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CROP CARE-A WEB APPLICATION FOR CROP MANAGEMENT

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ABSTRACT: "CROP CARE" is an online application that uses machine learning to provide personalized suggestions on crop selection, fertilizer use, and disease control. It truly transforms crop farming. Users may optimize yields and sustainability by entering their location and receiving personalized advise based on the local climate and soil characteristics. From user-uploaded photographs, its image recognition quickly detects crop diseases, providing a prompt diagnosis and treatment advice. Additionally, the website makes it easier to share illness data with specialists and Krishi Bhavan, as well as to sell to vendors. Farmers obtain competitive rates by putting suppliers to the test through manual bidding. This easily navigable tool advances food security and sustainability on a single, easily accessible platform by encouraging sustainable practices, boosting production, and strengthening resilience in agriculture.

KEYWORDS: Machine Learning, Crop Selection, Image recognition, Instant diagnosis, Resilience .

I. INTRODUCTION

A crucial component that plays a big part in feeding the world's expanding population is agriculture. Farmers must utilize their resources as efficiently as possible to maximize yield while reducing losses in order to meet the growing demand for food. Modern agriculture places a high priority on predicting and analyzing crop growth, and machine learning has become into a potent tool for achieving this objective [1,2]. Precision agriculture, often known as smart farming, is a contemporary agricultural method that maximizes crop yield while minimizing waste by leveraging cutting-edge technology.The goal of smart farming is to maximize crop yield while consuming the least amount of energy, fertilizer, and water possible [3]. Machine learning applications have become more prevalent in our lives in recent years, and they have proven useful in scenarios requiring decision-making in a variety of fields, including urbanization, education, health, and defense. Simultaneously, it began to generate technological and information solutions by serving as the foundation for the recently developed infrastructure of search engines, such ChatGPT (Chat Generative Pretrained Transformer from the OpenAI, Google Bard).Machine learning algorithms may be taught on extensive farm data, including weather patterns, soil characteristics, crop growth phases, and pest and disease outbreaks, to be used in agriculture, particularly in the cultivating area. Machine learning algorithms are able to anticipate business growth, production, and quality with a great degree of accuracy by analyzing the gathered data [4].

In addition, machine learning may assist farmers in determining which crops, given market demand and environmental conditions, will provide the highest profits. Machine learning algorithms can forecast crop demand and recommend the best dates and places for planting based on past market data and weather trends. [5].By doing this, farmers may reduce the chance of crop failure while increasing their income. Machine learning is capable of not only forecasting crop growth and yield but also evaluating the quality of the harvested crops.

Fruits and vegetables may be graded for ripeness and quality using machine learning models that examine their color, texture, and form. By using this data, harvesting procedures may be improved and it will be guaranteed that consumers only purchase food of the highest caliber [6, 7].Crop diseases are another important element that significantly lowers the quantity and quality of agricultural products in an indirect manner. There are several pesticide types available to reduce illness and boost output. However, determining the most recent disease, suitable, and efficient pesticide to control the infectious disease is challenging and necessitates professional advice, which is costly and time-consuming.The symptoms on the leaves are the primary indicator of disease presence on the plant. Therefore, a machine vision system that is automated, accurate, and less expensive is required to identify illnesses from images and recommend the best pesticide for the situation.

II. LITERATURE SURVEY

In [8] Bandara, P., Weerasooriya, T., Ruchirawya, T., Nanayakkara, W., Dimantha, M., & Pabasara, M.(2020) “Crop Recommendation System” comprising a theoretical and conceptual platform for a recommendation system built on

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integrated models of gathering environmental factors using Arduino microcontrollers, machine learning methods like support vector machines (SVM) and naive bayes (multinomial), unsupervised machine learning algorithms like K-Means clustering, and natural language processing (sentiment analysis) that work with artificial intelligence to recommend a crop with high accuracy and efficiency for the chosen land with site-specific parameters.

In [9] Pande, S. M., Ramesh, P. K., Anmol, A., Aishwarya, B. R., Rohilla, K., & SHAURYA, K. (2021, April) "Crop Recommender System Using Machine Learning Approach" suggests a practical and approachable yield forecast method for farmers. Farmers can connect to the planned system using a smartphone application. GPS facilitates user location identification. The user enters the region and kind of soil. Selecting the most profitable crop list or forecasting the crop yield for a crop that the user has chosen are made possible by machine learning algorithms. Support vector machine (SVM), artificial neural network (ANN), random forest (RF), multivariate linear regression (MLR), and K-nearest neighbor (KNN) are a few of the machine learning methods that are used to forecast agricultural productivity. With 95% accuracy, the Random Forest produced the best results out of all of them. Furthermore, the algorithm recommends when fertilizers should be used in order to maximize production.

In [10] Balakrishnan, D., Kumar, A. P., Reddy, K. S. K., Kumar, R. R., Aadith, K., & Madhan, S. (2023, June) "Agricultural Crop Recommendation System" is a software program that advises farmers on which crops to grow depending on their unique agricultural conditions by using artificial intelligence algorithms. To provide individualized crop suggestions, the system gathers and examines data from a variety of sources, including soil condition, climate, and past crop yields. The system is accessible via a mobile app or web-based platform and is user-friendly. Putting this strategy in place can assist farmers in increasing crop yield, cutting expenses, and improving agricultural productivity. The agriculture industry may undergo a significant transformation if an agriculture Crop Recommendation System based on machine learning were to be implemented.

In [11] Israni, D., Masalia, K., Khasgiwal, T., Tolani, M., & Edinburgh, M. (2022) "Crop-Yield Prediction and Crop Recommendation System" Choosing the appropriate crop to plant based on factors like area, rainfall, temperature, and district would enable the farmer to estimate crop yields before deciding which crop to plant in the end. This approach can help the farmer and offer insightful information. We employ a number of methods in this research, including the LGBM Classifier, Ridge Regression, and XGB Regressor. To improve the accuracy of these models, we have applied hyperparameter tuning.

In [12] Shariff, S., Shwetha, R. B., Ramya, O. G., Pushpa, H., & Pooja, K. R. (2022) "Crop Recommendation using Machine Learning Techniques" In India, agriculture is a significant sector. It is necessary for the Indian economy to thrive and survive. India produces a wide range of agricultural goods on a massive scale. An essential component of crop production is soil. Life requires soil, a dynamic, non-renewable natural resource. Crop cultivation used to be done by farmers with practical experience. Farmers can no longer select the most suited crop based on the features and qualities of the soil. Thus, a machine learning algorithm-based recommendation system has been created to suggest the crop that may be harvested in that specific soil. This system makes use of a number of machine learning methods.

III. SCOPE AND METHODOLOGY

Aim of the project

Our goal is to give farmers access to an easy-to-use online tool that offers precise, data-driven advice for farming decisions. "Crop Care" offers customized solutions for crop selection, fertilization, disease diagnosis, and preventative measures. It does this by leveraging machine learning and real-time climatic data to transform farming operations. By taking into account site-specific information like soil quality and climate, we want to help farmers make well-informed decisions. Our goal is to assure plentiful harvests and promote sustainable agriculture through proactive crop health management, which includes image-based disease identification. Come along on our path towards more environmentally friendly, economical, and intelligent agricultural methods.

Existing system

To the best of our knowledge, none of the apps provide accurate information about diseases, fertilizer, and crops that should be cultivated in one application. Because of this, farmers have to invest a lot of effort in obtaining accurate information on crops, crop diseases, and fertilizer recommendations based on the specific soil parameters of their fields. Furthermore, there is no structure in place that allows farmers to use a bidding procedure to sell their agricultural goods. Because of the participation of brokers, farmers now do not receive the true price for their produce. Farmers won't profit from the market because middle-class people will dominate it and cause fluctuations in agricultural prices.

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Proposed system

Below **Fig1** shows the architecture of the proposed system. The four primary parts of the system are classification, model generation, pre-processing, and system training. The dataset photos are pre-processed by scaling them to the necessary dimensions using the pre-processing module. A machine language model with the appropriate number of layers is built using the Model Creation module.The system is trained using dataset pictures during the system training phase, which also stores the model weight. The best crop is recommended by classifying the soil parameters using a classification module.

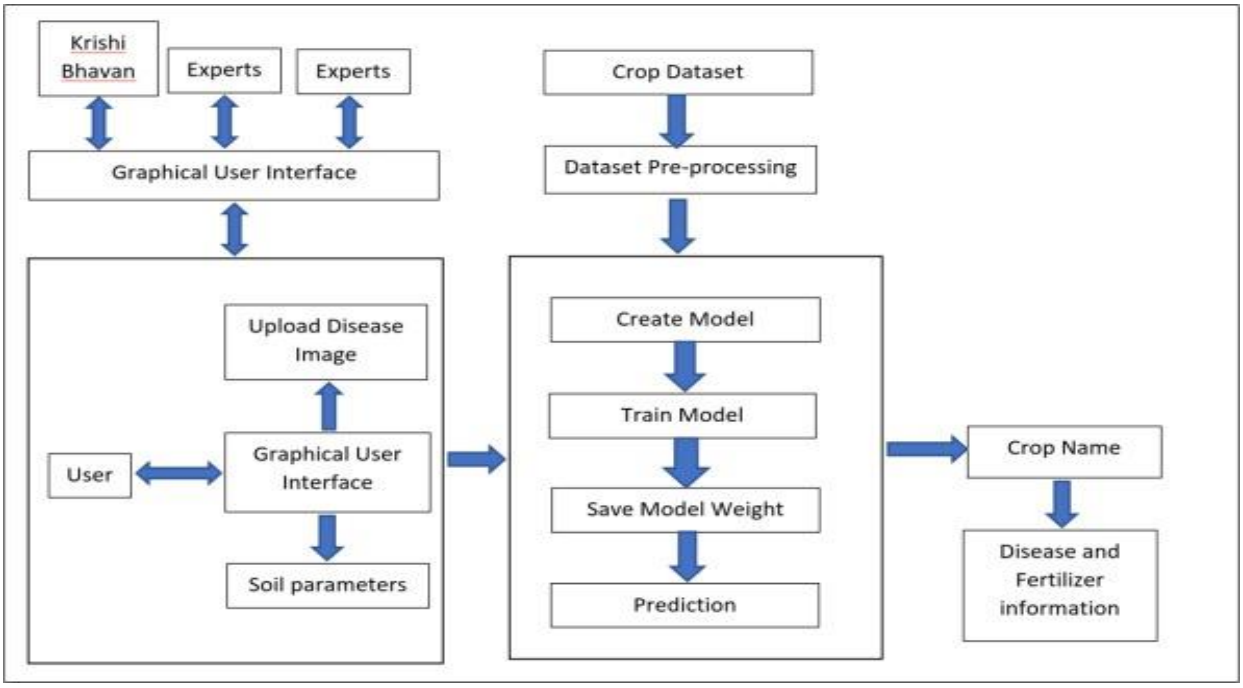

Fig 1. Proposed system

System Architecture

A formal explanation of a system is provided by an architectural explanation, which is arranged to support reasoning regarding the system's structure, individual components' properties that can be observed from the outside, and the interactions between them. It also offers a framework from which systems can be developed and products acquired that will cooperate to implement the system as a whole.

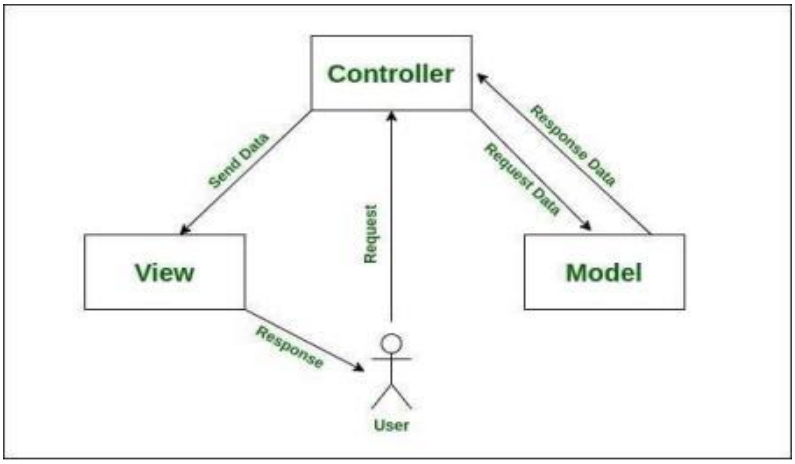

Fig 2. System Architecture

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IV. RESULT AND DISCUSSION

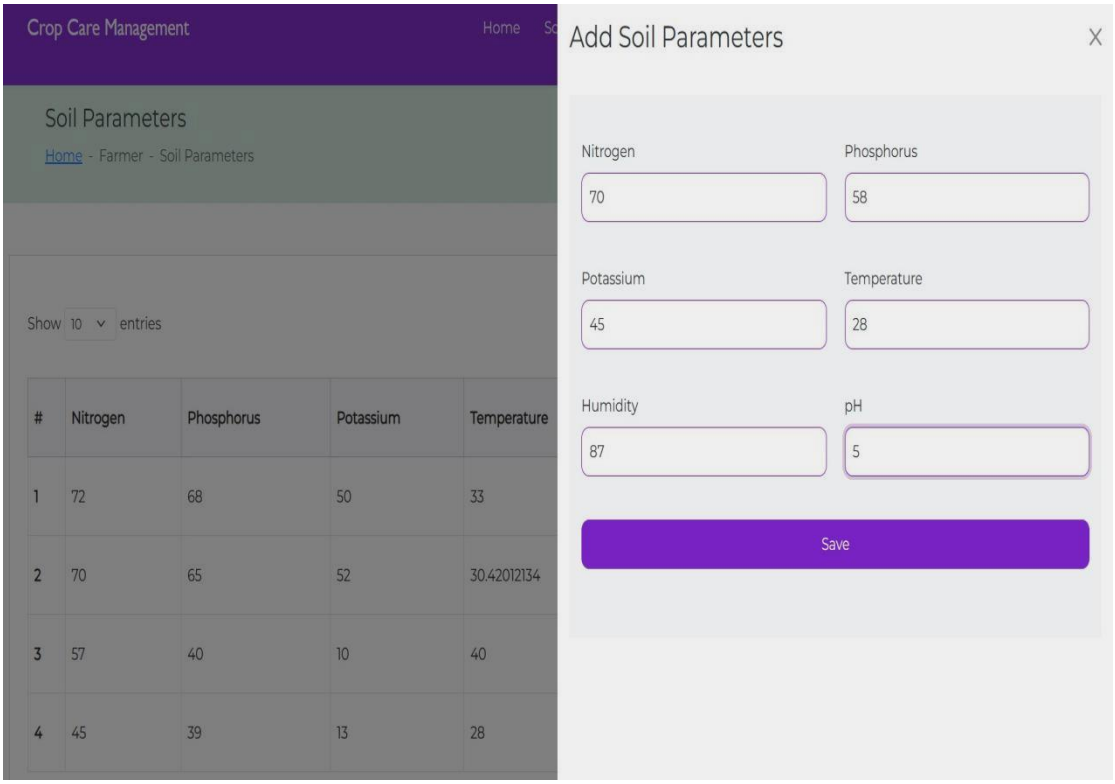

Fig 3: Add soil parameters

Farmer enters the soil parameters so that they can predict which crop to be grown in particular field.

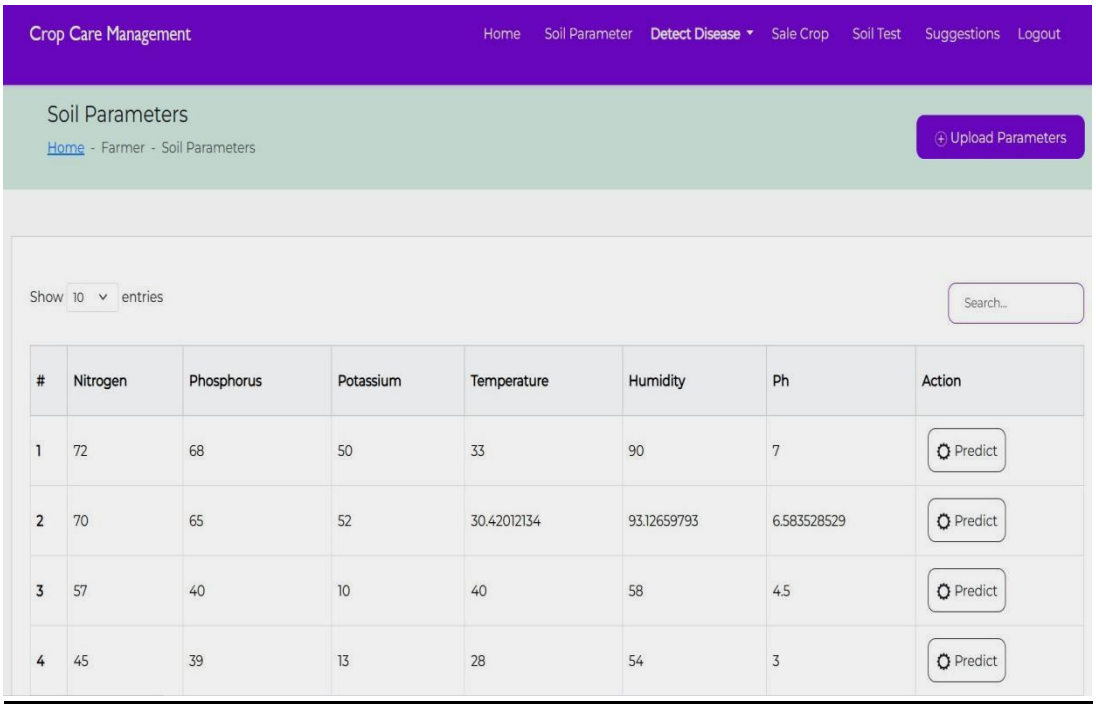

Fig 4: Soil parameter page

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Farmer predict the soil details and get the result.

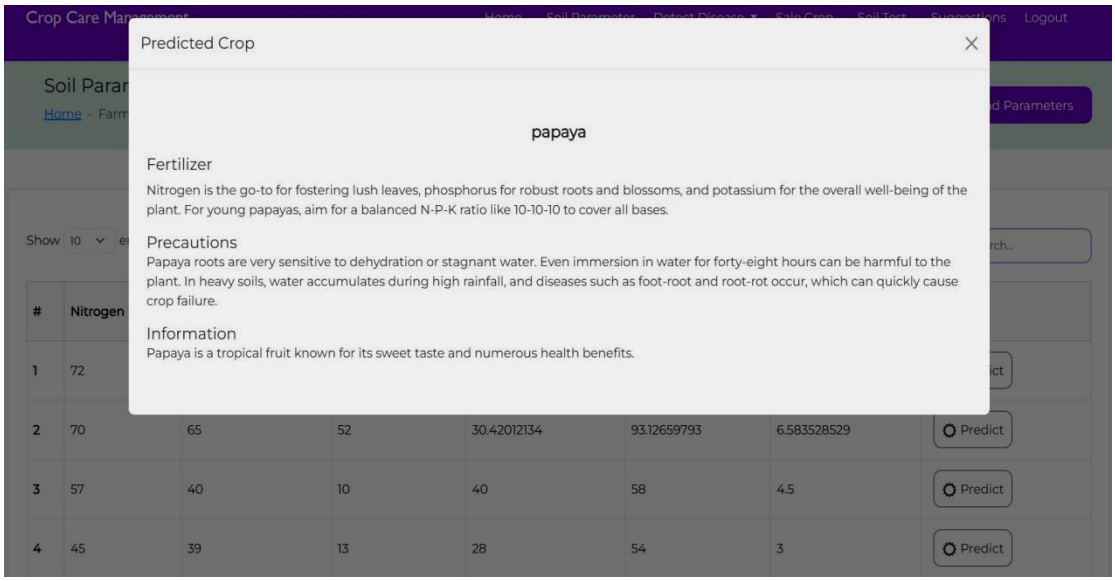

Fig 5: Soil Prediction result page

After adding the parameter farmer get the crop result.

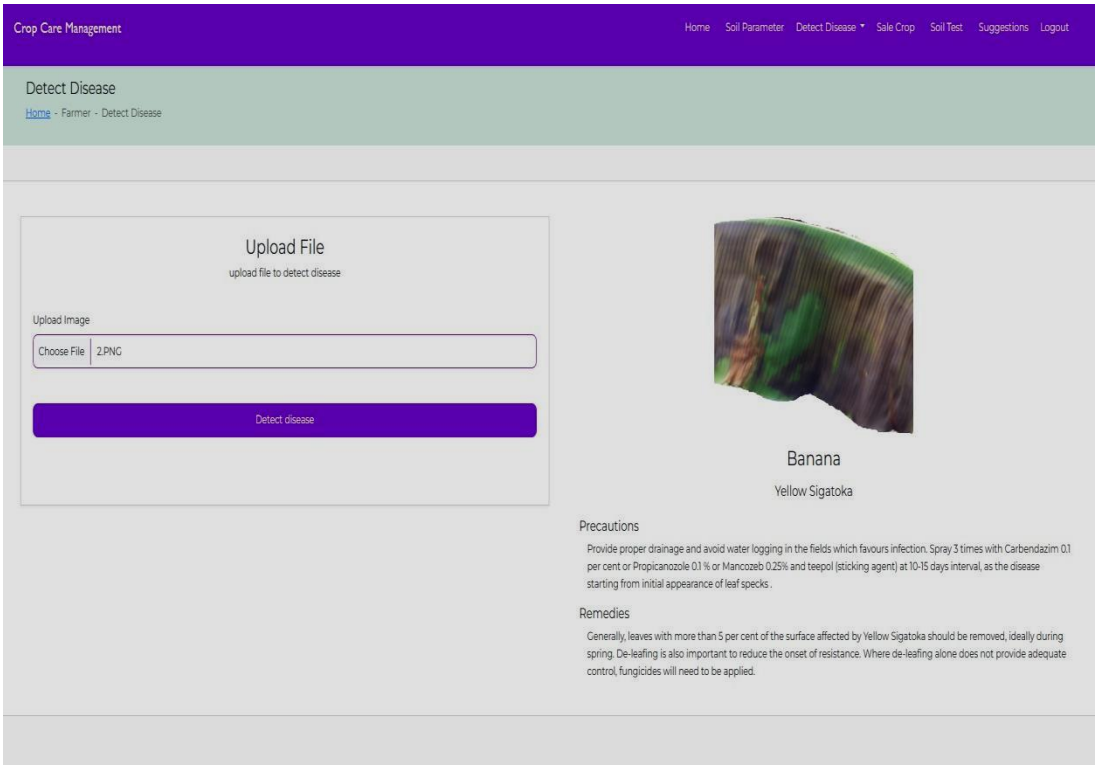

Fig 6: Disease Detection page

Farmer upload diseased plant image so that they can predict the plant disease.

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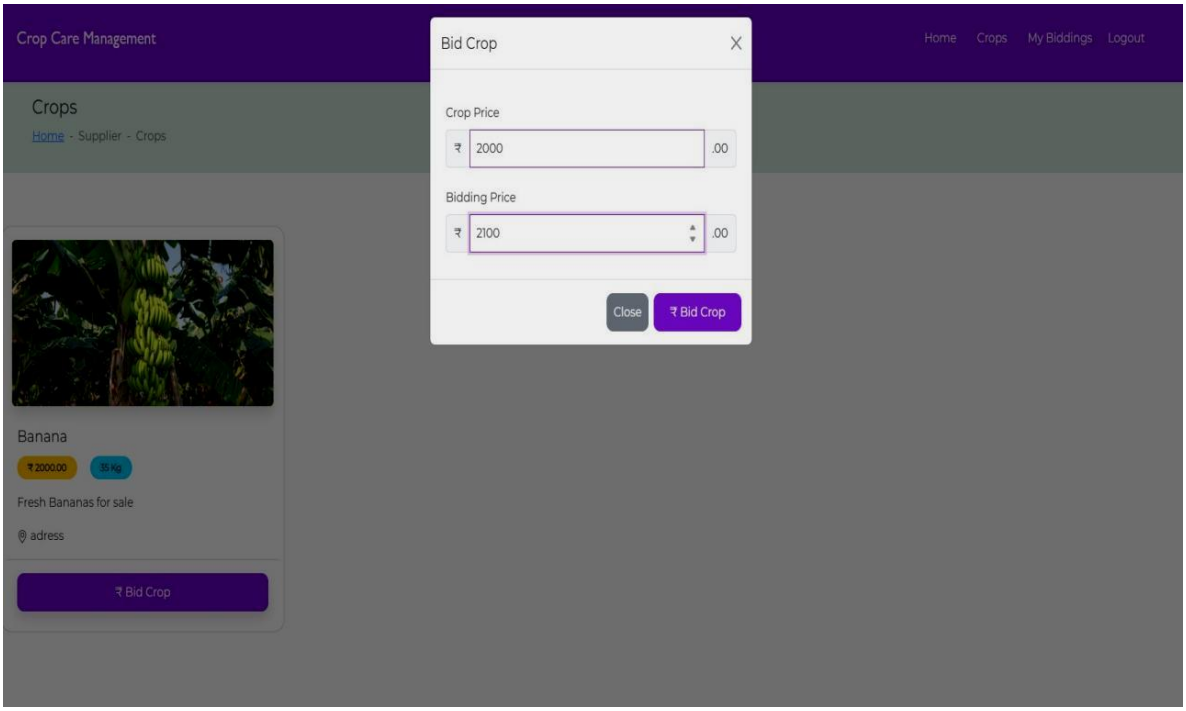

Fig 7: Crop Bidding Page

Supplier bid for the crop in this page and buy the crop.

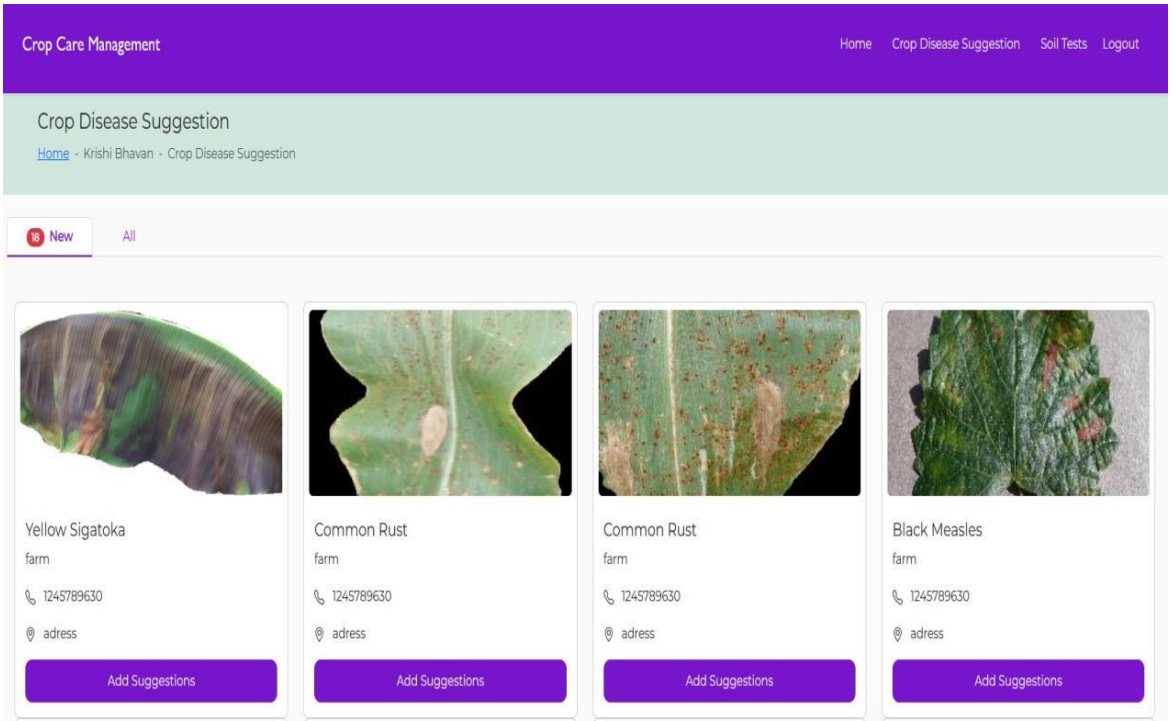

Fig 8: Crop Disease Suggestion

After detecting the crop disease, Krishi bhavan organization will suggest the remedy for the disease.

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V. CONCLUSION

To sum up, "Crop Care" is a bright light in the agricultural world, providing a revolutionary answer to the numerous problems that farmers encounter. Our online application gives farmers the knowledge and insights they need to make wise decisions and get past challenges like insect infestations, unstable weather patterns, and degrading soil by fusing machine learning with real-time data. Crop Care transforms agricultural methods by boosting efficiency and sustainability with customized crop suggestions, fertilization advice, and quick disease diagnosis. By taking a proactive stance when it comes to crop health management, we open the door for a day when digital innovation and precision agriculture will combine to provide abundant harvests and food security. Let's go out on this path to more environmentally responsible and intelligent agriculture together.

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