

## ABSTRACT

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The Agricultural Portal is an innovative platform designed to improve crop production by providing farmers with easy access to agricultural information, resources, and tools. The portal offers a wide range of features including weather forecasts, pest and disease management tips, soil health assessment, crop planning tools, and market prices. This technical paper outlines the development and implementation of the Agricultural Portal, highlighting its features and functionalities. The paper also explores the benefits of the portal for farmers, including increased productivity, improved decision-making, and enhanced profitability. The portal is built on a robust technology platform that is scalable and adaptable to the needs of farmers of different sizes and geographies. It is designed to be user-friendly and accessible on multiple devices, including mobile phones and tablets. The Agricultural Portal represents a significant step forward in the use of technology in agriculture. By providing farmers with easy access to information and resources, it has the potential to transform the way they farm and improve crop production across the globe.

Keywords-Agricultural portal, crop production, farmers, user friendly.

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# INTRODUCTION

## 1.1 Background

Agriculture is the backbone of any country, and it has become the most significant growing sector all over the world because of increasing the population. About 60% of our country's population works in agriculture which contributes more to our country's GDP and employment. The main challenge in the agriculture industry is to improve farming efficiency and quality to fulfill the speedily increasing demand for food. Apart from the mounting population, the climate circumstance is also a huge challenge in the agricultural industry. In our project, we will make use of ML algorithms to assist farmers to know future crop yield predictions and favorable weather predictions. It also assists the farmers to sell the crops directly to the customers.

## 1.2 Overview

### A. Basic Concepts

An agricultural portal is an online platform that provides access to a variety of resources and services to farmers and other stakeholders in the agriculture industry. The main objective of such a portal is to help farmers improve their crop production and profitability by providing them with information, tools, and services that can help them make informed decisions and adopt best practices. Some of the basic concepts that are central to an agricultural portal for better crop production include:

Market Intelligence: This refers to the information that farmers need to make informed decisions about when to sell their crops and at what price. Agricultural portals provide farmers with access to real-time market information that can help them get the best possible.

Weather data: Farmers must be able to plan their planting and harvesting schedules in accordance with the weather as it is so important to agriculture. Agricultural portals give farmers access to weather alerts and forecasts, which can aid them in making decisions regarding pest control, irrigation, and other tasks. exemplary practices.

Best Practices: Farmers must stay current on the most recent best practices and procedures because agriculture is a complicated and ever-evolving industry. It gives farmers access to a variety of tools and materials that can assist them advance their agricultural methods.

## **B. Proposed System**

The suggested system is a web application built using HTML and Bootstrap4 that allows farmersto sell their products directly to consumers without the use of a middleman. The process aids in product development and testing. When working on the front end, we are concerned with how itappears. After creating it, we test it and discuss what to do next and how it can be made better. In order to give farmers and customers quick access to important data and tools that can aid in better decision-making, increased production, and improved livelihoods, we have developed an online platform.

### **1.3 Machine Learning Algorithms**

For our project, we are using various kinds of Machine learning algorithms. They are Decision Tree, Naive Bayes Gaussian, K Nearest Neighbor, and Random Forest. Decision tree gives the highest accuracy of all.

## **LITERATURE REVIEW**

[1] According to analysis, the most used features are temperature, rainfall, and soil type, and the most applied algorithm is Artificial Neural Networks in these models. The author used parameters like State, district, season, and area. The user can predict the yield of the crop in which year the user wants. The paper uses advanced regression techniques like Kernel Ridge, and Lasso to predict the yield and uses the concept of Stacking Regression for enhancing the algorithms to give a better prediction.

[2] In this paper, the author says, yield prediction was performed by considering farmers' experience on a particular field and crop. Different Data Mining techniques are used and evaluated in agriculture for estimating the future year's crop production. This is achieved by applying association rule mining on agriculture data. This research focuses on the creation of a prediction model which may be used for future prediction of crop yield. This paper presents a brief analysis of crop yield prediction using a data mining technique based on association rules for the selected region.

[3] The author describes how the old farming data can be utilized to depict the future expectation of harvests and yield. It likewise proposes to the ranchers what kind of yield can be developed utilizing the climate station data and gives the appropriate data to incline toward the precise season for cultivating. The curse on the harvest yield is broken down by utilizing different ecological elements and Regression Analysis (RA), Linear Regression (LR) Algorithms utilizing the various data mining strategies how to improve harvest production.

[4] This paper uses machine learning algorithms, direct relapse demonstrated from insights, and two enhancement techniques, the Normal condition strategy, and the Gradient plunge technique to anticipate the weather based on a couple of parameters. this work utilizes the ordinary condition model's speculation and contrasts it and the angle plunge model to give a superior thought of the productivity of the models. This paper is about the use of machine learning

## Farmer's Assistance Portal for Better Crop Production

algorithms, direct relapse demonstrates from inside, and two enhancement techniques.

[5] We describe an approach to yield modeling that uses a semiparametric variant of a deep neural network, which can simultaneously account for complex nonlinear relationships in high-dimensional datasets, as well as the known parametric structure and unobserved cross-sectional heterogeneity. We show that this approach outperforms both classical statistical methods and fully nonparametric neural networks in predicting the yields of years withheld during model training. Our approach is less pessimistic in the warmest regions and the warmest scenarios.

[6] This paper predicts the yield of almost all kinds of crops that are planted in India. This script makes novel by the usage of simple parameters like State, district, season, area and the user can predict the yield of the crop in which year he or she wants to. The paper uses advanced regression techniques like Kernel Ridge, Lasso, and ENet algorithms to predict the yield and uses the concept of Stacking Regression for enhancing the algorithms to give a better prediction.

[7] In this paper, we can predict the things like rainy, windy, sunny, stormy, floods and variations in temperature, etc. Nowadays, the weather is making a bad impact, as society is growing more and more, causing much damage, injury, and loss of life for farmers. Weather forecasting is very important for agriculture and terrace gardening. Weather forecasting will help remote areas for better crop production. In this paper, a low-cost solution for weather forecast prediction is discussed.

[8] This paper uses algorithms such as Random Forest, Support Vector Machine, Weather, and K Nearest neighbor, which are used for better performance results for each selected weather parameter. We also use soil and weather parameters such as soil type, soil fertility, maximum temperature, minimum temperature, and rainfall are used to identify suitable crops for specified farms or land. Ethiopia consolidates both remotely detected information (RSD) and agrarian overview information for a considerable beneficiary of specially appointed imported nourishment help.



## **REQUIREMENT SPECIFICATION**

### **3.1 Functional Requirements**

#### **1. Farmer should be able to:**

- Get recommendations for crop and fertilizers.
  - Under the recommendation option, crop recommendation and fertilizer recommendation will tell which crop to be grown and which fertilizer to be used.
- Get predictions for crop, yield, and rainfall.
  - Under the prediction option, crop prediction will predict the crop to be grown, yield prediction will predict the yield of the crop, and rainfall prediction will predict the rainfall for that area in millimeters.
- Do trading.
  - The farmer will be able to trade crops, check the crop stocks and see the selling history.
- Able to access additional tools.
  - This consists of a chatbot, news feed, and weather forecast which will help the farmer.

#### **2. Customer should be able to:**

- Check crop stocks.
  - Stock for each crop is visible to the customer so that he can buy accordingly.
- Buy crops.
  - The customer can select the crop and the quantity needed and buy it online.

#### **3. Admin should be able to:**

- See the customer's list.
  - A list of all the registered customers is visible to the admin.
- See the farmer's list.
  - A list of all the registered customers is visible to the admin.
- See the queries.
  - A list of all the queries is visible to the admin to answer them.

## **3.2 Non-Functional Requirements**

### **3.2.1 Performance requirements**

Response time should be minimum. The application should be responsive.

### **3.2.2 Security requirements**

User information should be kept secure. Unauthorized users should not be able to access the data. OTP-based authentication is provided to register through a mobile number.

### **3.2.3 Usability requirements**

The interface should be user-friendly. The application environment should be easy to use. It should be adaptable to all kinds of platforms.

### **3.2.4 Reliability requirements**

The system should behave consistently in a user-acceptable manner when operating within the environment for which the system is intended.

## **3.3 Software Requirement**

- Operating system: Windows 10 or above.
- Browser: Chrome.
- Other softwares: Visual studio code, XAMPP, PyCharm, Postman, Jupyter notebook.
- Frontend: HTML5, CSS3, JavaScript, Bootstrap4, jQuery.
- Database: MySQL.
- Backend: Apache, php.

## **3.4 Hardware Requirement**

- Processor speed: 2.50GHz-2.71GHz.
- RAM size: 512MB and above.
- User Interface: Mouse and Keyboard.
- Storage Capacity: 1GB (minimum).

## **SYSTEM DESIGN**

### **4.1 Introduction to system design**

The system design controls the major structural characteristics of the system. It has a major impact on the testability and modifiability of the system, and it affects its efficiency. Much of the designing software is spent in creating the system design. In the first level of the design process, the focus is on deciding which modules are needed for the system, the specification of these modules, and how the modules should be interconnected. This is called the system design or top-level design.

The design activity begins when the requirement documents for the software to be developed is available. The goal of the design process is to produce a model or representation of the system, which can be used later to build the system. The produced model is called design of the system. A structured design is a top down approach to minimize complexity and make a problem manageable by subdividing it into smaller segments. The most creative and challenging phase of the system development of life cycle is system design. The design phase is translation from user oriented document to document oriented programmers.

### **4.2 Problem Statement of the proposed system**

Below are the problems faced by the farmers these days:

1. Weather prediction
2. Yield prediction
3. Crop selection
4. Difficulty in selling the crop at the right time to the customers.

Our project aims at minimizing these problems and looks forward to easing the activities of the farmers.

### **4.3 Objective of the application**

The objective of our project is to build a project which helps the farmers to carry out better farming. Help the farmers to predict the weather and climatic changes. To enable easy communication between the farmers and the customers for selling crops.

## 4.4 Flowchart

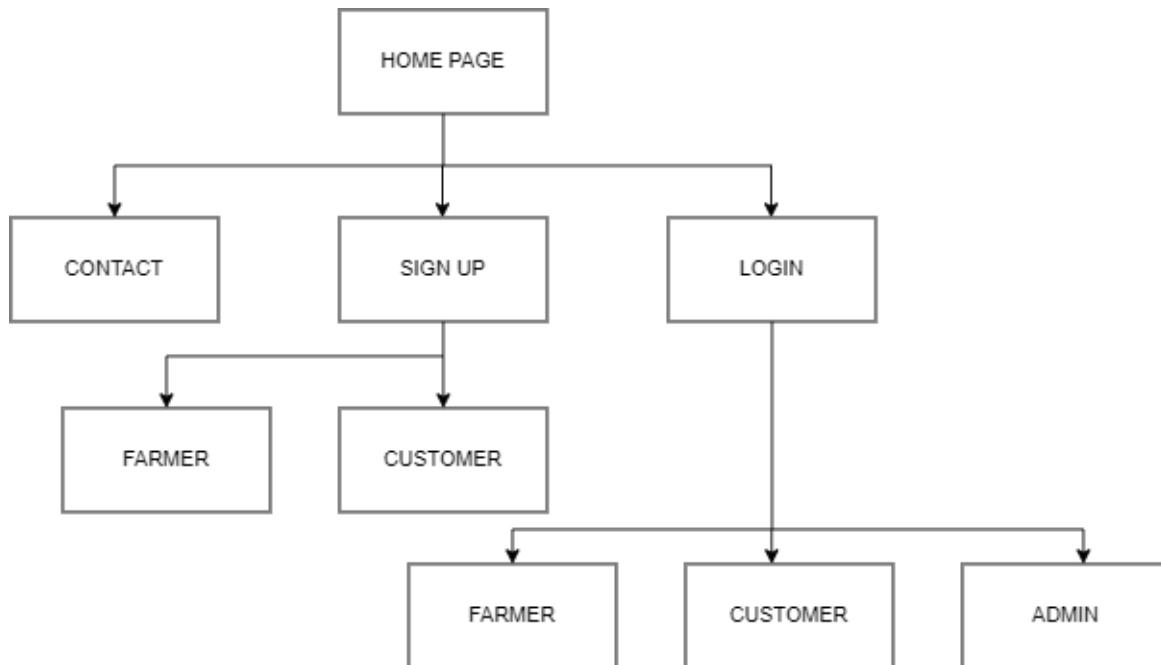


Figure 4.1 Flowchart of the portal

The above figure 4.2 is the design of our project Farmer's assistance portal for better crop production. The Farmers and customers can login to the portal and make use of various options available in their respective domain.

## 4.5 Methodology of the system

### 4.5.1 Steps in methodology

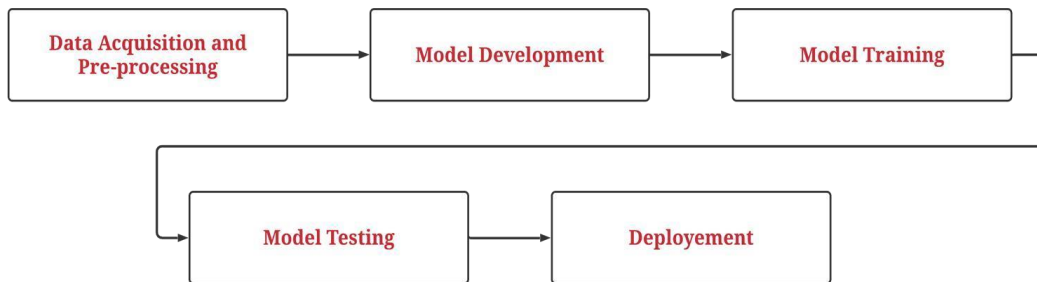


Figure 4.2 Methodology

The methodology of developing and deploying a machine learning model, which typically involves the following steps: data acquisition and preprocessing, model development, model training, model testing, and deployment.

#### 1. Data Acquisition and Preprocessing:

- Identify the problem statement and the type of data required to solve it.
- Collect the necessary data from various sources such as databases, APIs, or web scraping.
- Clean the data by removing any irrelevant or inconsistent entries, handling missing values, and dealing with outliers.
- Preprocess the data by performing tasks like normalization, feature scaling, feature engineering, and encoding categorical variables.

#### 2. Model Development:

- Choose an appropriate machine learning algorithm or a combination of algorithms based on the problem type (classification, regression, clustering, etc.) and the nature of the data.
- Split the preprocessed data into training and validation sets. The training set is used to train the model, and the validation set is used to tune its parameters and evaluate performance during development.
- Define the model architecture or structure, including the number and type of layers (in the case of neural networks) or the configuration of the algorithm.
- Set hyperparameters, such as learning rate, regularization strength, and batch size, which

control the learning process.

- Implement the model using a suitable programming language or a machine learning library/framework.

### **3. Model Training:**

- Feed the training data into the model and use an optimization algorithm (e.g., gradient descent) to update the model's parameters iteratively.
- Monitor the model's performance on the validation set during training to detect overfitting or underfitting and adjust hyperparameters accordingly.
- Continue training until the model achieves satisfactory performance on the validation set or converges to a stable state.

### **4. Model Testing:**

- Once training is complete, evaluate the trained model's performance on a separate, unseen test dataset.
- Calculate various evaluation metrics (accuracy, precision, recall, F1 score, etc.) to measure the model's performance and assess its suitability for the problem at hand.
- Analyze the model's performance and make any necessary adjustments or improvements based on the evaluation results.

### **5. Deployment:**

- Prepare the model for deployment by packaging it in a format suitable for the chosen deployment environment (e.g., a serialized model file or a containerized application).
- Integrate the model into the target system, which may involve writing code to handle input/output, data preprocessing, and interacting with other components of the system.
- Test the deployed model thoroughly to ensure it functions correctly in the production environment.
- Monitor the model's performance and collect feedback from real-world usage to continuously improve and update the model if necessary.

## 4.5.2 Methodology-preprocessing:

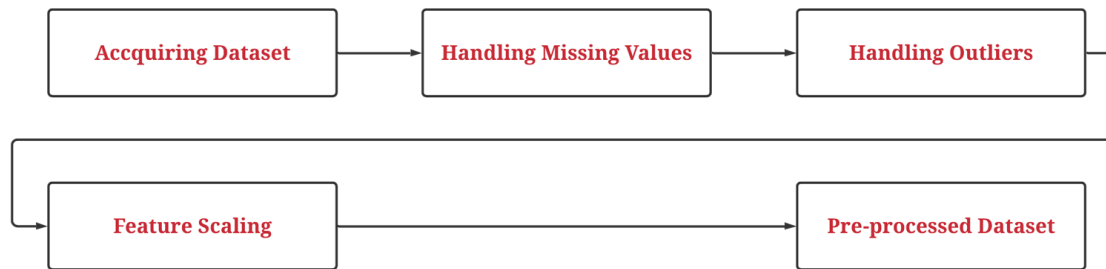


Figure 4.3 Methodology-preprocessing

The preprocessing step in machine learning involves several important tasks to prepare the data for model training. Let's break down each task:

### 1. Acquiring Dataset:

- Determine the data sources that are relevant to your problem statement.
- Gather the required data from these sources, such as databases, APIs, or web scraping.
- Ensure that the collected data is in a structured format, such as CSV, JSON, or a database table.

### 2. Handling Missing Values:

- Identify any missing values in the dataset, represented as NaN (Not a Number) or null values.
- Decide on an appropriate strategy to handle missing values based on the nature of the data and the missing data patterns.
- Some common strategies include:
  - Removing the rows or columns with missing values if they are few and the loss of information is acceptable.
  - Imputing the missing values by filling them with a statistical measure like the mean, median, or mode of the respective feature.
  - Using more advanced imputation techniques such as regression or machine learning algorithms to predict missing values.

### 3. Handling Outliers:

- Detect and handle outliers, which are data points that significantly deviate from the normal range or distribution of the dataset.

- Visualize the data using techniques like box plots or scatter plots to identify potential outliers.
- Decide on an appropriate strategy based on the nature of the data and the specific problem:
  - Removing outliers if they are due to data entry errors or measurement issues and have a significant impact on the analysis.
  - Transforming the data using techniques like log transformation or winsorization to reduce the impact of outliers.
  - Applying robust statistical techniques or algorithms that are less sensitive to outliers.

#### **4. Feature Scaling:**

- Normalize or scale the features in the dataset to ensure that they are on a similar scale and have comparable ranges.
- Common techniques for feature scaling include:
  - Standardization (Z-score normalization): Transforming the data to have zero mean and unit variance.
  - Min-max scaling: Scaling the data to a specific range, typically between 0 and 1.
  - Robust scaling: Scaling the data using statistical measures that are more resistant to outliers.
- Feature scaling is important to prevent features with larger magnitudes from dominating the learning process and to enable algorithms to converge faster.

#### **5. Preprocessed Dataset:**

- After completing the above steps, you will have a preprocessed dataset ready for model training.
- This dataset should be cleaned, with missing values handled, outliers managed, and features appropriately scaled.
- It is advisable to save the preprocessed dataset separately for future reference and to ensure consistency during model development.

### **4.5.3 Modules**

There are 3 modules in our project, farmer module, customer module and admin module.



**Farmer module:**

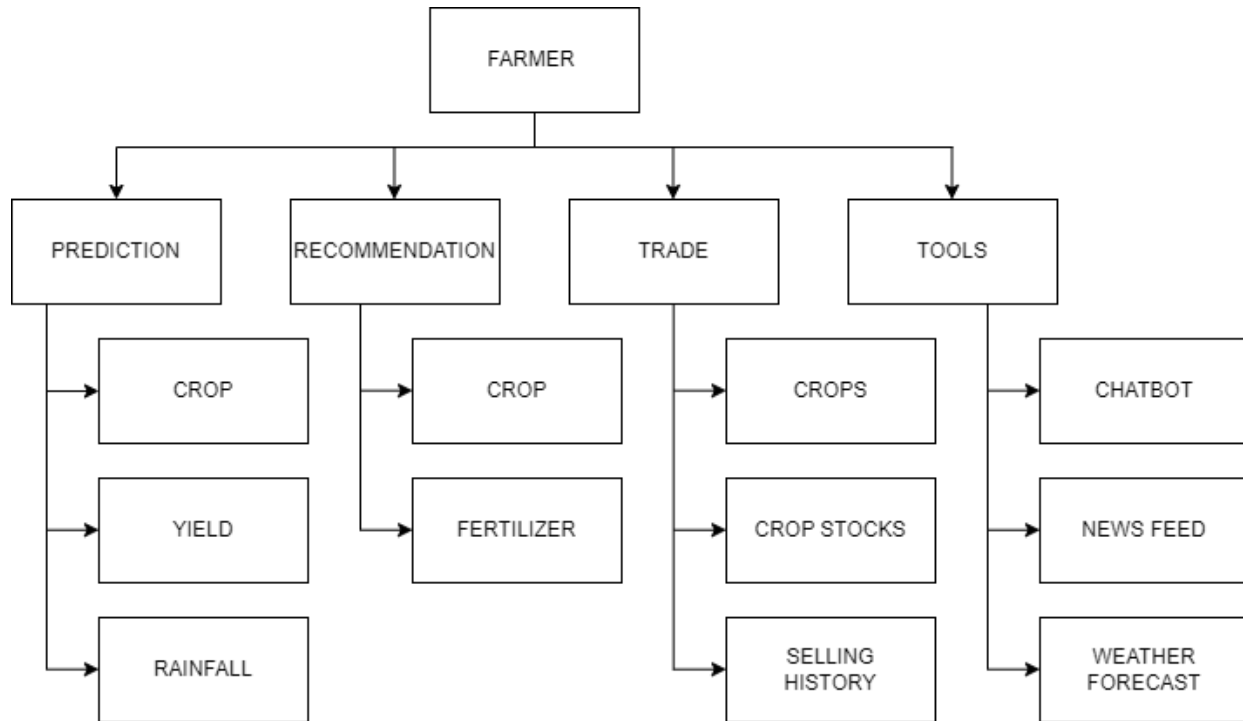


Figure 4.2 Farmer module

The above figure 4.2 is the farmer module. First the farmer has to signup/login to the portal. Later the farmer will be redirected to his/her profile. The farmer can make use of several options that are available after logging in to the portal. The various options the farmer can make use of are prediction, recommendation, trade and tools. In prediction, farmer will be getting predictions for crop, yield and rainfall. In the recommendation, the farmer will be getting recommendations about crop and fertilizers that can be used. In trade, the farmer can enter the crops that he/she wishes to sell and then the farmer can view the crop stocks. The farmer will also be having history of the sales. In tools, the farmer can make use of chatbot, news feed and weather forecast. If farmer has any queries, then he/she can clarify the doubts through chatbot. The farmer will be getting new updates related to agriculture through news feed.

**Customer module:**

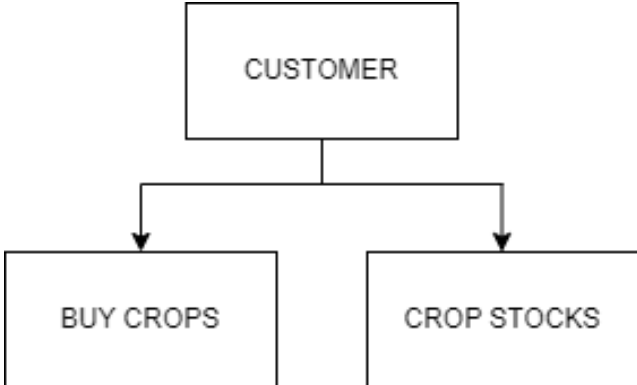


Figure 4.3: Customer module

The above figure 4.3 is the customer module. First the customer has to signup/login to the portal. Later the customer will be redirected to his/her profile. The customer can make use of several options that are available after logging in to the portal. The various options the customer can make use of are buying of crops and crop stocks. In buy crops, the customer first has to add the crop which he/she wants to buy and later the farmer has to proceed with the payment. After the successful payment, the farmer will be getting the invoice of his/her payment. In crop stocks, the farmer can see the available crops. With the help of the crop stocks the farmer can purchase the required crops.

**Admin module:**

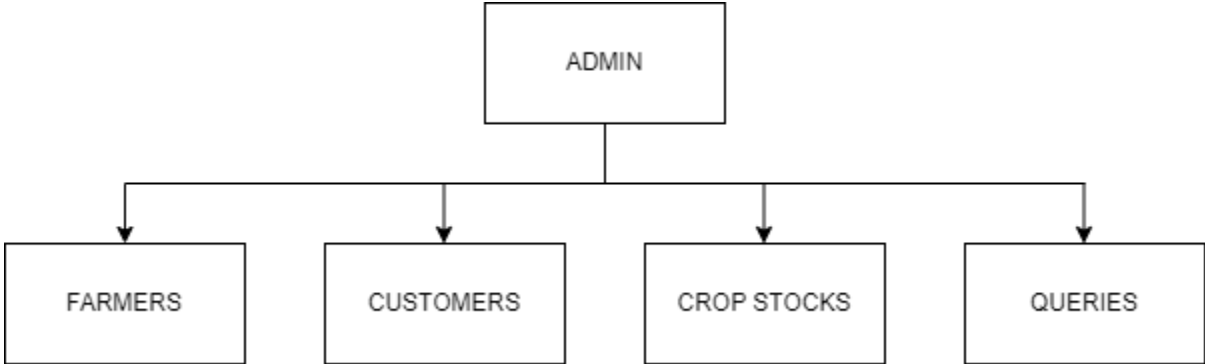


Figure 4.4: Admin module

The above figure 4.4 is the admin module. First the admin has to signup/login to the portal. Later the admin will be redirected to his/her profile. The admin can make use of several options that are available after logging in to the portal. The various options the admin can make use of are farmers list, customers list, crop stock and queries. In farmers list, the admin will be having access to the list of farmers who have registered to the portal. In customers list, the admin will be having access to the list of customers who have registered to the portal. In crop stocks, the admin can see the list of available crops which the customers can buy. In queries, the admin will be getting the queries which the user of the portal has sent through the contact us option.

## RESULTS

### Snapshots

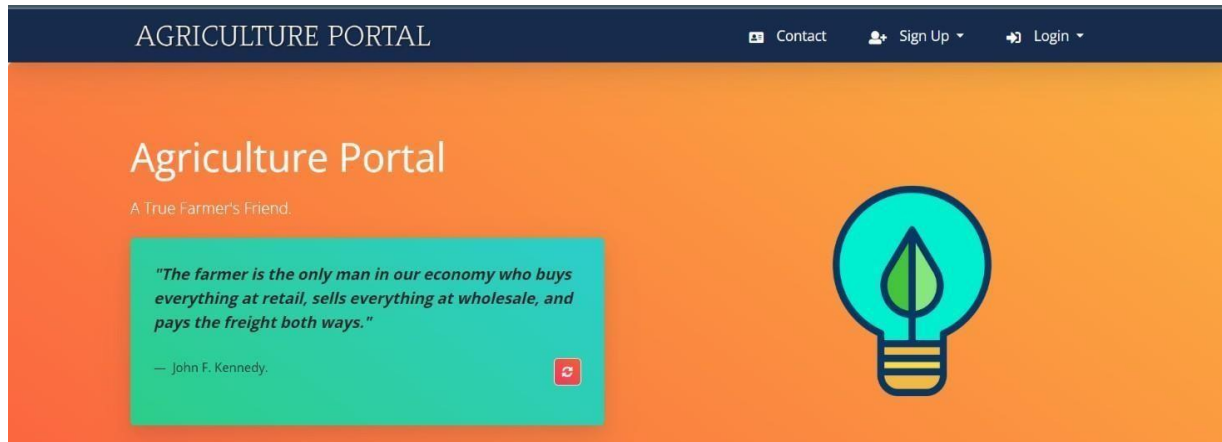


Figure 5.1: Home Page of the application

This is the homepage of our portal which consists of options on the right such as Contact, Sign Up, and Sign In. New farmers and customers need to sign up, whereas those already registered can use the log in option.

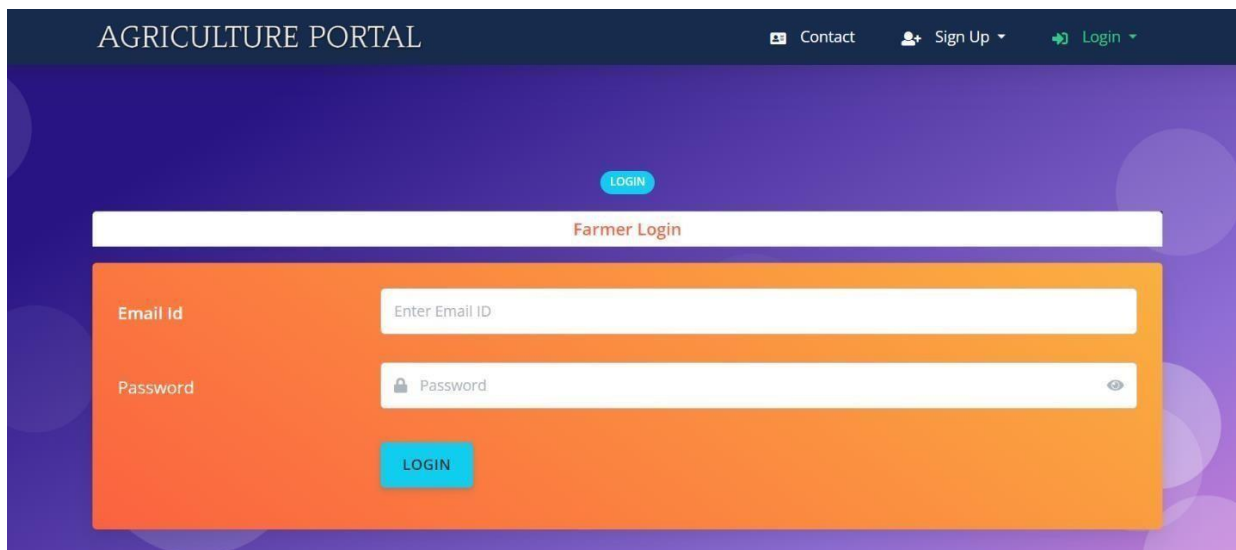


Figure 5.2: Farmer Login

The farmer has to put the credentials of the login, after which he will receive an OTP to the

## Farmer's Assistance Portal for Better Crop Production

email which is to be entered for confirmation, post which his profile will be visible.

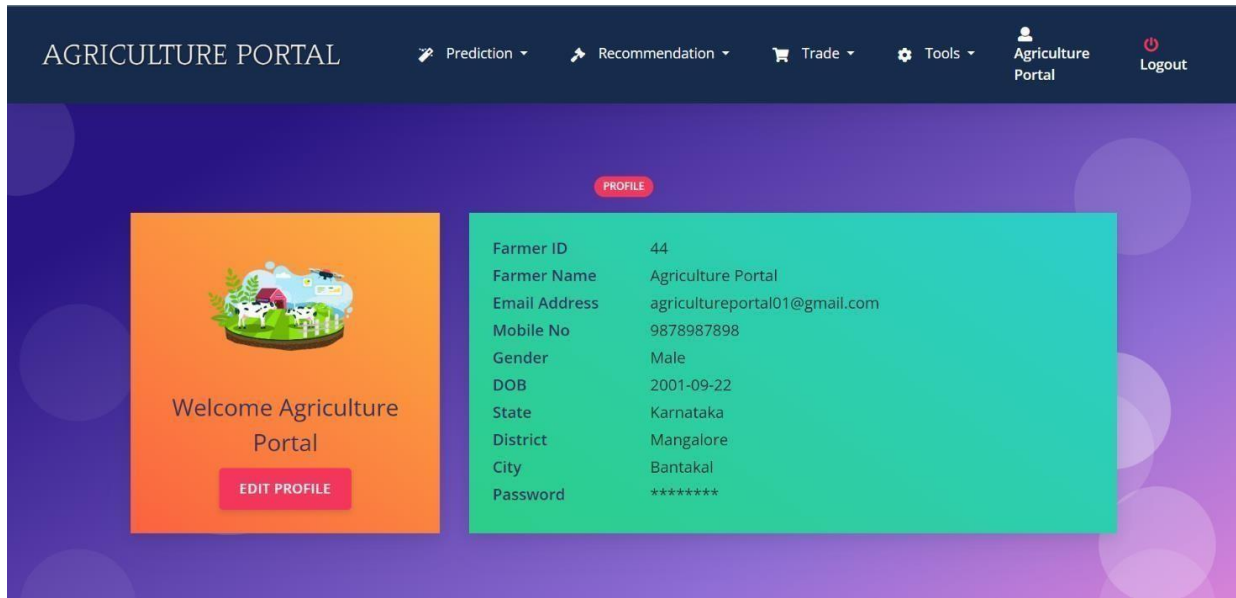


Figure 5.3: Farmer Profile

After the 2-factor authentication, the farmer's profile will be visible, which gives all the details regarding the farmer.

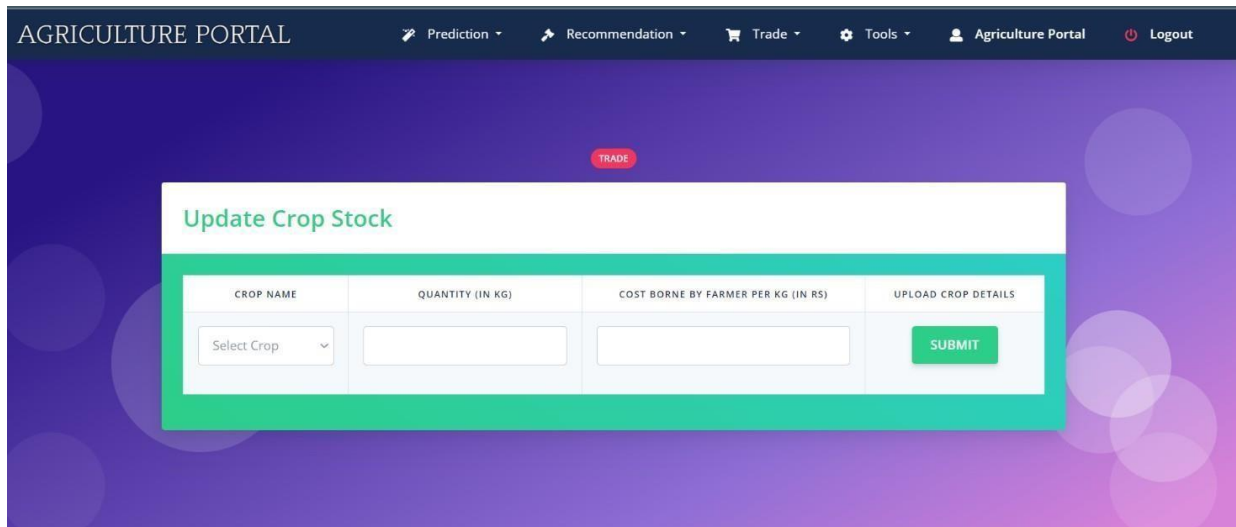


Figure 5.4: Update crop stock

After logging in, farmers have options such as Update Crop Stock, Trade Crops, and SellingHistory.

AGRICULTURE PORTAL

Prediction Recommendation Trade Tools Agriculture Portal Logout

RECOMMENDATION

### Crop Recommendation

SUBMIT

NITROGEN	PHOSPHOROUS	POTASIOUM	TEMPARATURE	HUMIDITY	PH	RAINFALL
Nitrogen Eg:90	Phosphorus Eg:42	Pottasium Eg:43	Temperature Eg:21	Humidity Eg:82	PH Eg:6.5	Rainfall Eg:203

### Result

Recommended Crop is : rice

Figure 5.5: Crop recommendation

Crop recommendation recommends the particular crop to be grown in that particular area.

AGRICULTURE PORTAL

Prediction Recommendation Trade Tools Agriculture Portal Logout

RECOMMENDATION

### Fertilizer Recommendation

SUBMIT

NITROGEN	PHOSPHOROUS	POTASIOUM	TEMPARATURE	HUMIDITY	SOIL MOISTURE	SOIL TYPE	CROP
Nitrogen Eg:37	Phosphorus Eg:1	Pottasium Eg:0	Temperature Eg:	Humidity Eg:52	Soil Moisture Eg:	Select Soil	Select

### Result

Recommended Fertilizer is : 28-28

Figure 5.6: Fertilizer prediction

Fertilizer prediction will recommend the particular fertilizer suitable for that area. That fertilizer will be helpful for the crop which is to be grown.

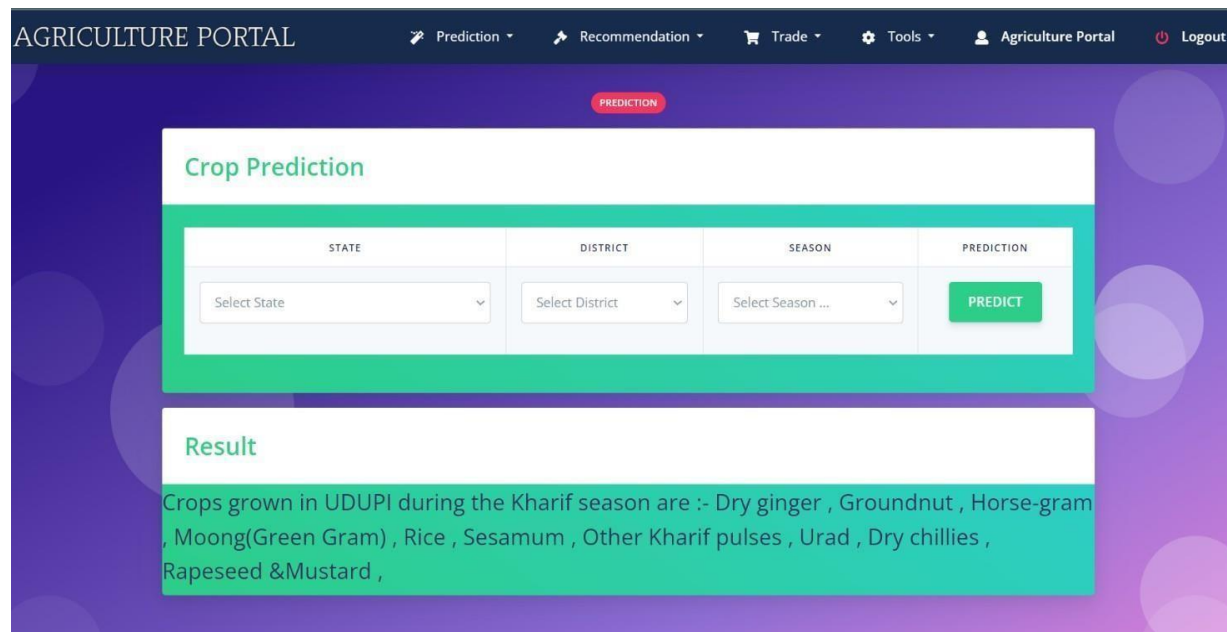


Figure 5.7: Crop prediction

Crop prediction will predict different kinds of crops suitable to be grown for the area which has been selected through the input.

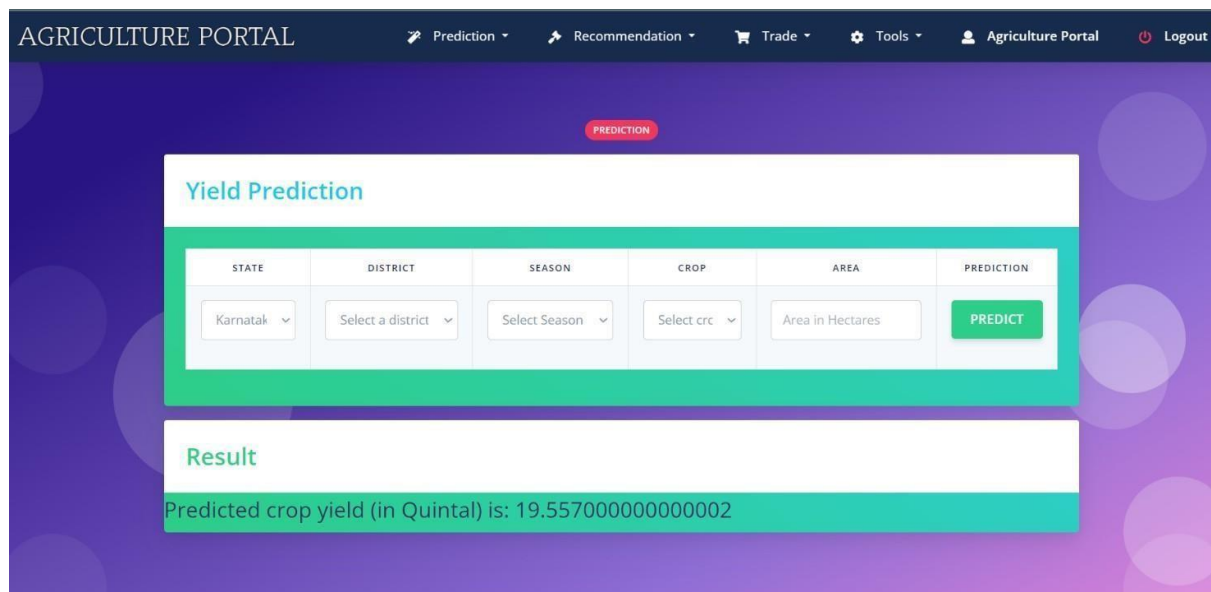


Figure 5.8: Yield prediction

In yield prediction yield for the particular area which is selected is predicted, this will give the farmer an idea about the production of the crop.



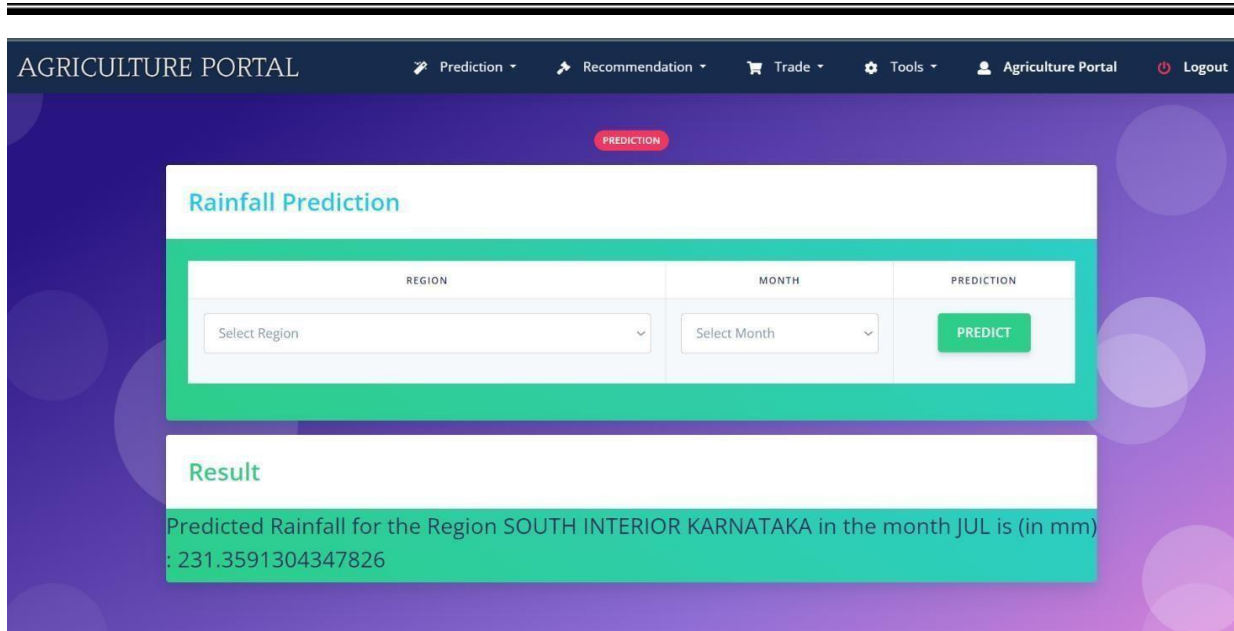


Figure 5.9: Rainfall prediction

Rainfall prediction will predict the rainfall for the particular region which is selected according to the inputs from the list. This will help farmers from incurring losses.

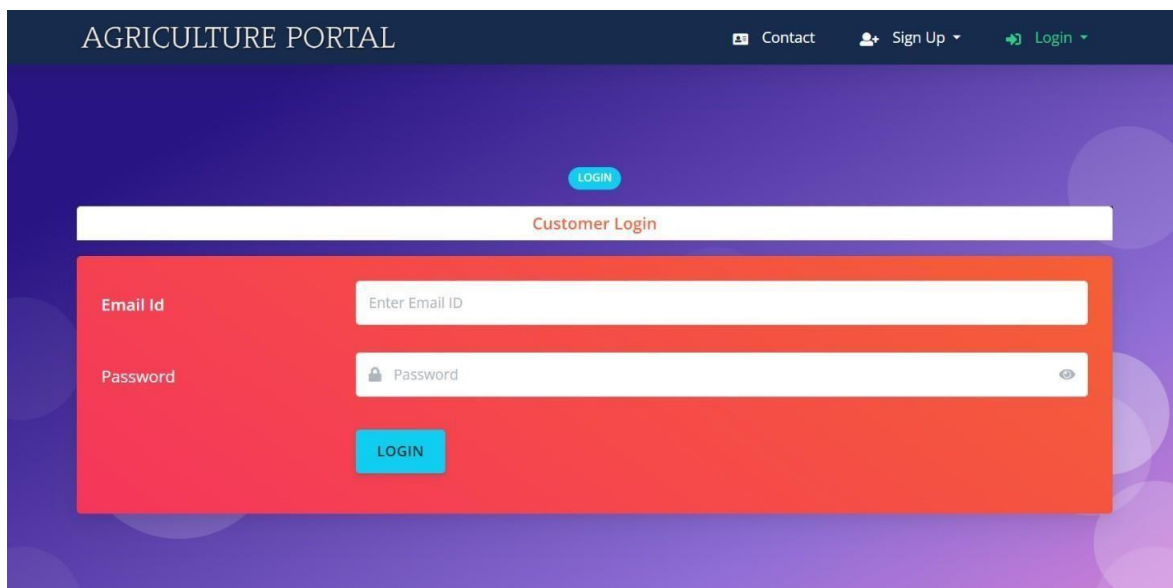


Figure 5.10: Customer login

The customer has to put the credentials of the login, after which he will receive an OTP to the email which is to be entered for confirmation, post which his profile will be visible.

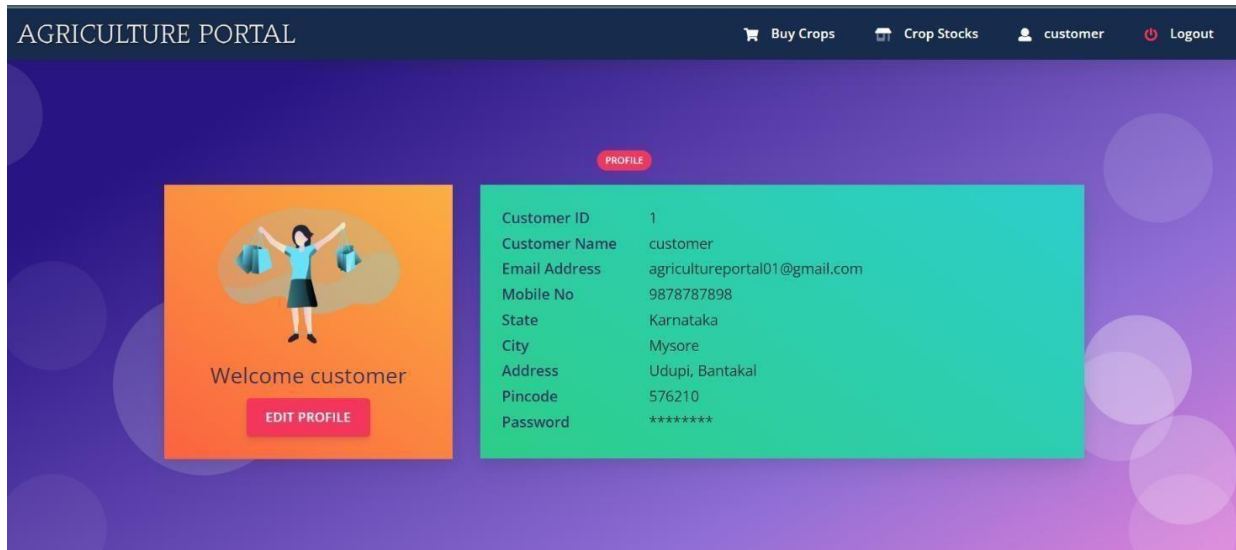


Figure 5.11: Customer details

After the 2-factor authentication, the customer's profile will be visible, which gives all the details regarding the customer.

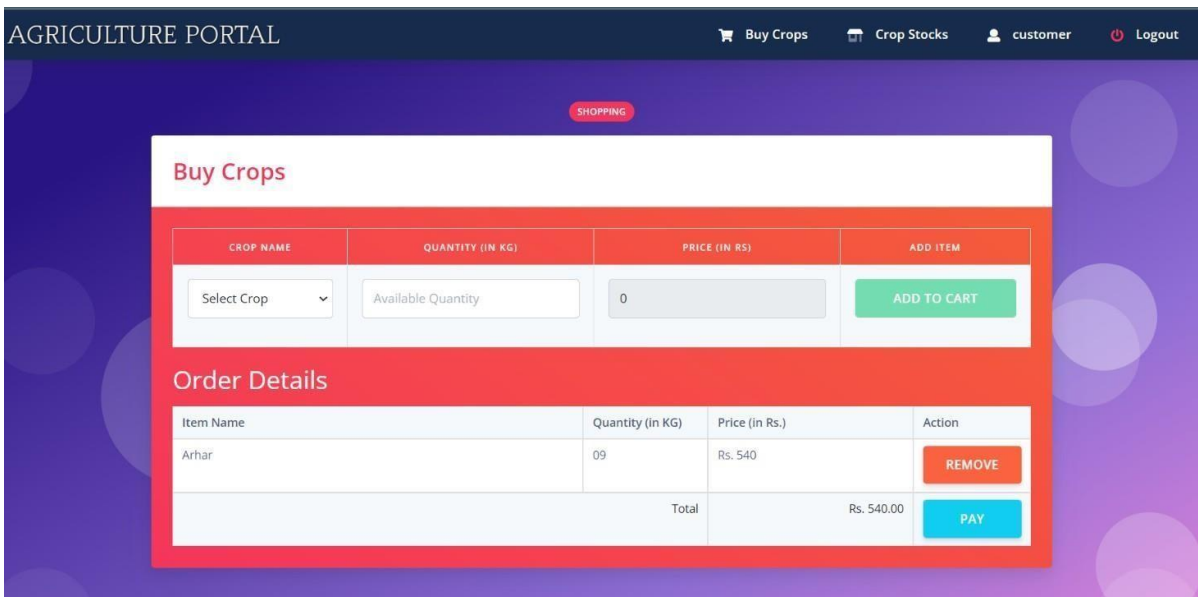


Figure 5.12: Buy crops

The customer can buy crops online from the list of crops available in the portal and how much quantity is required.

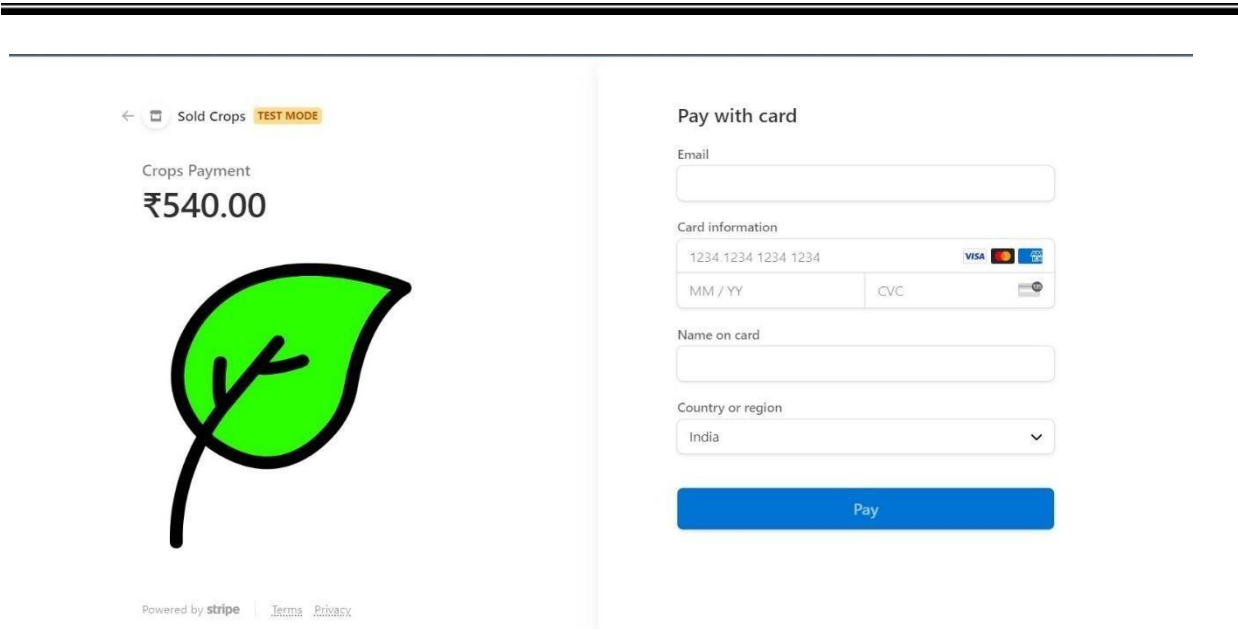


Figure 5.13: Payment test mode

This is a test payment mode where you can do payment online by entering your card details, post which you will receive an OTP for authentication.

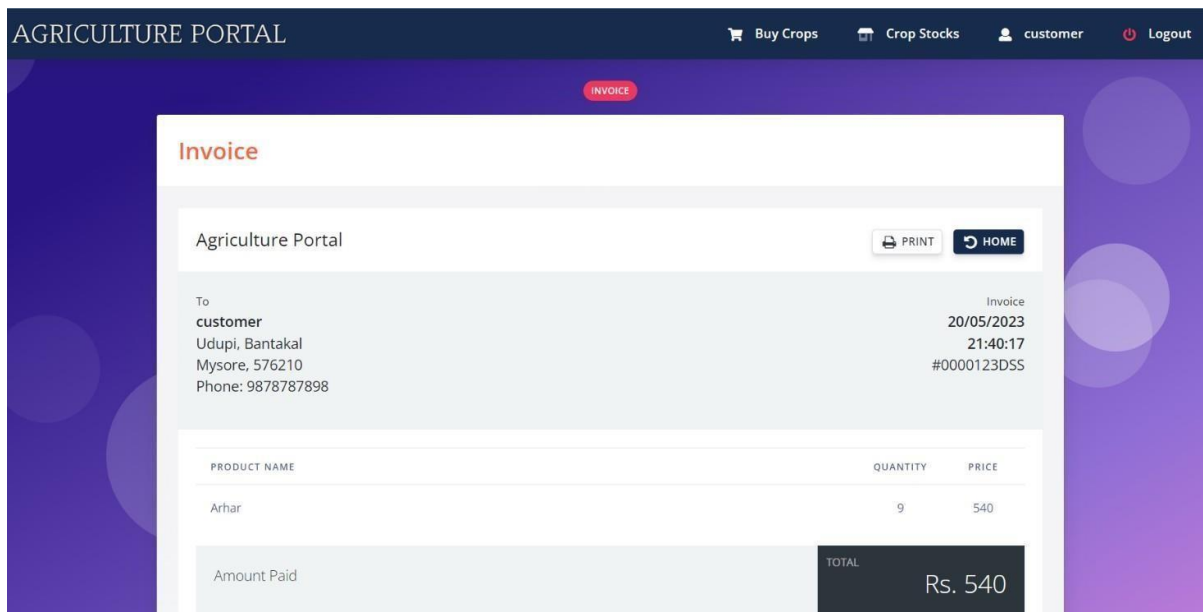


Figure 5.14: Payment details

Payment details. which means an invoice will be generated here for the payment which has been done by the customer.

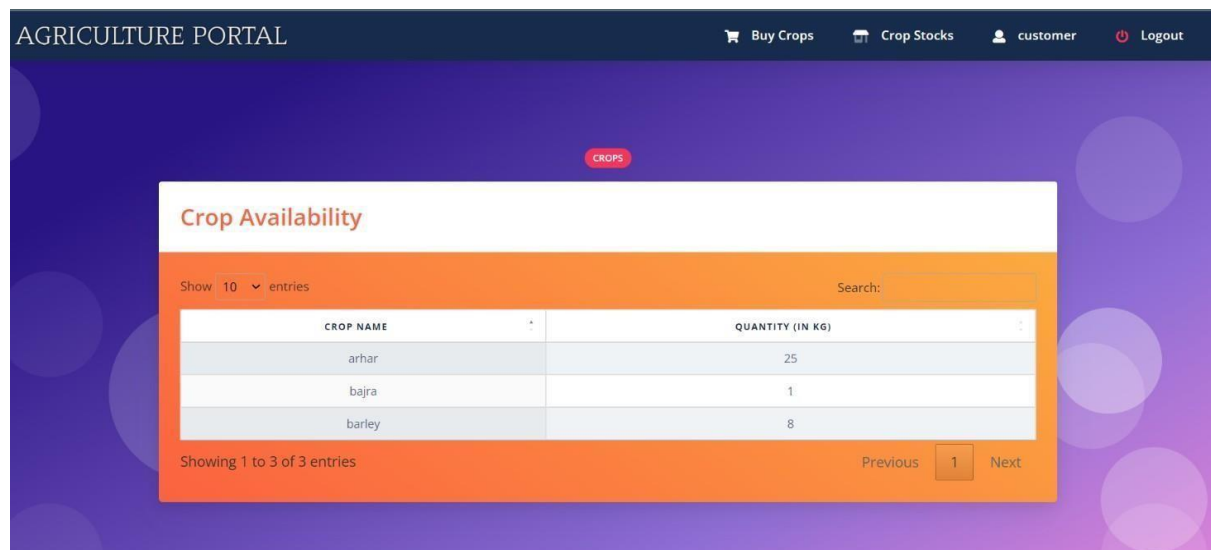


Figure 5.15: Crop availability

Here the available crops are visible to the customer which gives him an idea of which crops to buy.

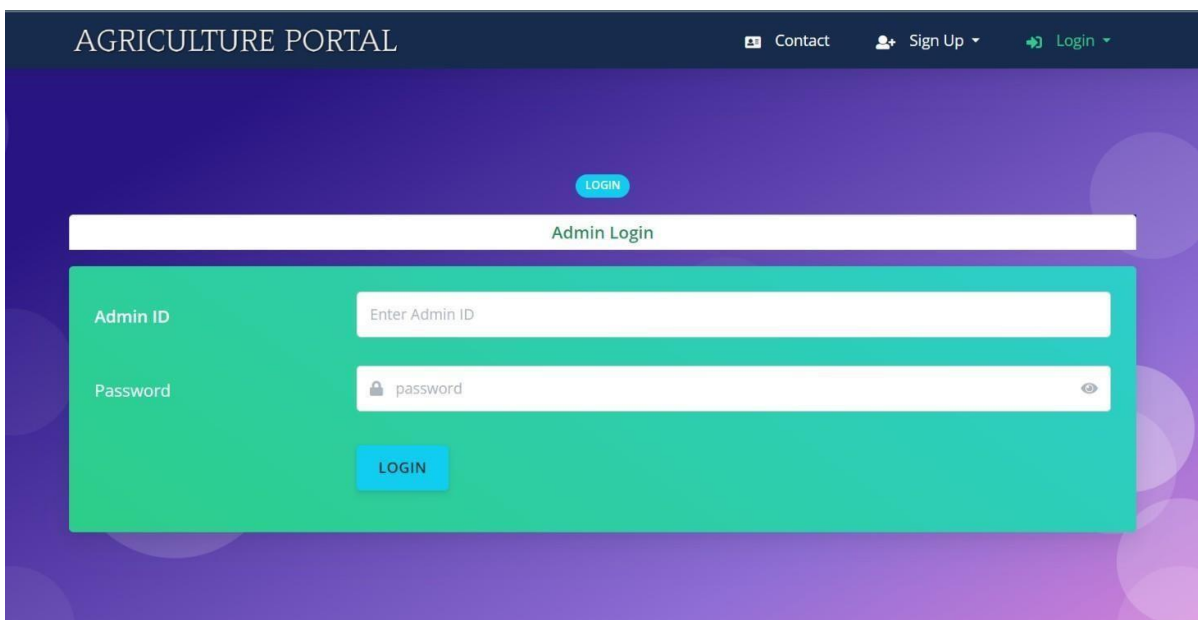


Figure 5.16: Admin login

The Admin has to put the credentials of the login, after which his profile will be visible.

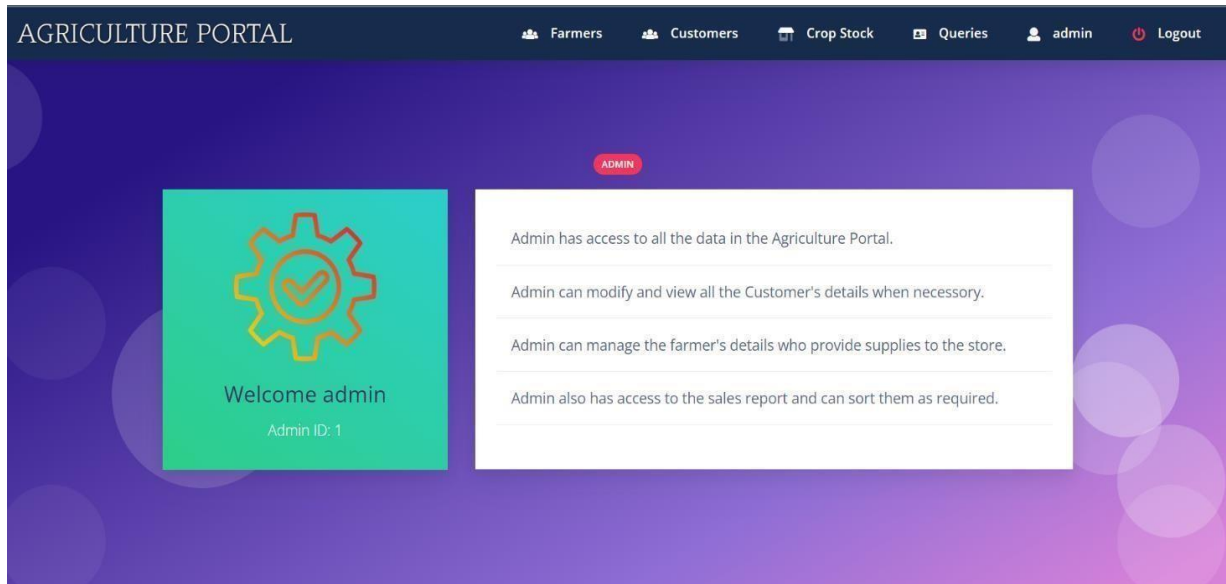


Figure 5.17: Admin features

The admin's profile will be visible, and details of features of what he can access and manage is visible.

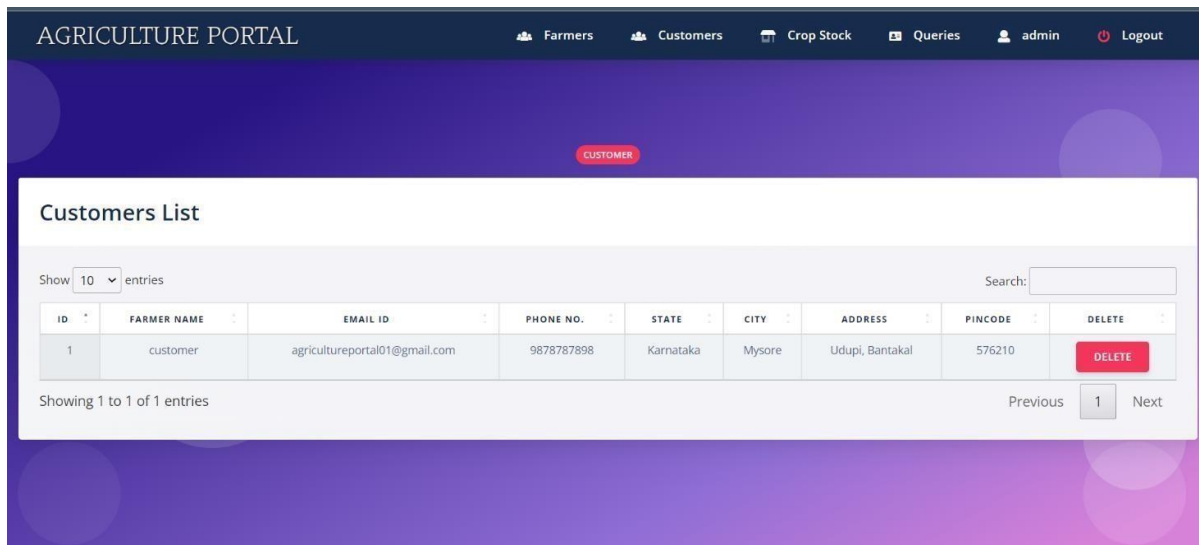


Figure 5.18: Customer list

The admin also has the feature of getting a list of customers who have logged in the website and are using it.

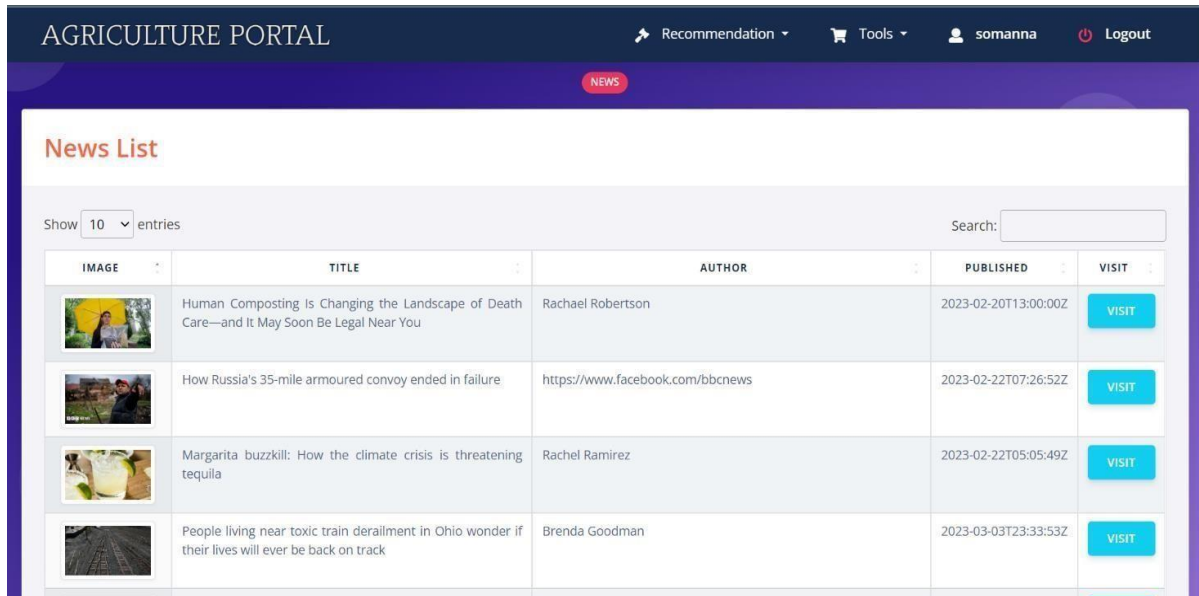


Figure 5.19: News feed

The News feed gives the news of every news related to agriculture from all around the world which will be helpful for the farmers.

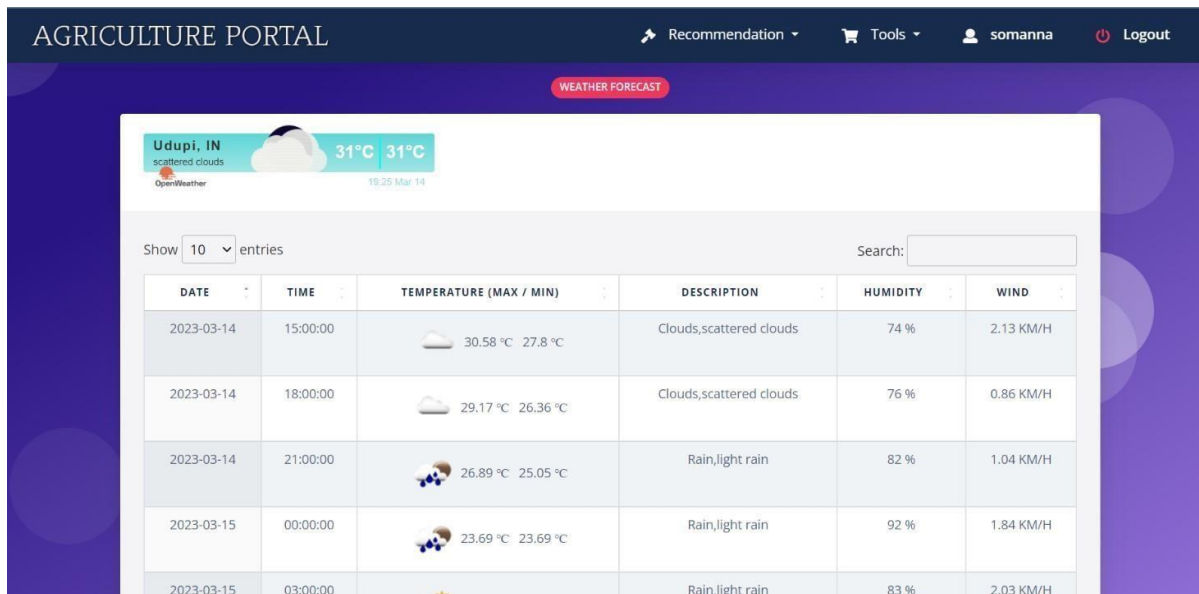


Figure 5.20: Weather forecast

The weather forecast predicts the weather of the coming days, which might be helpful for agricultural purposes.

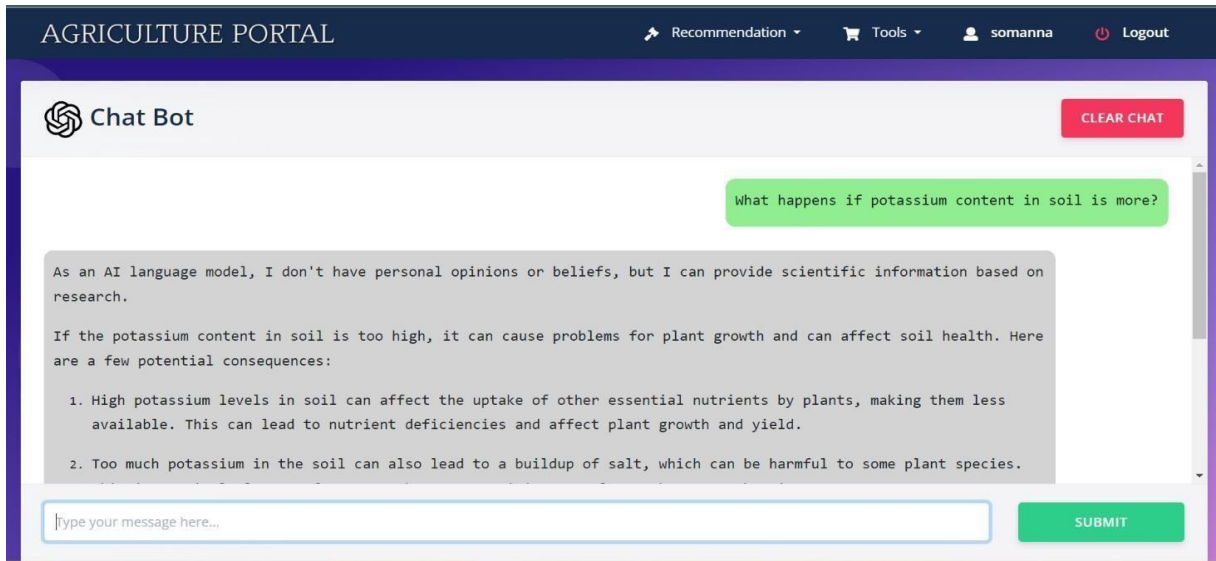


Figure 5.21: Chatbot

The chatbot is a feature that answers the queries which are asked to it by the farmer.

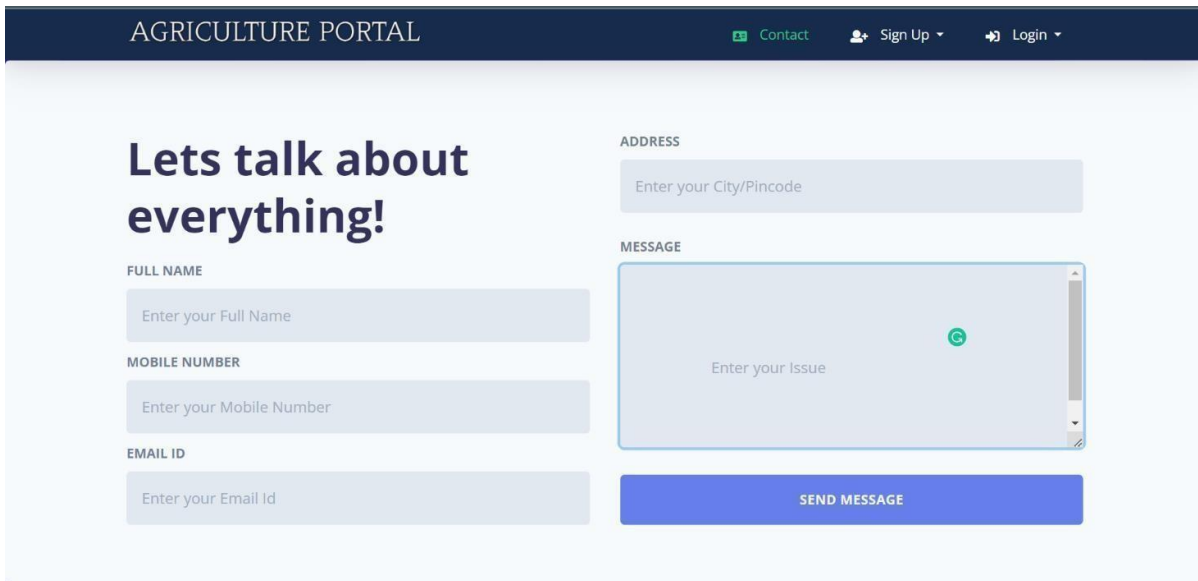


Figure 5.22: Feedback

Feedback can also be given by the people who have used the service of this portal. They need to fill in the above-mentioned details and submit it, which will be recorded.

## Chapter 6

# CONCLUSION AND FUTURE ENHANCEMENT

### 6.1 Conclusion

This paper presents the various machine learning algorithms for predicting the yield of the crop on the basis of weather and other conditions. This project develops a website for predicting crop yield, weather, and fertilizer recommendation using machine learning algorithms. The decision tree is found to provide the most accurate predictions for crop yield, weather, and fertilizer recommendation. The prediction system takes the inputs from the user and provides the best and most accurate predictive analysis for crop yield. The website also provides information on the best crop that is suitable and also which particular fertilizers are required for that crop. Results also revealed that the Random Forest classifier gives the highest weather prediction and fertilizer recommendation accuracy. These will not only help farmers maintain the proper crop supply to grow but also in cost management also it can be helpful. It will empower farmers to make informed decisions regarding crop selection, fertilizer usage, and overall cost management. The robustness and reliability of our system have been validated through experiments conducted on a reliable dataset.

### 6.2 Future Enhancement

As a future scope, the web-based application can be made more user-friendly by targeting more populations by including all the different regional languages in the interface and providing a link to upload information instead of entering the test value manually. This research work can be enhanced to a high level by building a recommender system of agriculture production and distribution for farmers. By which farmers can make their own decision like which season which crop should sow so that they can get better profit. This system works for structured datasets or databases.



## REFERENCES

- [1] Prameya R Hegde, Ashok Kumar A R, "Crop Yield and Price Prediction System for Agriculture Application", International Journal of Engineering Research & Technology (IJERT) Vol. 11 Issue 07, July-2022. Shangping Wang, Xu Wang, and Yaling Zhang, "A Secure Cloud Storage Framework with Access Control based on Blockchain".
- [2] E. Manjula, S. Djodiltachoumy, "Model for Prediction of Crop Yield", International Journal of Computational Intelligence and Informatics, Vol. 6: No. 4, March 2017
- [3] Dr. Y. Jeevan Nagendra Kumar, V. Spandana, V.S. Vaishnavi, K. Neha, "Supervised Machine learning Approach for Crop Yield Prediction in Agriculture Sector", (ICCES 2020) IEEE Xplore ISBN: 978-1-7281-5371-1.
- [4] R.B.Saroo Raj, Ankush Rai, Ronit Dharmik, Siddharth Bhattacharjee, "Weather Forecasting System using Machine Learning", International Journal of Emerging Technologies in Engineering Research (IJETER), Volume 6, Issue 10, October (2018).
- [5] Andrew Crane-Droesch, "Machine learning methods for crop yield prediction and climate change impact assessment in agriculture", Environ. Res. Lett. 13 (2018) 114003.
- [6] Potnuru Sai Nishant, Pinapa Sai Venkat, Bollu Lakshmi Avinash, B. Jabber. "Crop Yield Prediction based on Indian Agriculture using Machine Learning", International Conference for Emerging Technology (INCET) Belgaum, India. Jun 5-7, 2020
- [7] Shivani Turamari, Pooja Patil, Mallappa Hallad, Manjunath Bilagi, "Weather Forecast Prediction for Agriculture", (IJERT) ISSN: 2278-0181, Special Issue - 2022.
- [8] Pallavi Shankarrao Mahore, Dr. Aashish A. Bardekar, "Crop Yield Prediction using Different Machine Learning Techniques", International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307, Volume 7, Issue 3, May-June-2021.