

# Plant Pathology-Effect of Pollution on Plant Leaves: Survey

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**Abstract**— Plants is the heart of an agriculture field and it's become an important source of energy as well as financial income. The leaves of a plant provides the most important information or data which provides us to know which type of plant it is and which type of disease is infected on that leaf. Environmental pollution is a serious menace to all kinds of life and threatens our fragile environment that is so vital for our survival. The air pollutants cause direct and indirect effect on microbial community. The susceptibility of pollution stressed plants to microbial pathogens may be altered and the disease development may be influenced. Thus plant diseases may be either enhanced or suppressed depending upon the nature of the disease and host, the kind and concentration of the air pollutants.

**Key words:** Air Pollution, Texture, Plant Leaf Diseases

## I. INTRODUCTION

World population continues to grow, resulting in increased emission of gases from the combustion of fossil fuels, traffic, and industrial processes. Worldwide urbanization, industrialization, transportation, and energy consumption and deforestation are increasing to fulfill the requirement of increasing population like accommodate space to support the population growth. As a result of these processes, the chemical composition of the atmosphere has been changed. The increase in concentration of greenhouse gases such as carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), ozone (O<sub>3</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>), and chlorofluorocarbons (CFCs) in the atmosphere is among the most serious threats to humankind or plant growth which can directly affect the productivity. Global warming would cause unforeseen environmental changes, which may be very different in various regions of the globe. Changes in hydrological cycles may cause droughts in some areas but floods in some other regions due to increasing in pollution levels.

India is an agricultural country and the position of any country in the world depends on its agricultural production. In India the farmers have wide variety to select their plant for cultivation to produce maximum yield depending on environment available. Then also the production gets affected by diseases of the crop. The diseases of the plant are caused by pathogens, insufficiency of nutrients, fungus etc. Detecting diseases at early stages enables to overcome it and treat it appropriately. For this an expert is required for identifying the disease, describe the method of treatment and protection. Identifying the plant disease is not easy task. It requires experience and knowledge of plants and their diseases. It also requires correct result in describing the symptoms of plant diseases. A person can depend on a system which has experience and knowledge, called an Expert System. An expert system can be:

- Agricultural advisor
- An excellent farmers
- Electronic or Computerized expert system

An excellent farmer precisely catches the change of the crops in the growing process and they manage the cultivation in proportion to the change in order to cultivate the agricultural products of high quality. If farmers decide to take advice from agricultural expert regarding the treatment of incidence of pest /disease/trait to their crop/plant in order to increase the crop productivity then he may face following situations:

- Sometimes they have to go long distances for approaching the expert.
- Expert may not be present at that time even though they go long distances.
- Sometimes, the expert whom a farmer contacts, may not be present in that location to give opinion to the farmer with the information and knowledge.

In this quest the expert advice is very costly and time consuming. Electronic expert systems enable farmers in identifying type of diseases; making the right decision and selecting the proper treatment. The expert systems are smart computer programs that are capable of serving solutions or suggestion related to specific problems in given area. One of the advantages of using Electronic expert systems is its capability to reduce the information that users need to process, reduce personnel costs and increase throughput. Expert system performs work more consistently than human experts.

### A. Various Types of Leaf Spot Diseases:

#### 1) Plant Diseases- Fundamentals

In the field of crop production, plant disease is a significant factor that degrades the eminence and quantity of the plants. The common approach followed in plant diseases are the classification and detection model. Both the classification and detection model are widely studied by the Engineering and IT fields.

#### 2) Bacterial Diseases

A bacterial disease is generally referred as the "Bacterial leaf spot". It is initiated as the small, yellow green lesions on young leaves which usually seen as deformed and twisted, or as dark, water-soaked, greasy - appearing lesions on older foliage.

#### 3) Viral Diseases

All viral disease presents some degree of reduction in production and the life of virus infected plants is usually short. The most available symptoms of virus-infected plants are frequently appearing on the leaves, but some virus may cause on the leaves, fruits and roots. The Viral disease is very difficult to analyze. Leaves are seen as wrinkled, curled and growth may be undersized due to the virus.

#### 4) Fungal Diseases

Fungal disease can influence the Contaminated seed, soil, yield, weeds and spread by wind and water. In the introductory organize it shows up on lower or more seasoned clears out as water-soaked, gray-green spots. Afterward these spots are obscure and at that point white fungal development spread on the undersides. In wool buildup yellow to white streak on the upper surfaces of more seasoned clears out happens. It spreads outward on the leaf surface causing it to turn yellow.



Fig. 1: Spots on Leaf

## II. LITERATURE REVIEW

“Dixit Ekta Gajanan,” et al the expert systems that have been proposed in the literature are often based on facts described by the user or image processing of plant photos in visible, infrared, light etc. The recognition of a disease can often be based on symptoms like lesions or spots in various parts of a plant. The color, area and the number of these spots can determine to a great extent the disease that has mortified a plant. Higher cost molecular analyses and tests can follow if necessary. This application can easily be extended for different plant diseases and different smart phone platforms.

Roshni C.R et al. proposed technical solution for the farmers to detect and diagnose the right disease affecting the plants. Here Content Based Image Retrieval (CBIR) technique is used to retrieve the images of diseased plant from the training dataset based on a query image. The images thus retrieved are segmented using Hierarchical Clustering which produces cluster of diseased plant images. The clusters are then classified using Support Vector Machine (SVM) classifier based on the features extracted from clusters which verifies correct type of disease affecting the plant set

“Tejaswini Devram,” et al. A smart phone application for plant disease recognition will be presented. It is based on image processing that analyzes the color features of the spots in plant leaf. The algorithm that we would be using helps in identifying the presence of diseases by observing the visual symptoms seen on the leaf of the plant.

Li Jingfu et al proposed a discrete wavelet transform to analyze and process agriculture image by removing of noise, enhancement, compression and edge detection of two dimensional discrete wavelet transform, and the possibility of discrete wavelet transform in agriculture engineering.

“Saradhambal.G,” et al This paper is used to explore the leaf disease prediction at an untimely action. They have proposed an enhanced k-mean clustering algorithm to predict the infected area of the leaves. A color based segmentation model is defined to segment the infected region and placing

it to its relevant classes. Experimental analyses were done on samples images in terms of time complexity and the area of infected region. Plant diseases can be detected by image processing technique. Disease detection involves steps like image acquisition, image pre-processing, image segmentation, feature extraction and classification. This project is used to detect the plant diseases and provide solutions to recover from the disease. It shows the affected part of the leaf in percentage. They planned to design our project with voice navigation system, so a person with lesser expertise in software should also be able to use it easily.

“Prof. H.M. Deshmukh,” et al Based on the analysis, gray scale images is easy to process and implement. They have better clarity and suited for analysis than RGB images. Histogram equalization is used to enhance the contrast of the images and provides clear image to human eyes. So, these types of images will be used to analyze and diagnosis the plant leaves diseases and determines the diseases level of the plant leaves. Mobile phone has become available at the grass-root level providing different social and economic benefit. The aim of this proposal was to develop a user friendly automated system for the farmers that will help them in determining detection diseases of leaves without bringing an expert to the field.

Abdullah Na et al. proposed a system for remote monitoring of soil characteristics. For a farmer it is important to have knowledge about soil and its characteristics so based on it he can develop strategies. Soil has different characteristics like capacity of holding moisture, temperature, pH value and its organic components and they helps crops growth. They collected soil samples and measured its humidity, pH value and temperature remotely in real-time through smartphones. They used Bluetooth to remotely monitor between nearby mobile phone and MCU. SMT23 series MCU is used. The designed system works real-time and is cost effective and reliable. When system starts it always checks whether all the devices are connected are not, if they are then data is transmitted over Bluetooth.

Pallavi.S.Marathe et al. provide a system that can accurately detect and classify the plant disease for the successful cultivation of the crops, using digital image processing. The SVM classifier is used to detect the plant disease. This paper utilizes GSM so as to send the message to every kind of mobile handset. This project utilizes various image processing techniques which provide accurate results.

## III. EXISTING SYSTEM

The detection of the effect of the pollution on the plant leafs and disease at an early stage on crop is challenging task for farmers to increase the productivity. The urban air pollution is a major environmental concern, particularly in the developing countries. Therefore, the proposed system mainly aimed to study the effect of air pollution on the morphological characteristics of leaf as majority of physiological processes are concerned with leaf and serves as a good indicator to air pollutants.

Disease identification involves the steps like image loading, image pre-processing, image segmentation, feature extraction and classification. Image processing techniques could be applied on various applications as follows:

- 1) To detect plant leaf, stem, and fruit diseases.
- 2) To quantify affected area by disease.
- 3) Finding the boundaries of the affected area.
- 4) Used to determine the color of the affected area.
- 5) Determining size & shape of fruits.

Diseases in Meghalaya State”, 2013 Fifth International Conference on Advanced Computing (ICoAC).

#### IV. ADVANTAGES

- 1) Fully Automatic.
- 2) Notification to the farmers via SMS.
- 3) Mobile cameras are used for capturing the diseased leaf image.

#### V. CONCLUSION

The main approach of the system is to detect effect of pollution on plant leaves and provide disease prediction and monitor crop health and increase crop yield by measuring current pollution parameters and its effect on plant leaf. Hence, the extension of this work will review all above mentioned techniques and methods we can conclude that there are number of ways by which we can detect disease of plants and effect of air pollution on plant leaf. Each has some advantages as well as limitations. Therefore, there is scope of improvement in the existing research. Image processing is a technique which helps to improve all existing research and which gives fast and accurate result of plant diseases.

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