**PLANT DISEASE DIAGNOSTIC TECHNIQUES: STUDY OF SYMPTOMTOLOGY (SYMPTOMS,**

**SIGN, SYNDROME, INFECTIOUS AND NON INFECTIOUS DISEASES)**

This topic is a practical introduction to symptomology with an outlook to prepare for

diagnostic work.

Plant disease diagnosis is the identification of nature and cause of diseases based

on signs and symptoms. Identification of symptoms and signs and comparative

symptomologies of infectious and non infectious diseases are considered to be most

essential for diagnosis of a unknown plant diseases. The presence of the pathogens or

various structures viz., mycelium, sclerotia, sporophores and spores produced on the

surface of the host are called signs whereas symptoms refer to only to the appearance of

infected plants or plant tissues.

Diagnosis of a plant disease is one of the most important and useful techniques in

plant pathology and familiarity with the basic classification of plant diseases, the

characteristics of organisms that cause a particular diseases, the symptoms and signs

associated with different types of disease is a pre-requisite to diagnose a plant disease.

Majority of plant diseases can be diagnosed by a relatively straight-forward procedure

involving an evaluation of background information and a macroscopic and often

microscopic examination of diseases plant. However, some diseases can be diagnosed

correctly through the use of electron microscope and serology. A majority of abiotic and

biotic factors may cause similar disease symptoms and the best proof that a particular

organism is the cause of disease is fulfilment of Koch’s postulates. Koch's postulates are

performed infrequently, except when the disease agent is suspected to be new and

previously unreported .Most of the plant disease diagnoses done today involve

identification of plant diseases that have been previously described and named. Several

techniques may be performed to determine the identity of diseases. Visual studies of

symptoms and signs, microscopy, culture media studies and serology techniques are the

most frequently used techniques in diagnostic clinics.

**Identification of nature of a disease**

In determination of a plant disease the first step is to determine the infectious and

non infectious nature of the disease.

**Infectious diseases**

An infectious disease will spread to other plants in the field by various means and is

characterized by the presence of pathogens on the surface of the plants or inside the

plant. In diseases caused by pathogens viz., fungi, bacteria, nematodes, viruses,

mollicutes, a few or large numbers of these pathogens may be present on the surface of

the plants or inside the plants. The presence of such pathogens in an active state on the

surface of a plant indicates that they are probably the cause of the diseases. Their

detection and identification can be determined with the experienced naked eye or with a

magnifying lens and if no such pathogens are present on the surface of a diseased

plants then it will be necessary to look for additional symptoms, especially for pathogens

inside the diseased plant. Such pathogens are usually at the margins of the affected

tissues, in vascular tissues or at the base of the plant or roots. Certain infectious

pathogens like viruses are neither seen nor can be grown on artificial media. They

produce symptoms similar to those resulting from nutritional deficiencies.

**Non infectious diseases**

These are the diseases with which no parasite is associated; hence they are called

as abiotic diseases. They remain non infectious and cannot be transmitted from diseased

plant to healthy plant. If no organism is found in association with the diseased part and if

viral symptoms are not present, the diseases may be due to inanimate cause. If

symptoms look like those of nutritional deficiencies the identification can be confirmed by

spraying a solution of the possible element in its salt form and usually recovery will occur

within a week and identification can be confirmed. These non parasitic, non infectious

diseases are due to disturbances in the plant body caused by lack of proper

environmental conditions of soil and air, low and very high temperatures, unfavourable

oxygen relations, unfavourable soil moisture, pH, presence of toxic gases in the

atmosphere, mineral excess and deficiencies in the soil etc., are the major causes of non

parasitic diseases.

**Examples**

**Low temperature :** potato tuber injury

**High temperature :** blossom end rot of citrus fruit

**Effect of light :** bean scald

**Excessive moisture:** blossom end rot of tomato

**Low oxygen :** black heart of potato

**Air pollution :** ozone on corn

**Chemical injury :** ammonia on apple

**Herbicide injury :** 2, 4-D on dicot leaf

**Nutrient deficiency:** Zn on citrus

**Steps in disease diagnosis**

The basic steps involved in plant disease diagnosis are as follows.

1. Obtain background information on host and disease

Description of the problem

Identification of host cultivar

Planting date

Source of seed

Habitat of diseased plant

Soil type

Cultural practices

Disease history

Environmental conditions

Pattern of disease

2. Obtain a good sample of diseased plant or its parts.

Fresh sample in various stages of diseases development

3. Examine the plant and describe

Signs/symptoms of disease

Plant parts affected

Most common symptom

Visible signs of the pathogen

By critical examination of sign and symptoms produced in the plant one can identify the

broad group to which the causal agent belongs.

4. Obtain literature description regarding the disease for the particular host

5. Identify the disease by comparing your description of disease with published

description.

**Exercise: Identification of symptoms and signs**: Categories of specimens to provide

1. **Necrotic:** Blight, damping off, leaf spot, root rot.

2. **Colour change:** mosaic,

3. **Wilt:** vascular wilts

4. **Hyper-plastic:** club root, scab, root knot nematode

5. **Hypo-plastic:** yellows

**Materials for work on signs**

6. **Bacterial:** Wilt (vascular plugging), blight (ooze)

7. **Fungal:** Powdery mildew (mycelium), Sclerotia, rusts, smuts, Nematodes (root

knot galls).