market price tracking with graphical visualization to support farmers in identifying profitable crop selling periods. [5]

III. EXISTING SYSTEM

Traditional agricultural planning mainly depends on farmer experience, manual observation, and local knowledge. Farmers often rely on seasonal assumptions, past cultivation practices, or advice from nearby sources rather than data-driven decision-making. Existing agricultural applications provide only general information such as weather updates or fertilizer suggestions but lack intelligent prediction and real-time analysis. Most currently available farming support systems suffer from limited automation and do not integrate crop prediction, disease detection, and risk analysis into a single platform. Disease identification is typically done manually, which requires expert knowledge and delays treatment decisions. Additionally,

many agricultural advisory tools are mobile-app dependent and require installation, creating accessibility barriers for farmers using low-end devices or unstable networks.

Drawbacks:

- Manual decision-making
- Platform dependency
- Lack of disease detection
- Low accuracy planning
- Fragmented solutions

IV. PROPOSED SYSTEM

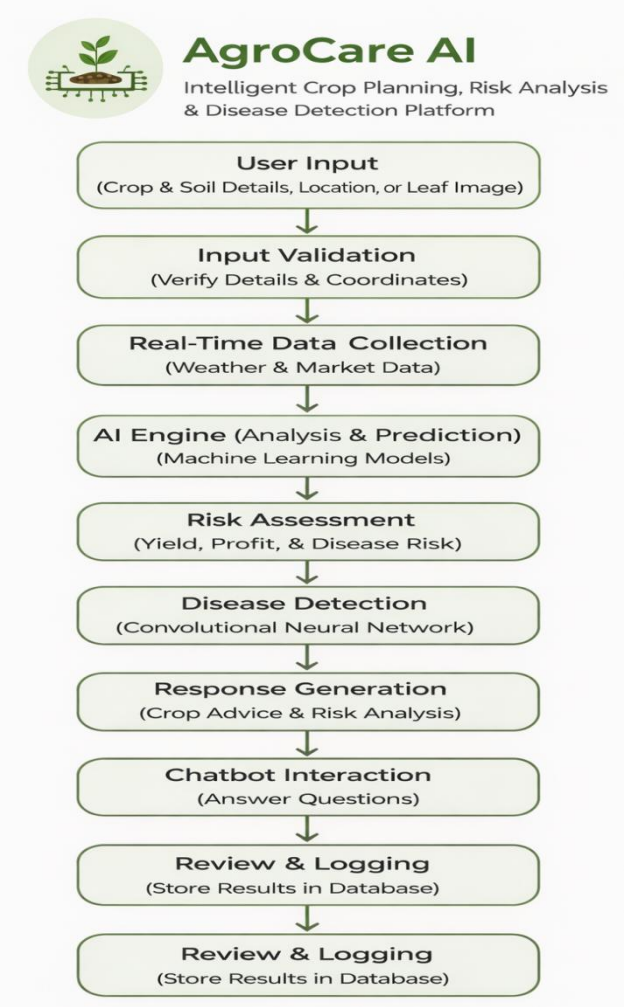
The proposed system, AgroCare AI – Intelligent Crop Planning, Risk Analysis & Disease Detection Platform, is a web-based AI-powered agricultural support system designed to assist farmers throughout the cultivation lifecycle. The platform integrates machine learning, computer vision, and real-time APIs to provide smart agricultural insights. Farmers can plan crops using predictive analytics that estimate yield, risks, and profit/loss outcomes. A CNN-based disease detection model analyzes uploaded crop images to identify diseases at early stages. AgroCare AI also includes an AI-powered chatbot that provides instant farming guidance, answers agricultural queries, and suggests solutions based on crop stage, weather conditions, and user inputs. Additionally, the system introduces a review and feedback module, where users can share cultivation results, platform experiences, and productivity outcomes. These reviews help improve transparency and assist other farmers in decision-making. The platform further displays daily market prices and graphical monthly analysis, enabling farmers to understand market trends and maximize profitability.

ADVANTAGES:

- Improved farming decision-making using AI-based predictions and analysis.
- Smart agricultural assistance for crop planning, monitoring, and management.
- Accurate disease detection with treatment and prevention guidance.
- Real-time weather updates and market price analysis for better planning.
- Profit & loss calculation and resource planning for efficient cultivation.
- Authentication and secure login.
- Developer-Friendly and Scalable.

V. METHODOLOGY

AgroCare AI follows a structured approach that combines agricultural data, artificial intelligence models, and a web-based interface to support farming decisions. Users provide farm details such as crop type, soil condition, and location through the dashboard, and the system analyzes this information using trained machine learning models. The platform generates predictions for crop suitability, yield, risk assessment, and disease detection. It also integrates weather updates, market price analysis, and a Farm Health Score to help farmers monitor crop conditions and make informed cultivation decisions.



VI. SIMULATED RESULT

TEST CASE 1:

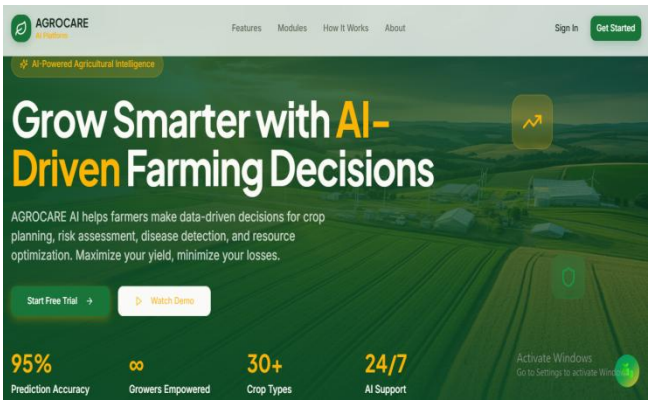


FIGURE 6.1 HOME PAGE

The AgroCare AI Home Page is designed with a clean and green-themed user interface representing agriculture and sustainability. The page provides a user-friendly experience with simple navigation and clear feature visibility.

TEST CASE 2:

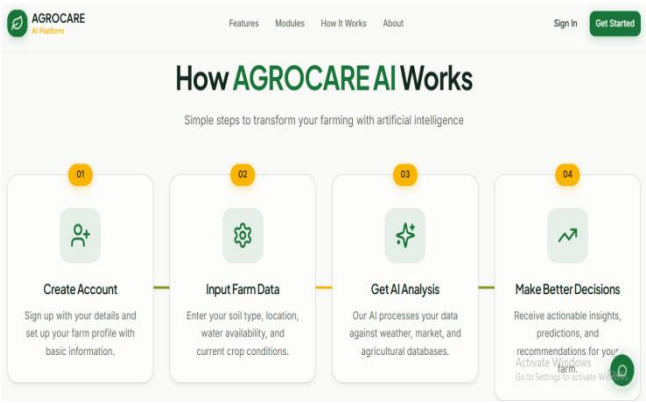


FIGURE 6.2 HOW AGROCARE AI WORKS PAGE

The How AgroCare AI Works page visually explains the step-by-step workflow of the system. It helps users understand how to create an account, provide farm inputs, receive AI analysis, and make data-driven farming decisions.

TEST CASE 3:

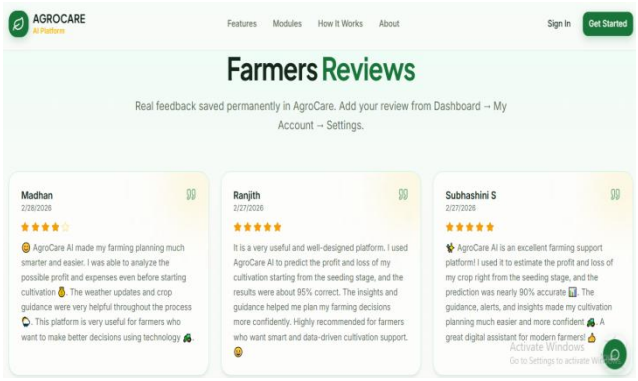


FIGURE 6.3 FARMERS REVIEW PAGE

The Farmers Reviews Page displays real feedback submitted by farmers who have used the AgroCare AI platform. The page features a clean, white-themed layout with the heading "Farmers Reviews" prominently displayed at the top, followed by a subheading that reads “Real Feedback saved permanently in AgroCare AI”.

TEST CASE 4:

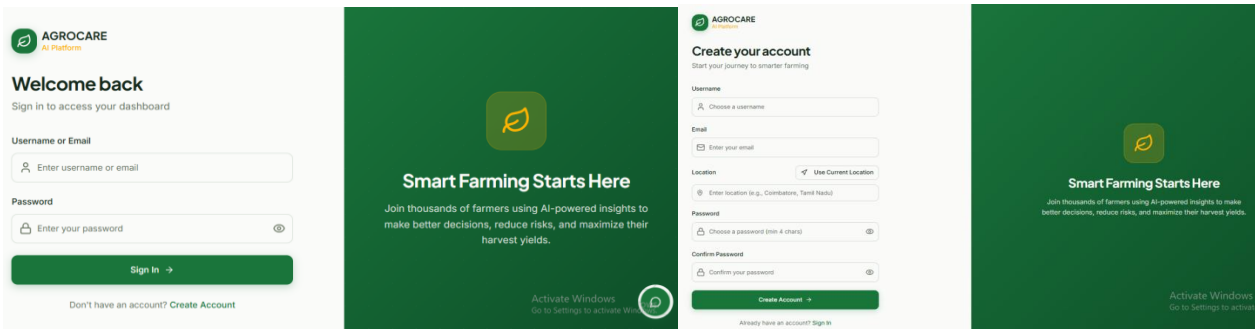


FIGURE 6.4 LOGIN & SIGN UP PAGE

The Sign Up and Login Page enables users to securely access AgroCare AI by creating an account and logging into the system. After authentication, users can utilize personalized AI features and manage their farming information efficiently.

TEST CASE 5:

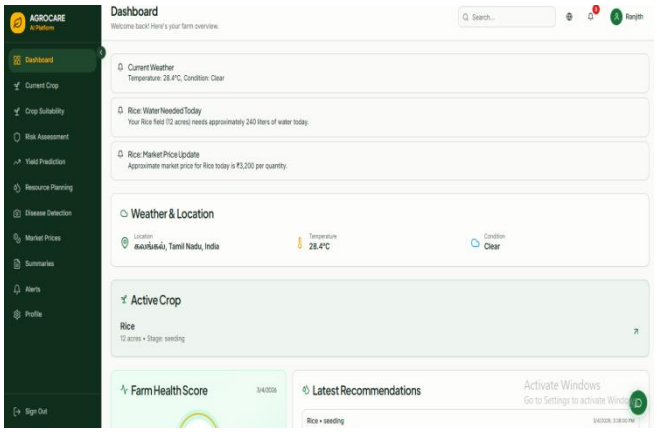


FIGURE 6.5 USER DASHBOARD PAGE

The AgroCare AI Dashboard acts as the central control panel where users can monitor weather conditions, access AI modules, manage farming activities efficiently through a single interface, including health score and recommendations.

TEST CASE 6:

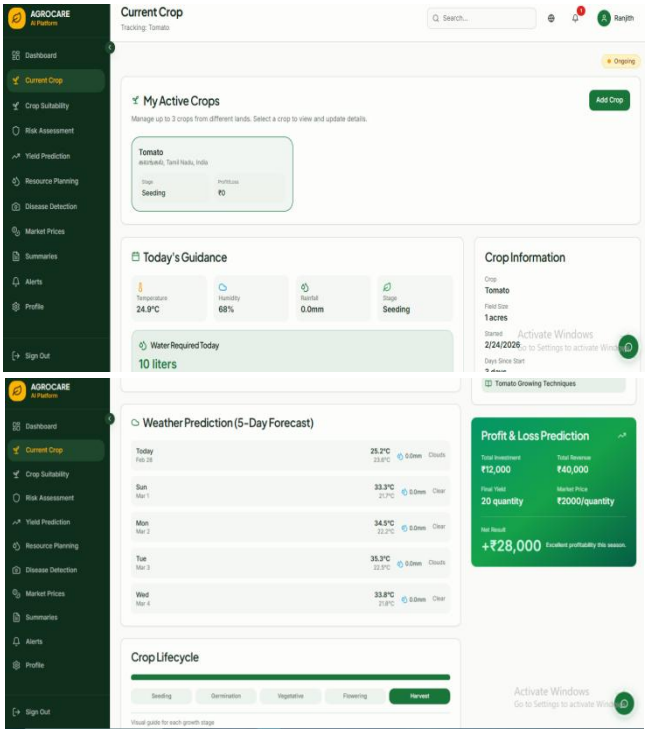


FIGURE 6.6 CURRENT CROP PAGE

The Current Crop module helps farmers monitor ongoing cultivation by providing daily guidance, life-cycle tracking, weather insights, and financial profit or loss estimation.

TEST CASE 7:

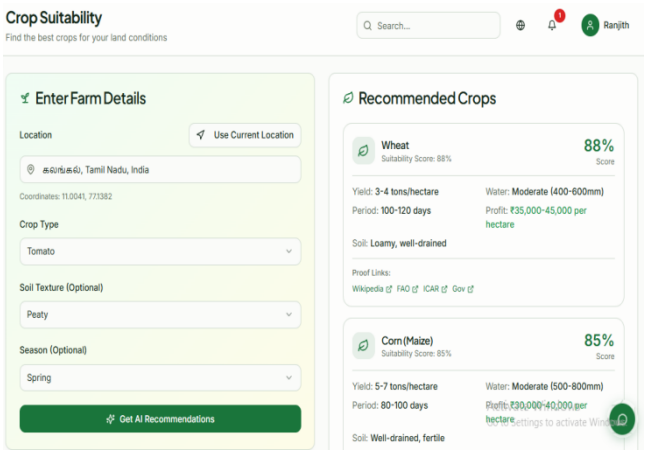


FIGURE 6.7 CROP SUITABILITY PAGE

The Crop Suitability module assists farmers in selecting the best crop based on soil and climate conditions using AI prediction techniques.

TEST CASE 8:

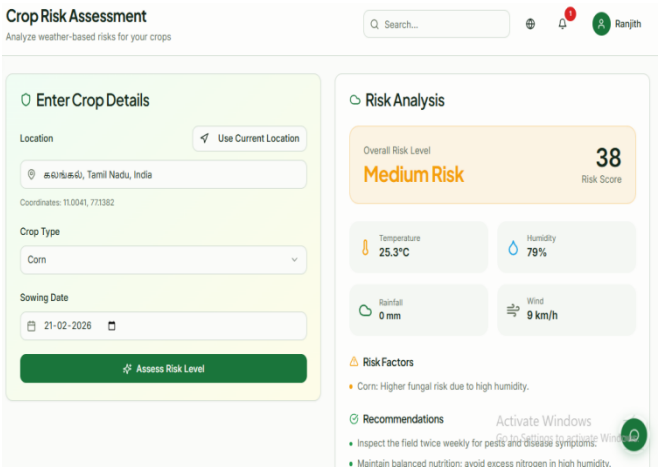


FIGURE 6.8 RISK ASSESSMENT PAGE

The Risk Assessment module helps farmers understand potential threats before they affect crop productivity, enabling preventive action.

In addition to risk assessment, AgroCare AI includes advanced modules such as Yield Prediction and Resource Planning, which also operate using intelligent AI models. These modules analyze farm inputs, environmental conditions, and cultivation factors to provide accurate production estimates and efficient resource utilization strategies. Together, they support farmers in making data-driven decisions throughout the cultivation cycle.

TEST CASE 9:

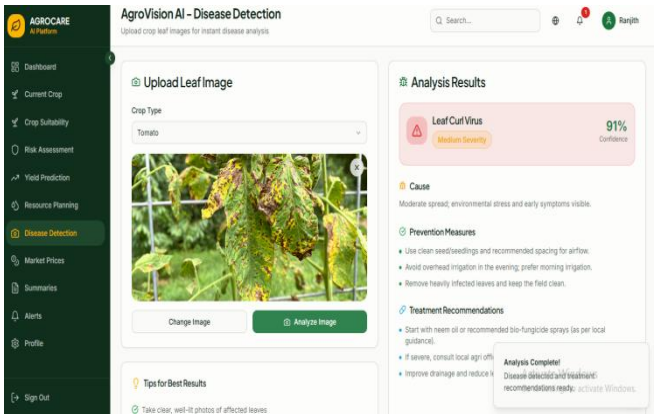


FIGURE 6.9 DISEASE DETECTION PAGE

The Disease Detection module analyzes crop images using computer vision techniques to identify plant diseases and provide corrective solutions.

TEST CASE 10:

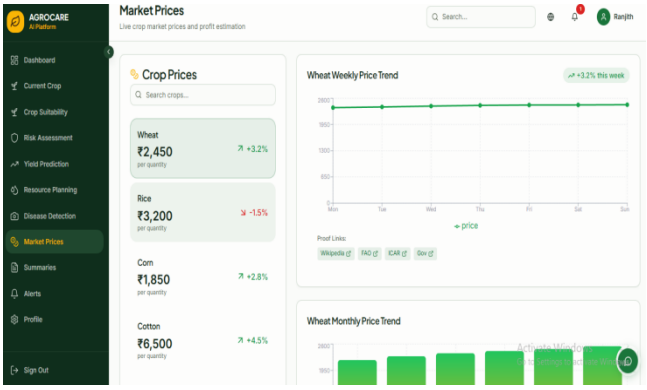


FIGURE 6.10 MARKET ANALYTICS PAGE

The Market Price module helps farmers analyze price trends and choose the best time to sell crops using graphical insights.

TEST CASE 11:

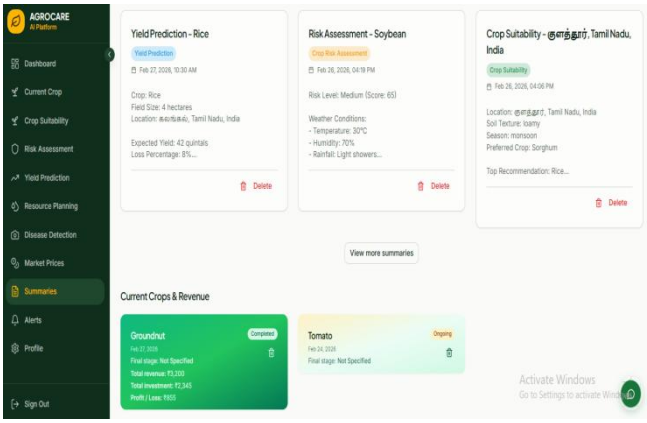


FIGURE 6.11 SUMMARY PAGE

The Summary Section provides a complete overview of farming analysis, enabling users to review predictions, risks, and financial outcomes together.

TEST CASE 12:

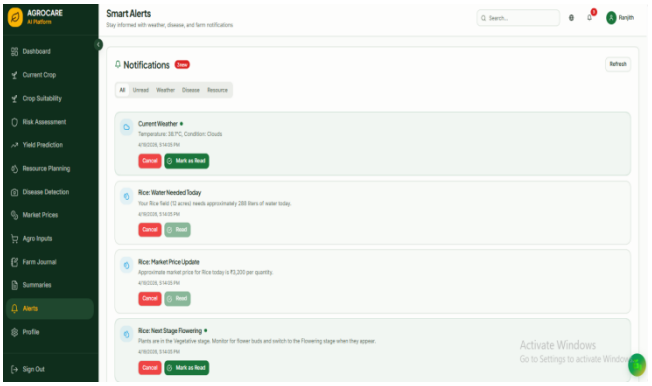


FIGURE 6.12 ALERTS PAGE

The Alerts Page ensures farmers receive timely notifications to take immediate action and protect crop health.

TEST CASE 13:

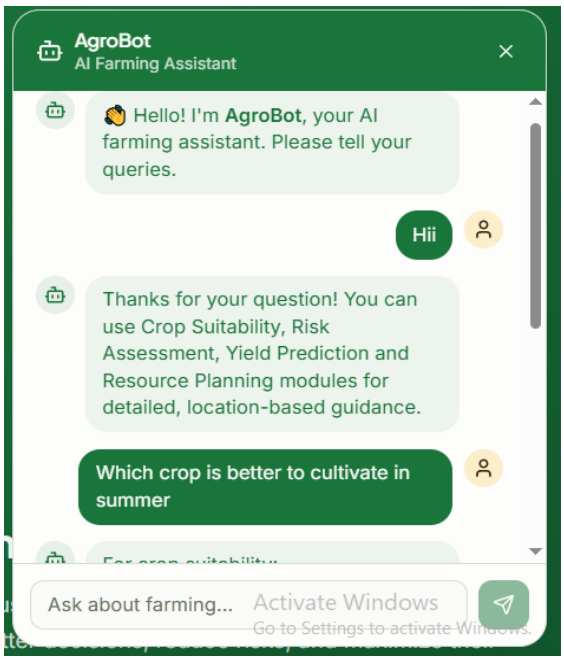


FIGURE 6.13 AGROCARE CHATBOT

The AgroCare AI Chatbot provides real-time assistance and farming functionality as an intelligent help center.

TEST CASE 14:

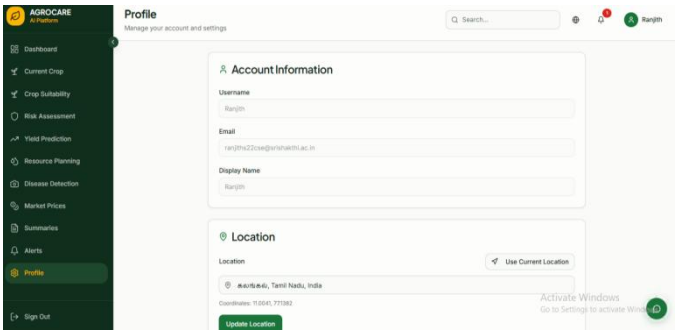


FIGURE 6.14 PROFILE MANAGEMENT PAGE

The Profile Management section allows users to customize their account and maintain personalized farming record. Through the settings option from user icon , users can also submit their own reviews and feedback about the platform.

VII. CONCLUSION

In Conclusion, AgroCare AI presents an intelligent agricultural support system that integrates artificial intelligence, machine learning, and modern web technologies to assist farmers in crop planning and decision-making. By combining features such as crop prediction, disease detection, risk assessment, market price analysis, and cultivation monitoring, the platform provides a smart digital farming solution. The Current Crop module helps farmers track cultivation activities, while AI-based analytics and the Farm Health Score provide insights into productivity and farm performance. Overall, AgroCare AI demonstrates how technology can simplify agricultural decisions and support more efficient and sustainable farming practices.

VIII. FUTURE WORK

Future enhancements of AgroCare AI aim to expand its functionality and improve agricultural support. The system can include region-specific recommendations based on soil and climate conditions, along with integration of digital calendars for better farming schedule management. The disease detection module can be improved to support more crops with higher accuracy, and IoT-based sensors can be integrated for real-time soil and environmental monitoring. Additionally, the analytics dashboard can provide deeper insights into crop performance and yield trends. AgroCare AI currently supports Tamil and English, and future updates may introduce more regional languages and a dedicated mobile application with offline access to improve usability for farmers.

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