LESSON TEN

Solanaceae Diseases

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In this lesson we will study the diseases of the Solanaceae. Parts of the lesson are underlined. Younger members can ignore these parts. Make sure you do everything **in bold print**, answer all the questions, do one of the projects, and fill in the chart at the end of the lesson. WORDS PRINTED IN ALL CAPITAL LETTERS may be new vocabulary words. Pay special attention to their meaning. Definitions can be found in the Glossary.

INTRODUCTION

A. PLANT DISEASES

Plant diseases are not new. They are mentioned in ancient records. Plant diseases affect all types of plants, both wild and cultivated. It is easy for us to understand what disease means when we talk about human beings. But what is a plant disease? When are plants diseased? What is your answer to these questions?

_____

_____

Scientists consider a plant disease as anything that prevents the normal development of a plant and reduces the plant's economic or aesthetic value. About 30% of the world's crops are lost to plant diseases and weeds.

Question 1: How much of the world's crops are lost to plant diseases and to insect pests? (Hint, check Lesson 7) _____

PLANT PATHOLOGY is the science of plant diseases. A PLANT PATHOLOGIST studies the effects and causes of plant diseases and how to control them.

Plant disease can be caused by living agents (BIOTIC). Some diseases do not have a biotic cause, they are ABIOTIC diseases. ABIOTIC diseases are also called NONPARASITIC DISEASES. They result from unfavorable growing conditions. Examples of a NONPARASITIC DISEASE is too much or too little rain, temperature which are too high or too low, toxic chemicals, not enough

nutrients in the soil, and even mechanical damage. Can an abiotic disease spread from one plant to the next?

_____

Why not?

_____

_____

Do humans get NONPARASITIC DISEASES? _____

Can you give an example?

_____

B. BIOTIC AGENTS OF PLANT DISEASES

Diseases caused by BIOTIC agents are sometimes called PARASITIC DISEASES. The plant is infected by the disease causing agent, also called the PATHOGEN. The BIOTIC agent uses the plant for food and/or to complete its own life cycle. The most common causes of PARASITIC DISEASES are FUNGI, BACTERIA, PHYTOPLASMAS, VIRUSES, and NEMATODES.

FUNGI are organisms which do not have chlorophyll. They can not make their own food. If they are a disease agent, they use the plant as a food source. The best known FUNGI to most of us are mushrooms and bread mold. Some diseases caused by FUNGI that you might know are mildews and smuts. There are over 100,000 different FUNGI. About 8,000 are plant PATHOGENS. FUNGI are the most numerous of the BIOTIC agents. FUNGI are also the BIOTIC disease agents which cause the most economic damage. Can you name a human disease caused by fungus? _____

BACTERIA are one celled organisms. They are the second most important BIOTIC plant disease agent. Can you name a human disease caused by bacteria?

_____

BACTERIA are able to reproduce every 20 to 60 minutes. One BACTERIUM can result in 17,000,000 BACTERIA in one day.

NEMATODES are microscopic round worms found in the soil. NEMATODE caused diseases usually result in poor plant growth. Poor plant growth can lead to significant decreases in crop yields.

VIRUSES are the smallest know disease producing agents which can be spread

from one plant to the next. Many VIRUSES are spread by insects, especially aphids and leaf hoppers. Can you name a human disease caused by a virus?

_____

PHYTOPLASMAS are small bacteria like organisms. They are mostly spread by leaf hoppers.

C. DISEASE TRIANGLE

PLANT PATHOLOGISTS use an important concept when talking about BIOTIC plant diseases. It is the disease triangle.

The disease triangle is made up of the PATHOGEN, a susceptible host (the plant, and the proper environment allowing for infection. The job of a PLANT PATHOLOGIST is to figure out how to interrupt the disease triangle. It is important to remember that a BIOTIC agent will not cause a disease in every plant. Some BIOTIC agents only cause diseases in certain types of plants. Some BIOTIC agents can only cause a disease under certain environmental conditions.

There are different ways to fight plant diseases. Scientists have developed plant breeds that are not affected by certain diseases. They have interrupted the triangle by eliminating the host. Some diseases can be limited by planting seeds later when conditions are dry, eliminating proper environment for disease development. Carefully removing all plant debris at the end of the growing season is another way of eliminating the disease causing organisms. Some farmers use **fungicides** to combat some diseases, again eliminating the PATHOGEN.

D. IMPORTANT DIESEASES OF SOME SOLANACEAE

There are many different diseases which can affect the peppers, tomatoes, and potatoes. We will study only 15 of them. The diseases are:

1. Late Blight
2. Anthracnose Fruit Rot
3. Bacterial Spot of Pepper
4. Fusarium and Verticillium Wilts
5. Bacterial Spot, Speck, Canker of Tomato
6. Blossom-End Rot of Tomato, Pepper, and Eggplant
7. Phytophthora Bight of Pepper
8. Septoria Leaf Spot of Tomatoes

9. Rhizoctonia Stem and Stolon Canker of Potato
10. Fusarium Dry Rot and Seed-Piece Decay of Potato
11. Blackleg, Aerial Stem Rot, and Tuber Soft Rot of Potato
12. Scab of Potato Tubers
13. Potato Pink Rot, Pythium Leak and Seed-Piece Decay
14. Bacterial Ring Rot of Potatoes
15. Early Blight of Potato and Tomato

Study the handout titled ‘Important Solanaceae Diseases - Quick Guide’. Complete the chart on the next page.

Glossary

ABIOTIC - nonliving
BACTERIA - one celled organisms
BIOTIC - living
FUNGI - organisms which do not have chlorophyll
FUNGICIDE - something, usually a chemical, which kills fungi
NEMATODES - microscopic round worms found in the soil
NONPARASITIC DISEASES - diseases which are not caused by a biotic agent
PARASITIC DISEASES - disease caused by an organism.
PATHOGEN - disease causing agent
PLANT PATHOLOGIST - scientists who study the effects and causes of plant diseases and how to control them
PLANT PATHOLOGY - the science of plant diseases
PHYTOPLASMAS - small bacteria like organisms
VIRUSES - the smallest know disease producing agents which can be spread from one plant to the next.