# Use Case Scenarios for Plant Disease Diagnosis App:

This document presents three essential Use Case Scenarios for the Plant Disease Diagnosis application. The scenarios cover user authentication, disease diagnosis with treatment suggestions, and optimal plant recommendations based on soil and weather conditions.

### **Use Case Specification: User Login**

| **Use Case ID** | UC-01 |
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| **Use Case Name** | User Login |
| **Actors** | User, Application |
| **Description** | Allows users to log in to access the app's features. |
| **Preconditions** | - The user must have a registered account. - The application must be connected to the authentication database. |
| **Normal Flow** | 1. The user opens the app. 2. The application displays the login screen. 3. The user enters their email and password. 4. The application verifies the credentials against stored user data 5. If correct, the application redirects the user to the home page. |
| **Alternative Flow** | - **A1:** If the user enters incorrect credentials, the system displays an error message. - **A2:** If the user forgets the password, they can request a password reset. |
| **Postconditions** | - The user gains access to the application upon successful login. |
| **Non-Functional Requirements** | - **Security:** User credentials must be encrypted using industry-standard encryption. - **Performance:** The login process should not exceed **2 seconds**. - **Availability:** The authentication service must be available **99.9%** of the time. - **Usability:** The login screen must be user-friendly and support **biometric authentication** (if applicable). - **Scalability:** The application must handle up to **10,000 concurrent login requests** efficiently. |

### **Use Case Specification: Diagnose Plant Disease and Provide Treatment**

| **Use Case ID** | UC-02 |
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| **Use Case Name** | Diagnose Plant Disease and Provide Treatment |
| **Actors** | User, Application, System (CNN Model) |
| **Description** | The user uploads an image of a plant, and the system diagnoses the disease and provides treatment recommendations. |
| **Preconditions** | The user must have a stable internet connection and a clear image of the plant. The application must be able to communicate with the CNN model. |
| **Normal Flow** | 1. The user opens the application and selects "Diagnose Plant Disease". 2. The application prompts the user to upload an image. 3. The user uploads an image of the plant. 4. The application sends the image to the CNN model for analysis. 5. The CNN model processes the image and identifies the disease. 6. The application displays the diagnosis, including disease name.  7. The application retrieves treatment recommendations from the system’s database. 8. The application suggests preventive measures to avoid future infections. 9. The user reviews the diagnosis and treatment. 10. The use case ends when the user saves or exits the results. |
| **Alternative Flow** | **A1**: If the uploaded image is unclear, the application prompts the user to upload a clearer image. **A2**: If the disease cannot be identified, the application suggests sending the image for manual expert review. |
| **Postconditions** | The user receives a disease diagnosis with recommended treatment. The system logs the diagnosis data for future reference. |
| **Non-Functional Requirements** | **Accuracy:** The CNN model must have a minimum accuracy of 85% in disease detection. **Performance:** The system should process and return the diagnosis within 5 seconds. **Availability:** The disease diagnosis feature must be operational at least 99% of the time. **Usability:** The application should provide a simple and intuitive UI for image uploading and result display. **Security:** User-uploaded images must be stored securely and deleted after processing to maintain privacy. **Scalability:** The system should handle up to 1,000 diagnoses per hour without performance degradation. |

### **Use Case Specification: Crop Recommendation Based on Soil and Weather Conditions**

| **Use Case ID** | UC-03 |
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| **Use Case Name** | Crop Recommendation Based on Soil and Weather Conditions |
| **Actors** | User, Application, System (Recommendation Engine) |
| **Description** | The system recommends the best crop based on soil nutrients and weather conditions provided by the user. |
| **Preconditions** | The user must enter soil and weather parameters correctly. The application must be able to process the input data and communicate with the Recommendation Engine. |
| **Normal Flow** | 1. The user opens the application. 2. The user selects "Best Crop Recommendation". 3. The application prompts the user to enter soil and weather parameters (e.g., nitrogen, phosphorus, potassium levels, temperature, humidity, pH, and rainfall). 4. The user manually inputs the required values. 5. The application sends the input data to the Recommendation Engine for processing. 6. The Recommendation Engine analyzes the data and determines the best crop for the given conditions. 7. The application displays the single most suitable crop recommendation. 8. The user reviews the recommendation and may save it for future reference. 9. The use case ends when the user exits or proceeds with additional actions. |
| **Alternative Flow** | **A1**: If the user enters incomplete or invalid data, the application prompts an error message and asks for correct input. **A2**: If no suitable crop is found, the application notifies the user and suggests improving soil conditions. |
| **Postconditions** | The system provides a single recommended crop based on the input data, and the recommendation is logged for future reference. |
| **Non-Functional Requirements** | **Accuracy:** The recommendation model must have at least 90% accuracy in suggesting crops. **Performance:** The system should generate a recommendation within 3 seconds. **Availability:** The crop recommendation feature must be available at least 99% of the time. **Usability:** The application should provide clear input fields and validation checks to assist users in entering correct data. **Security:** User-submitted soil and weather data should be encrypted and stored securely. **Scalability:** The system should support up to 5,000 crop recommendations per hour without performance issues. |