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# Crop Recommendation with Crop Price and Yield Prediction Using Machine Learning

Prof. Emmanuel R, Chandan R, Akash R M, Bhavanam Varun Kumar Reddy, Tejaswini P

Associate Professor of ISE, R R Institute of Technology, Bengaluru, India

UGstudents, Dept of ISE, RRIT, Visvesvaraya Technological University (VTU), Bengaluru, India

**ABSTRACT:** This Project is an attempt to minimize the losses occurs in Agriculture field due to Climate and Environmental changes which leads to inappropriate selection of crop to grow on land. Crop recommendation and yield prediction is an important of agriculture that helps farmers make informed decisions about their crops. The agriculture sector provides a major contribution to the country's Gross Domestic Product (GDP). Due to the less yield and low price for the grown crop is one of the possible causes for a higher suicide rate among marginal farmers in India. This paper proposes a user-friendly yield prediction and recommendation system for the farmers. The proposed system provides connectivity to farmers via a web application. It involves estimating the number of crops that will be produced in a given area based on various factors such as soil type, weather conditions, and crop management practices. In recent times, machine learning (ML) has emerged as a powerful tool for predicting crop yields. Machine learning is a branch of artificial intelligence (AI) that allows computers to learn from data without being explicitly programmed. This makes it ideal for crop yield prediction because it can identify patterns and relationships in large amounts of data and make predictions based on these relationships. Machine learning algorithms allow choosing the most profitable crop list or predicting the crop yield for a user-selected crop. To predict the crop yield, selected Machine Learning algorithms such as Support Vector Machine (SVM), Artificial Neural Network (ANN), Random Forest (RF), Multivariate Linear Regression (MLR), and K-Nearest Neighbour (KNN) are used.

## I. INTRODUCTION

Since ancient times, agriculture is considered to be the main and foremost culture practiced in India. Due to rich invention, people focus on growing hybrid products where it leads to unhealthy life. Nowadays, modern people do not have awareness about growing crops at right time and right place. These farming techniques also change seasonal climatic conditions against essential assets such as land, water and air, leading to food insecurity. Machine learning learns an algorithm based on supervised, unsupervised and reinforcement learning, each with its own importance and limitations.

Data analysis is the process of reviewing, cleaning, modeling data to discover useful information and conclusions. It is the process of analyzing, extracting and predicting meaningful information from huge data to extract a certain pattern. Most farmers relied on their long-term experience in the field with specific crops to expect a higher yield in the next harvest season, but still the price of the crops is not worth it. It is mostly caused by improper irrigation or inappropriate crop selection.

Agricultural researchers insist on the need for an efficient mechanism to predict and improve crop growth. The amount of crop yield depends mainly on parameters such as crop variety, seed type and environmental parameters such as sunlight (temperature), soil (ph), water (ph), rainfall and humidity. By analyzing the soil and atmosphere in a particular region, the best crop can be recommended so that higher crop yield can be

achieved and the net crop yield can be predicted. This forecast will help farmers to select suitable crops for their farm based on soil type, temperature, humidity, water level, soil PH, season, fertilizer and months.

Estimating crop yield is a difficult task as it is affected by various factors such as genetic potential of the crop cultivar, soil, weather, cultivation practices (sowing date, amount of irrigation and fertilizers etc.) and biotic stress. a way of transferring information from traditional farmers to educated farmers. To obtain estimates of aggregated physical

production functions for yields of various crops in specified states considering various technological factors and a newly developed weather index as inputs.

## II. RELATED WORK

**[1] Lstm Based Crop Price Prediction System (2021):** The procedure is used to predict the expense of rare crops using elements such as the place and tentative sowing date. Two approaches were compared one is using machine learning algorithms, the second one is a hybrid sequential modeling approach. In this analysis aspects like Area gathered, the result of a crop, and time-series data of one-time cost of produce and crop season are taken into consideration. Following datasets, one is having time-series data of crop, area, and crop production taken from data.gov.in and another time-series data of crop and past prices from agmarknet.gov.in are used. Both datasets are merged based on crop names, year, and month. the Data was checked for any kind of correlation and the parameters that had less correlation were removed.

**2.Cluster Prediction and Forecasting System using Supervised Machine Learning Algorithms :** This method used in the system is the deceleration of the decision tree which is a way of minimizing machine learning. The parameters considered in the forecast are: - rainfall, wholesale price indicators (minimum support [MSP], farming costs, planting costs, etc.). Accurate forecasting of crop prices; is important in crop production management. Such forecasting will also help affiliated industries that rely on agriculture to find raw materials to strategize for their business. With the benefits of this app, farmers get an early forecast that allows them to maximize their profits and prevent major losses. Which will also increase the country's economy.

**3. A Comprehensive Review of Crop Yield Prediction Using Machine Learning Approaches With Special Emphasis on Palm Oil Yield Prediction :** . Crop yield predictions are carried out to estimate higher crop yield through the use of machine learning algorithms which are one of the challenging issues in the agricultural sector. Due to this developing significance of crop yield prediction,

The potential solutions are additionally prescribed in order to alleviate existing problems in crop yield prediction. Since one of the major objectives of this study is to explore the future perspectives of machine learning-based palm oil yield prediction, the areas including application of remote sensing, plant's growth and disease recognition, mapping and tree counting, optimum features and algorithms have been broadly discussed. Finally, a prospective architecture of machine learning-based palm oil yield prediction has been proposed based on the critical evaluation of existing related studies

**4 Crop-yield and Price Forecasting using Machine Learning(2020):** The suggested model has been materialized to support agriculturalists create more profitable decisions concerning which harvest is most appropriate during his expected duration of sowing and the surroundings. This procedure indicates the product and expense of the produce of preference, delivering the agriculturalist valuable knowledge satisfactorily before beginning the process of cultivation. Many guessing algorithms can be used to generate yield and price estimates such as SVM, decision trees, Neural networks, etc.This representative uses the Decision Tree. It is trained in a few ragi plants (such as paddy, arhar, bhajan, barley, etc.), and Kharif brings logical precision. In order to provide a sustainable livelihood to growing populations, agronomists need to increase the supply of food in the current farming environment to avoid deforestation.

**5. ] The Crop Price Prediction System uses a machine-learning algorithm (2020):** The main purpose is to show the yield payment for the following method. The task to be done is to find relevant data models aimed at achieving high and standard accuracy in estimating crop values. To solve this problem, different Data Mining strategies are tested with different data sets. This paper proposes a system that uses data analysis techniques to predict crop prices. This will give farmers an idea of what the future price of the crop will be. The design promotes the creation of configurations by combining data from mixed assumptions, data analysis, and advanced analysis that can help report the cost of crop marks and increase revenue for agricultural exports.

## III. METHODOLOGY

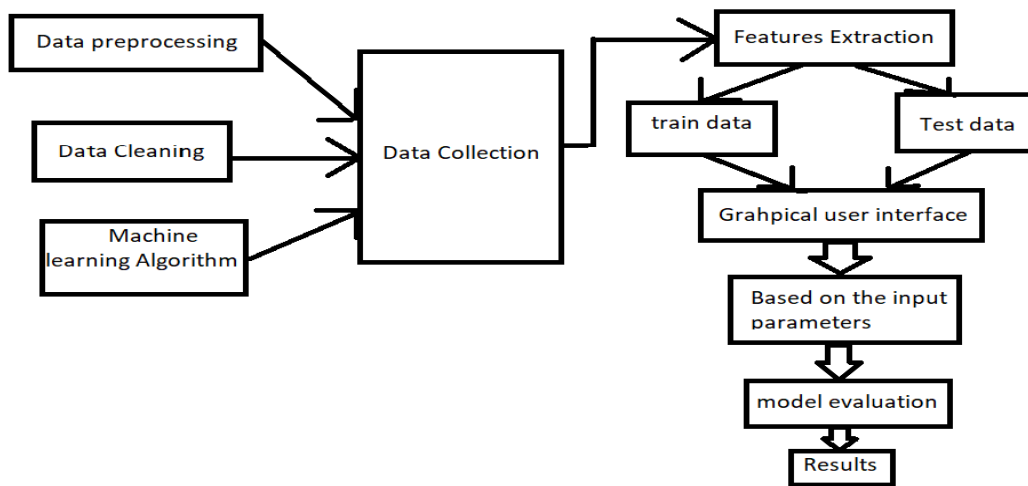
This is a Crop yield Prediction system which is built with the help of Machine learning, where the data is accessed to do comparison and data analysis of collected data with the possible historical data collected based on region, climate,

soil parameters by applying different machine learning algorithms we get the Predicted results through web application.

Methodology is the specific procedures or techniques used to identify, select, process, and analyze information about a topic. In a research paper, the methodology section allows the reader to critically evaluate a study's overall validity and reliability.

The method section of a report details how the research was conducted, the research methods used and the reasons for choosing those methods. It should outline: the participants and research methods used, e.g. surveys/questionnaire, interviews. refer to other relevant studies.

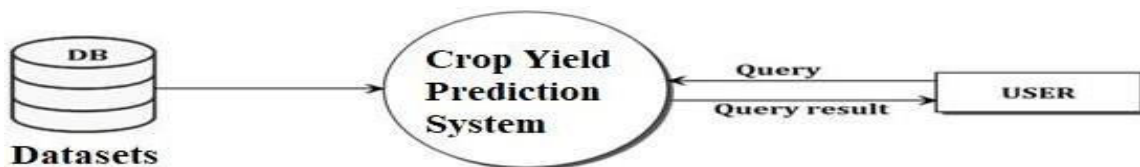
**Block diagram**



**Fig . Block Diagram of Proposed System**

**DATA COLLECTION**

In this module datasets are collected from various sources like APMC, agmarknet.gov.in and India Metrological Department (IMD). The datasets include information like temperature, rainfall, price, area, production and yield of the previous years .

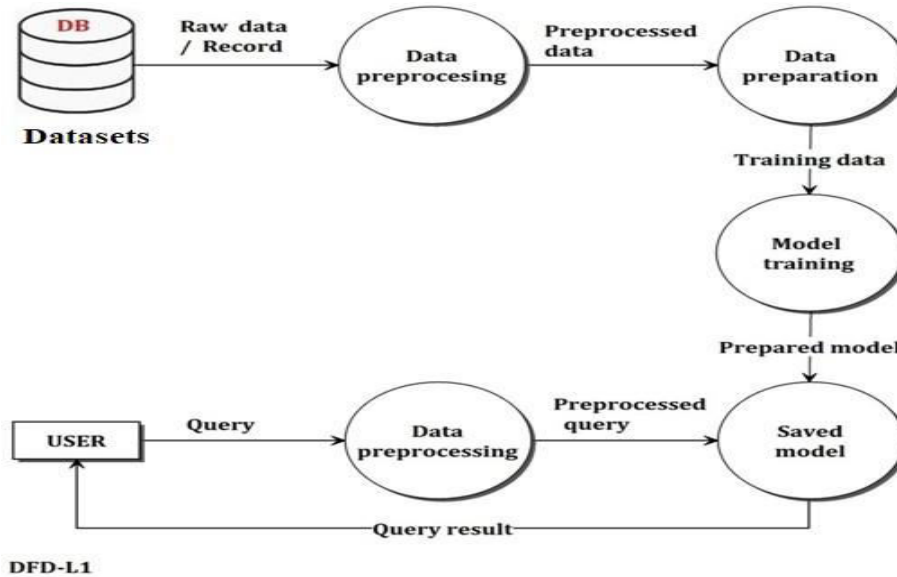


Data collection Diagram

DFD-LO

**DATA PRE-PROCESSING**

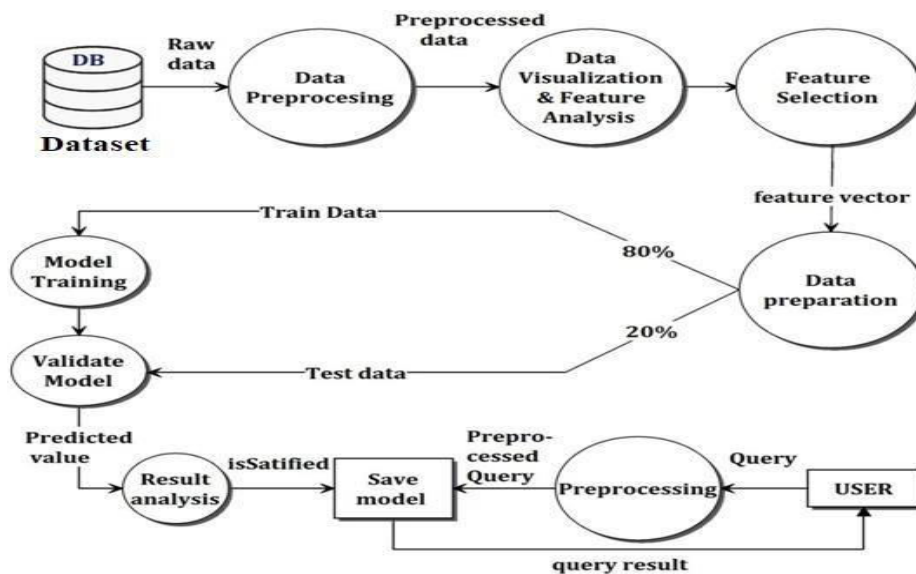
Data pre-processing includes removing of the unwanted attributes from the datasets. Feature extraction is done in order to extract only the attributes that affect the price and yield of a crop like rainfall, temperature, location, area, production and yield.



Dataflow Diagram of Pre-Processing

**ANALYSIS AND PREDICTION**

In this module, patterns in data is recognized, percentage correlation between various factors affecting crop yield and price are determined. Various data visualization techniques are used to study the patterns in data and factors causing change. Algorithms like Multiple Linear Regression and Random Forest are used to predict crop yield and price. The accuracy of these algorithms are compared using mean absolute percentage error thus helping us determine the most suitable approach for prediction.





#### IV. RESULTS

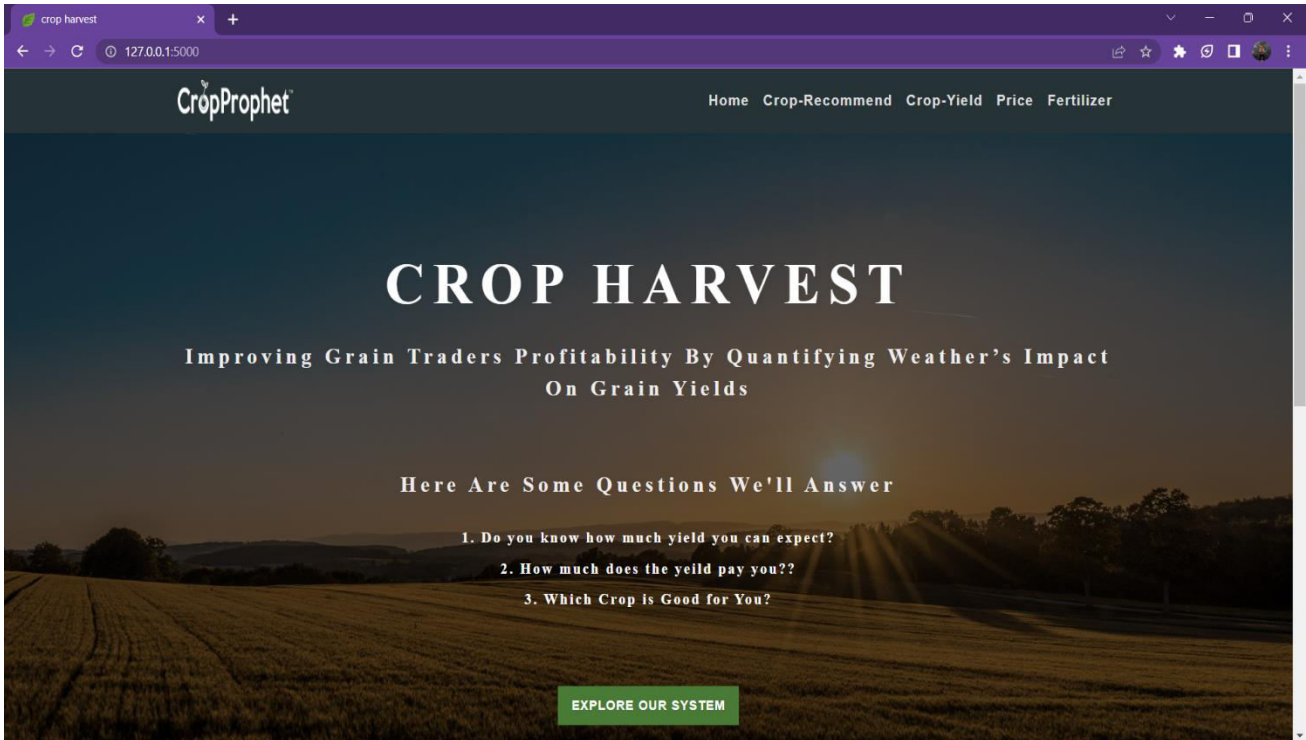


Fig 1 : Home screen Page

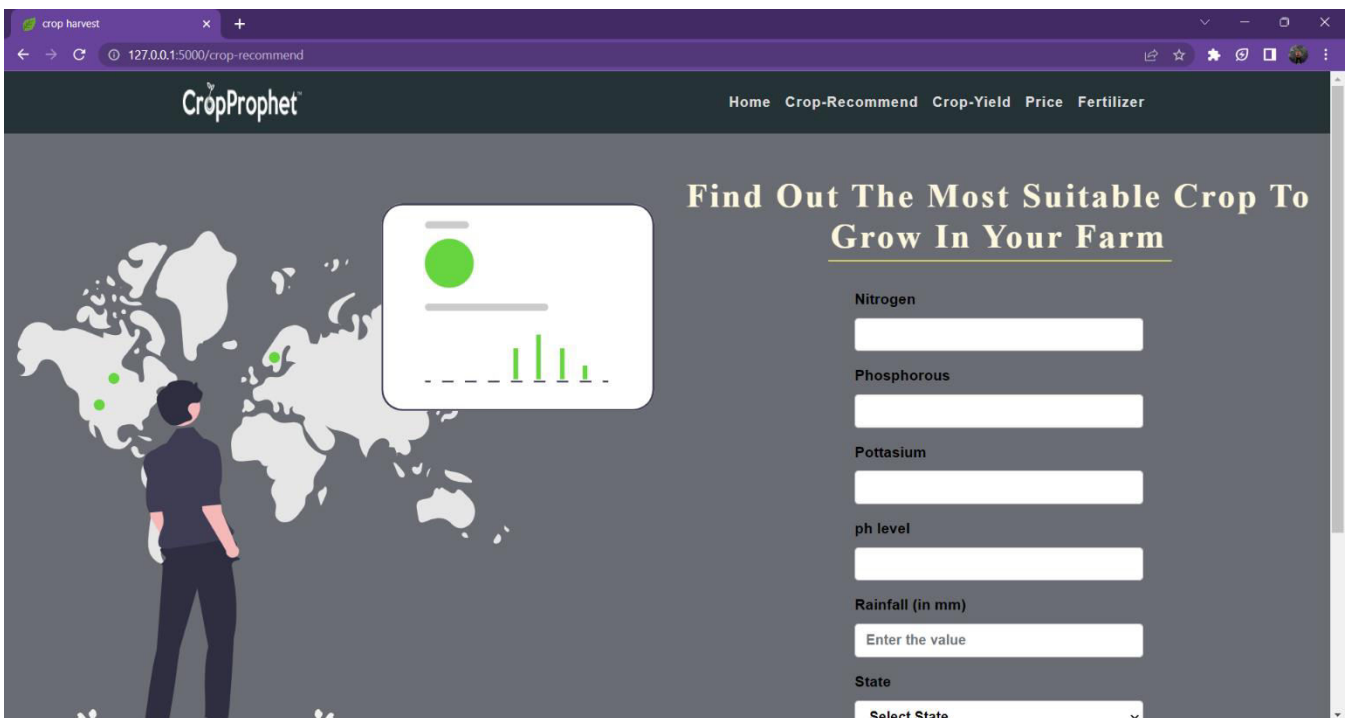


Fig 2 : Crop Recommend

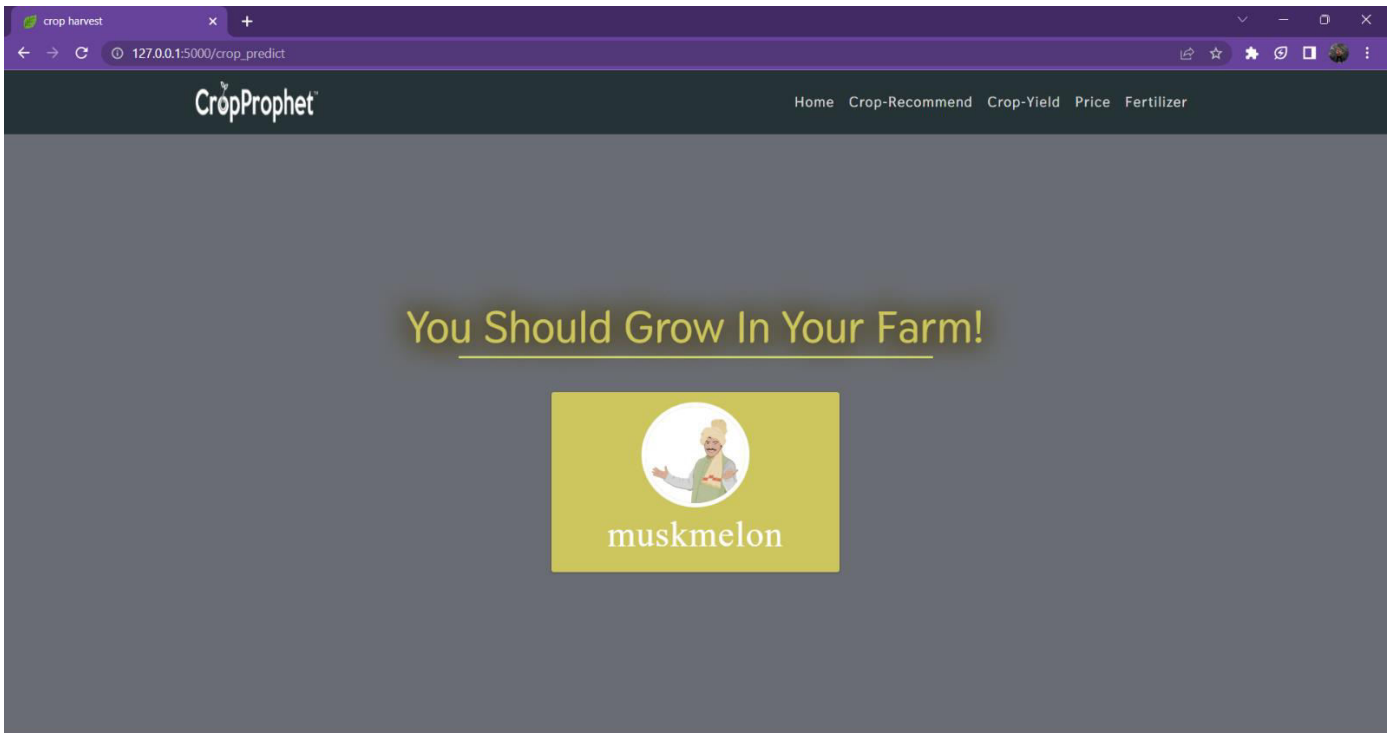


Fig 3 : Result of Crop Recommend

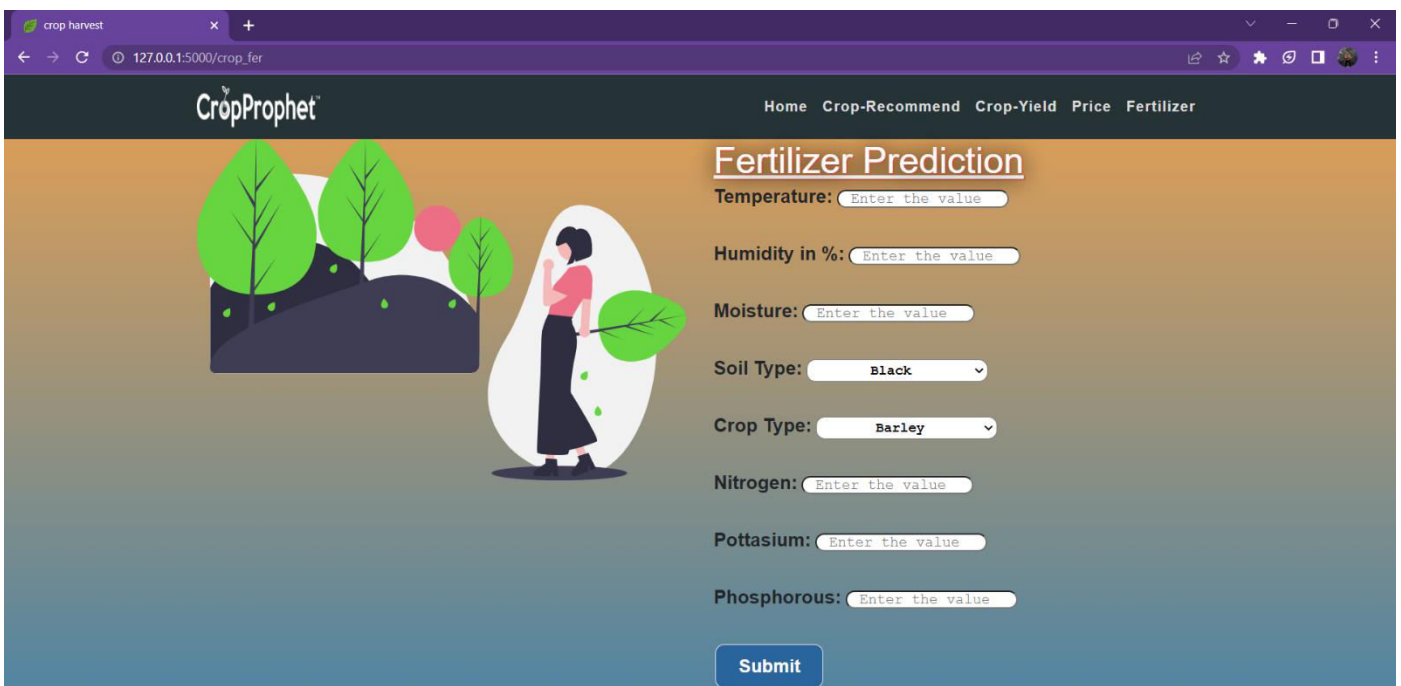
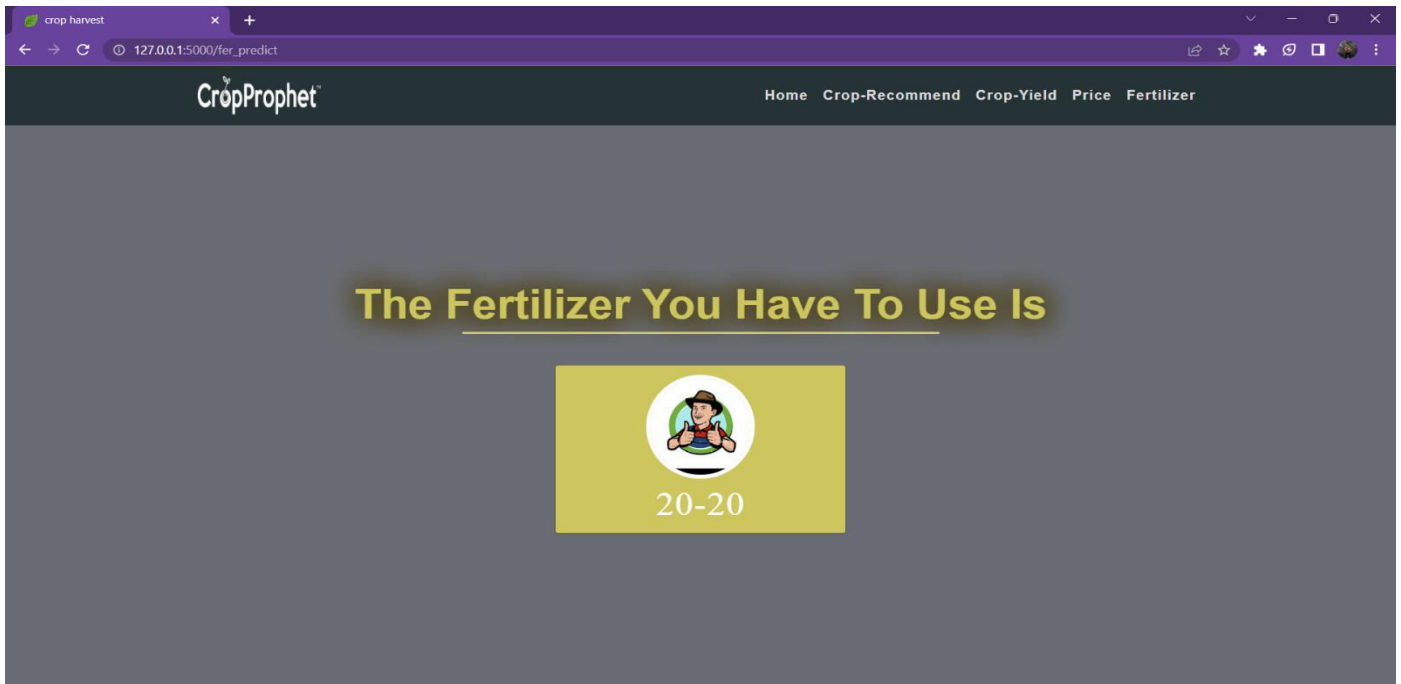


Fig 4 : Fertilizer Prediction





**Fig 5 : Result of Fertilizer Prediction**

## V. CONCLUSION

This project is done using machine learning and evaluates the performance using random forest and backpropagation. In our proposed model, out of all the two algorithms, Random Forest provides better yield prediction compared to other algorithms. Together with the random forest structure, the Back Propagation model classifies the output that shows improvement in the dataset. Thus, we analyzed that the proposed model has more efficiency than the existing model for crop yield detection. Implementation of the above mentioned system would help in better cultivation of agricultural practices of our country. Further, it can be used to reduce losses faced by farmers and improve crop yield to get better capital in agriculture. The model can be improved by integrating it with other departments like horticulture, sericulture and others towards the agricultural development of our country.

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