SURVEY ON MANGO DISEASE DETECTION AND CLASSIFICATION

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Abstract

Fruits are a vital source of nutrients for human beings. Fruit illnesses cause a significant loss in yield due to a lack of maintenance and fungus. Mango is a popular fruit all over the world, but it is sensitive to diseases that can reduce its quality and quantity. The majority of farmers in our nation are illiterate. As a result, they are unable to obtain accurate illness information. It necessitates the assistance of an expert advisor or agricultural official. However, reaching every farmer with an expert advisor or an agricultural officer is difficult.

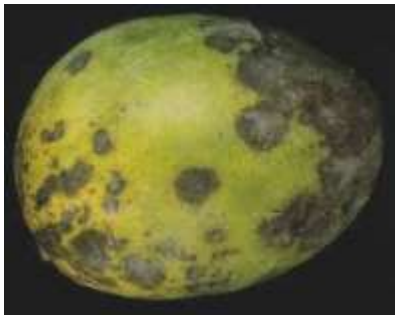
Introduction

Due to climatic circumstances and environmental concerns such as severe rains, high humidity, soil nutrient depletion, and a variety of linked diseases and disorder problems, mango fruit yield is currently declining. Mango plant illnesses are typically detected by naked eye observation, which has limited accuracy. Mango fruit yield is low due to several diseases affecting mango plants that farmers are unable to recognise due to their illiteracy.[7] Farmers in some remote locations may have to travel a considerable distance to see experts, which may be too costly and time demanding, and farmers may be unaware of diseases. Kisan call centres are available, although they do not provide service 24 hours a day, seven days a week, and communication may be interrupted at times.[3]

The agricultural officer's reaction is occasionally delayed. As a result, adequate disease identification does not occur in a timely manner, resulting in a decline in mango fruit yield. This document explains how to detect and recognise illnesses on several sections of the mango plant, such as the stem, fruit, leaves, and branches.[12] Also, effective preventive care is provided for the mango plant's afflicted zone, resulting in increased mango fruit output and improved mango fruit quality.[3] Mango trees are revered in Indian culture for the many applications and advantages they provide.

Mango leaves are antimicrobial and produce a large amount of oxygen, boosting health and cleanliness. Mango is high in fibre, vitamins, and antioxidants, and it is also good for your intestines. Farmers confront difficulties in locating sick fruits, which degrade the quality of healthy fruits, resulting in a significant loss of cash.[15]

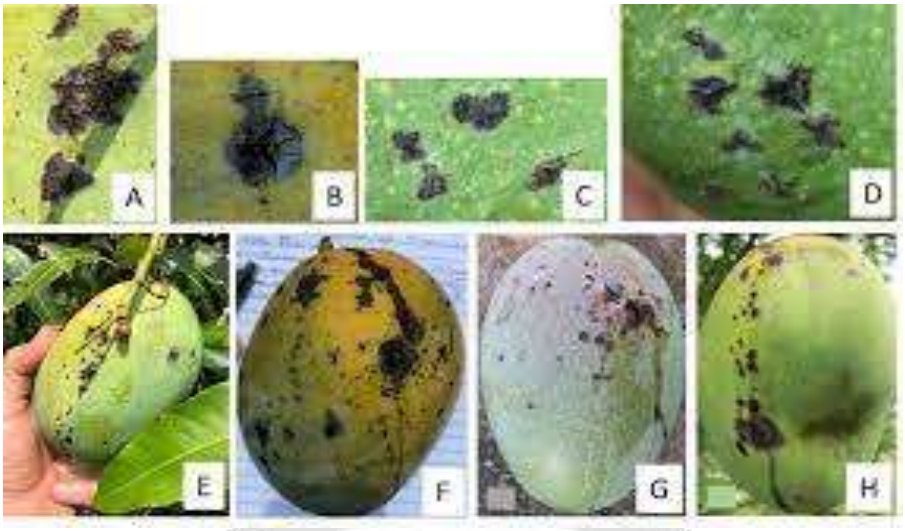
Anthracnose is a type of blossom blight. Anthracnose appears on various parts of the mango tree. The first signs of the disease on the inflorescence are blackish brown specks on peduncles and flowers. Small black spots appear on panicles and open flowers, gradually enlarging and killing the flowers.[5] The infected flowers drop off, leaving the more persistent spikes on the peduncles, resulting in significant crop loss (10-90 percent). Symptoms of leafy anthracnose appear as oval or irregular brown to deep brown spots of varying sizes scattered across the leaf surface. The fungus multiplies rapidly in moist conditions.[7] Younger leaves are more likely to attract than older ones. Insect attacks may facilitate pathogen entry, resulting in a high incidence of disease.[3]



Root not is an infection that occurs at/below ground level in a circular irregular shaped water-socked patches. These patches grow in size and eventually encircle the entire base of the stem. The diseased tissues become soft, dark brown, or black as a result of rotting.[5]

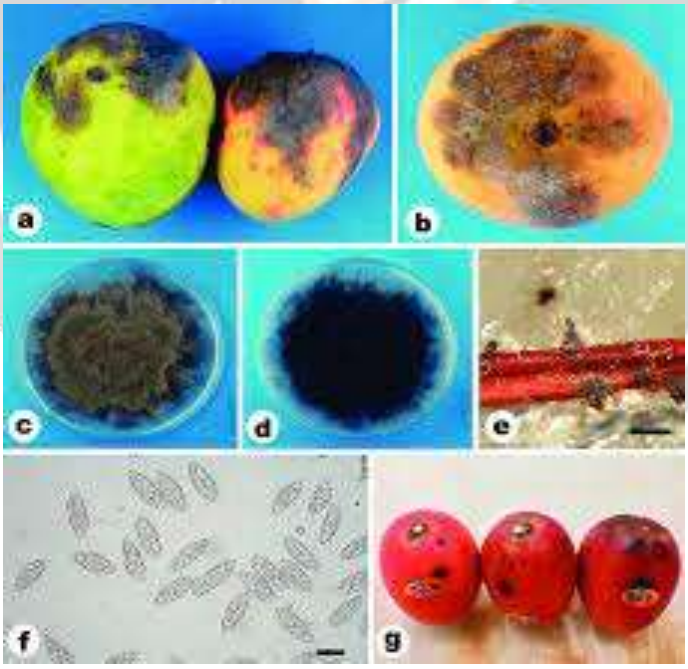
Powdery Mildew is a disease for which the symptoms can be seen on the inflorescence, inflorescence stalk, leaves, and young fruits. The white superficial powdery growth of the fungus on these parts is one of the disease's symptoms.[3] Effective flowers may fall prematurely, and young fruits may remain on the tree until they reach marble size, at which point they will drop prematurely. The dropping of unfertilized infected flowers and young fruits causes significant crop loss (20-80 percent).[12]

Bacterial Canker is a disease in which the apex of the leaves is usually crowded with minute water-soaked irregular to angular raised lesions. Halos are larger and more distinct on young leaves, whereas on older leaves, they are narrow and visible only against light. When a leaf becomes infected, it turns yellow and falls off.[2]



Stem end Rot is disease which occurs when the fruit ripens. It turns brown to black, usually at the stem end. Within two to three days, the entire fruit turns black, and the disease spreads downward, affecting half of the fruit's surface. Though the flush of the entire fruit is frequently observed, wrinkles are also observed. The affected skin remains firm, but decay has set into the pulp beneath it and emits an unpleasant odour.[16]

Every software development project needs a survey. The survey method is required to determine the software's requirements. The survey also includes an examination of the current system as well as an examination of the tools required for software development.[7] It is critical to have a thorough grasp of the tools. The following is an excerpt from the information gathered during the literature survey.



The study of few literatures on Mango disease detection and classification is as below;

1. Mango Disease Detection by Using Image Processing

Authors: Prof. Shripad S. Veling, Mr. Rohit S. Kalelkar.

Year: 2019

Findings:

Name of disease - Anthracnose, Powdery Mildew, Black Banded , Red Rust.

Algorithm - MATLAB based disease detection system

Fast &robust Fuzzy C - Means Algorithm for image Segmentation

Gray level Co-occurance Matrix Algorithm used for feature extraction

SVM classifier used to classify type of disease

Database used and considered - 50 samples

Parameters considered - auto correlated, entropy, energy, variance, contrast

2. Mango Classification Using Deep Learning
Authors: Mettleq, A. S. A., Dheir, I. M., Elsharif
Year: 2020
Findings:
The proposed system allows us to detect and recognize diseases on mango plants, as well as provide appropriate preventive care and solutions. The system simplifies disease detection through complete automation, and notifications of affected diseases and remedies are sent to farmers as soon as possible. This system will boost productivity and improve mango fruit quality.

3. Detection of Stone Weevil in Mango Fruit using Non-Destructive Techniques

Authors: Sambrani
Year: 2020
Findings:
Name of disease - Anthracnose , spongy tissue.
Algorithm/classifier - Support Vector Machine, FCM, L*a*b*, HSI and RGB color model, CIE Lab color space, Computed Tomography
Parameters (methodology) shape, size, color and firmness.

4. Assessing mango anthracnose using a new three-dimensional image-analysis technique to quantify lesions on fruit
Authors: **Gabriel Corkidi**

Year: 2019

Findings:

Name of disease-Anthracnose
Implementation- image analysis, pseudocylindrical projection , spot lesions, 3-D area measurement

5. Detection and Classification of Diseased Mangoes
Authors: **H Akshay Koushik**

Year: 2020

Findings:

Disease Name: Anthracnose, Scab
Implementation-Convolutional Neural Network(CNN) for image classification
Dataset: real time plant village dataset/dermnet.com
2866 & 739 images in training & test sets with ratio 4:1
Accuracy - 93%-94%

Conclusion

Mango is a popular agricultural product that is exported all over the world. Mango fruit quality assessment has b
een done manually since the beginning of time, which makes it time-
consuming and labor=intensive, and those who inspect the quality must be experts in the subject. Mangoes must be manually assessed, which necessitates the destruction of the sample fruit, lowering the yield. To tackle these issues, nondestructive approaches have been devised, including the interior examination of the fruit.The nondest
ructive procedures used to inspect the fruit quality from its physical structure to its internal composition, mechan
ical damage, diseases and flaws, and insect infestation are presented in this study.
It intends to provide an update on the most recent technology used for mango fruit grading before it is shipped t
o market, as well as what can yet be studied in the field of post-harvest mango fruit handling.This system facilitates disease detection through complete automation and notification of affected diseases. Colour, appearance, size, and other factors influence the quality of the fruits as well as the customers. As a result, this experimentation assists the agriculture industries in updating their business processes while also leveraging IT education.

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