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## IDENTIFICATION AND PREVENTION OF DISEASES IN THE HOME VEGETABLE GARDEN

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Prevention of diseases in the home vegetable garden is challenging because of the wide variety of vegetables grown, the small garden area available for rotation, the practice of intensive cropping and the large number of diseases which may attack vegetables. Accurate diagnosis should proceed the making of recommendations and the implementation of preventative measures\*.

### Diagnosis of Plant Diseases:

The diagnosis of diseases should be undertaken in a well organized logical manner. The following suggestions are intended to provide a framework to be used in the diagnosis of plant diseases.

### IDENTIFY THE VEGETABLE IN QUESTION:

- A. Cultural or Environmental Problems
  1. Nutritional
    - a. Deficiency; various kinds of symptoms involved such as poor growth, leaves not a dark shade of green, most of the vegetables showing the same or similar symptoms.
    - b. Toxicity; excessive amount of fertilizer leading to high soluble salts.
  2. Soil problem
    - a. Poor drainage -- soil waterlogged
    - b. Poor soil structure -- hardpan, water runs off the surface rapidly
    - c. Unfavorable pH -- this may lead to a nutrient deficiency or toxicity.
  3. Fungicide or insecticide burn (usually uniform over the area sprayed with the pesticide).
    - a. Leaves burned or spotted or may show abnormal growth
    - b. Problem is transitory, new growth is usually unaffected
  4. Climatic (problem occurs uniformly)
    - a. High temperature injury
    - b. Low temperature injury
    - c. Sun scald
    - d. Wind injury
    - e. Hail injury
    - f. Lightning injury (usually a circular patch of dying plants)
    - g. A lack of or an excess of water following periods of drought or unusually heavy rainfall
    - h. Abiotic (physiological) frequently the cause of blossom end rot and leaf roll of tomato
    - i. Miscellaneous -- black walnut toxicity, uneven pesticide application, mechanical injury, bird or animal damage, air pollution.

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\*Colored slides of vegetable diseases are available from my office in the Department of Plant Pathology & Physiology, Virginia Polytechnic Institute and State University.

- B. Disease Symptoms or Signs (usually not uniform over the entire vegetable crop but instead occurring in areas or groups of plants).
  - 1. Necrotic (dead spots or areas on leaves, stems, fruit, or roots).
  - 2. Discoloration of the vascular system of the stem or petioles of the leaves.
  - 3. White powdery growth on the surface of the leaves.
  - 4. A rot or decay of plant tissues.
  - 5. Obvious fungal growth on leaves, stems, flowers, or fruit.
  - 6. A mottling or stipling of the leaves or abnormal development of leaves or fruit.
  - 7. Swellings on the roots.

#### EXAMINE VEGETABLES FOR PATTERNS OF SYMPTOMS

- A. Do the symptoms occur on many kinds or types of plants? If so, it is unlikely that a disease is involved.
- B. Is there a correlation with low or high elevation, nearness to shrubs or trees or other areas of little air movement?
- C. Is there an association with time of planting, variety, cultural practices, etc.?
- D. Does the problem seem to be spreading? If so, under what particular conditions?

#### COLLECT HELPFUL BACKGROUND INFORMATION

- A. Date the symptoms were first noticed
- B. History of the garden area
- C.
  - 1. Fertilization programs
  - 2. Previous pesticide application
  - 3. Previous problems
- C. Weather conditions and watering or irrigation practices
- D. Source of seed or transplants

#### RECOMMENDED EQUIPMENT HELPFUL IN THE DIAGNOSIS OF VEGETABLE DISEASES

- A. A hand lens, 10X
- B. A sharp knife
- C. Plastic bags and labels
- D. A hand trowel
- E. Notebook and pencils

#### PREVENTION OF VEGETABLE DISEASES IN THE HOME GARDENS

- A. Plants are bred or developed resistant or immune to diseases. Vegetables may also be made more tolerant to disease by balanced nutrition.
- B. The environment is made less favorable for disease development. The basic concept is to grow the vegetable in an environment which will be unfavorable to the growth, multiplication and spread of disease producing organisms. This can be done by the following.
  - 1. Keeping the foliage as dry as possible for as long as possible. Bacteria and fungi (with the exception of powdery mildews) require free moisture on the foliage for 3 to 12 hours or more for infection to take place. Therefore, spacing rows and orienting them to take advantage of the drying effects of the daily winds, plus irrigating or sprinkling only when the temperatures are rising, (usually in the

- morning), will help reduce the time the foliage will remain wet. Weed control is also important since the weeds may slow down air movement. Avoid working among the plants when the leaves are wet because this may promote disease spread from plant to plant.
2. Provide good drainage and aeration. Water should drain from the soil rapidly and the surface should dry out to prevent the development of root-rotting diseases. Planting in a well-prepared seedbed in well-drained soil will reduce the possibility of damping-off or seedling diseases.
  3. Mulching or staking plants (wire cages) so that the fruit does not come in contact with the soil. Many fruit rots can be avoided by this practice.
  4. Storing vegetables in a dry area or under refrigeration will prevent the development of rots caused by fungi and bacteria.
  5. Avoid injury to vegetables. Cuts, bruises, cracks and insect damage are often the site for infection by disease causing organisms.
- C. The disease causing organism is prevented from coming in contact with the vegetable.
1. Elimination of dead and diseased plant parts: Removal of diseased plant parts reduces the primary means of overwintering for certain disease organisms as well as reducing the amount of infectious material in the garden. Spading or roto-tilling under this diseased plant material will aid in the destruction of disease causing organisms. There are many beneficial bacteria, fungi and actinomycetes, in the soil.
  2. Rotating the vegetables resistant to certain diseases with susceptible ones. It is important to know the vegetables and weeds which are susceptible to certain diseases, and how long a period of rotation is necessary to starve out the disease-causing organisms. This is frequently impractical in the home garden where a small area is used repeatedly to grow vegetables.
  3. Planting only certified disease-free transplants and/or seed: Vegetable seed should be grown in dry, arid areas of the western United States. Transplants or seed of questionable origin should not be planted.
  4. Hot water treatment of seed is frequently provided by the seed company. This will prevent seed-borne diseases. Seed rot and damping-off of seedlings is prevented by application of a fungicide by the seed company.
- B. The use of fungicides on a preventative schedule before diseases occur is important. Insects which transmit disease-causing viruses, bacteria or fungi should be controlled with insecticides or other practices to prevent disease spread. Disease prevention is possible if all above-ground plant parts and surfaces are covered with a fungicide with applications starting before the disease occurs. Most fungicides are protective and not curative in their actions. Applications at intervals of 5-10 days must be used when conditions are favorable for disease development. Sprays are more effective than dusts in the home vegetable garden because of improved coverage and weathering of the chemical.
- C. Crop rotation is often impractical in the home garden and many of our disease causing fungi can persist for long periods of time in the soil. The crucifer club root fungus for example will survive for 7 years. Therefore, the use of a chemical which will fumigate or eradicate disease-causing organisms in the soil like Vapam is suggested. (See manufactureres label.)