Outline of Basics for Managing Vegetable Diseases with Focus on Biology

Understanding biology is key to managing diseases successfully, especially with cultural practices.

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Additional information posted at: http://www.longislandhort.cornell.edu/vegpath/organic.html

I. Requirements for Disease (first 3 form the ‘Disease Triangle’)
   1. Pathogen (disease-causing organism)
   2. Susceptible plant
   3. Favorable environmental conditions
   4. Time for disease to develop

II. Management of Diseases
    Focus on Prevention. Integrated approach. No cures.

III. Components of Disease Cycle to Target in Managing (these vary among diseases)
   A. Sources of Disease-causing Organisms
      1. Infested debris
      2. Infested seed or infected transplants
      3. Live in soil in absence of host
      4. Alternate hosts (weeds, other crops)
      5. Plants in another location
      6. Survival structures (ex. fungal sclerotia, nematode cysts)
      7. Insect vectors

   B. Mechanisms for Dispersal
      1. Wind
      2. Rain and irrigation
      3. Soil
      4. Seed
      5. Insects and other vectors
      6. Humans (handling, machinery)

IV. Management Practices (these vary among diseases)
   A. Control the Source of Pathogens
      1. Select certified 'disease-free' seed and transplants.
      2. Treat seed with hot water.
      3. Rotate land to a non-susceptible crop for at least one year (longer for some diseases).
      4. Control weeds.
      5. Control insect vectors.
6. Plant when pathogen does not normally occur.
7. Exclude exotic pathogens.
8. Destroy infected plants when disease is detected early, few plants are affected, and the pathogen likely has not opportunity for extensive spread.
9. Amending soil with compost might increase activity of beneficial microorganisms.


B. Minimize the Opportunity for Dispersal
   1. Cover soil with mulch.
   2. Do not handle plants when they are wet.
   3. Disinfect pruning and cutting tools frequently.
   4. Physically separate plantings of similar crops.

C. Reduce Plant Susceptibility
   1. Select disease resistant varieties.
   2. Maintain plant vigor through proper nutrition, watering, weed control, etc. But avoid luxuriant growth.
   3. Plant when temperatures are favorable for germination and growth of the plant.
   4. Hairy vetch mulch has been shown to induce resistance in tomato.
   5. Apply organic fungicides that function by inducing plant resistance.

D. Make the Environment Less Favorable for Disease Development
   1. Locate plants where there is good air movement, avoid shady areas, and plant rows parallel to the prevailing wind direction.
   2. Use raised beds.
   3. Plant when conditions are not favorable for disease.
   4. Grow a diversity of crops.
   5. Stake or trellis plants when possible.
   6. Avoid a dense plant population.
   7. Control weeds.
   8. Provide adequate soil moisture - do not over or under water.
   9. Use trickle irrigation or use sprinkle irrigation in morning before a good drying period.

E. Examine Plants Weekly. Identify Cause of Any Problems.

F. Suppress Disease Development by Applying Fungicides
   1. Most effective when used preventively or at the first sign of disease. Fungicides that function by inducing plant resistance are most effective applied before disease onset. Products with biocontrol agents for soil-borne pathogens need to be applied before planting.