

Plant Disease Control

Principles of Plant Disease Management

- Pathogen Exclusion
- Pathogen eradication and reduction of inoculum
- Plant protection
- Resistant Varieties
- Integrated Management



Epidemic of Sudden Oak Death in Big Sur

Photo courtesy of D.M. Rizzo Lab, UC Davis.

Plant Disease Control

Principles of Plant Disease Management

Pathogen Exclusion:

- Prevent the transportation and introduction of plant pathogens
- Government regulations prevent introductions
 - Quarantine stations
 - “Samsonite invaders”
- Purchase of certified disease free stock, clean seed
- Seed treatments (fungicides on seed coating) and disinfestations
- Modify actions to prevent spread into uncontaminated areas



Plant Disease Control

Principles of Plant Disease Management

Pathogen eradication and reduction of inoculum

- Prevents spread of introduced diseases, reduces inoculum density
- **Sanitation** – cleaning of tools and clothing (10% bleach sol'n), removal of infected plant debris
- **Roguing and pruning** of diseased plants and infected wood
- **Crop Rotation** – Planting a non-host crop can reduce (but not eliminate) density of the pathogen. Do not plant crops of the same family in the same position in the garden every year.
- **Eliminate weeds and alternative hosts** – serve as reservoir for fungi/viruses
- **Use of techniques that disfavor vectors/movement** – reflective mulches for aphids, sticky cards for other insect vectors, trench barriers for root diseases
- **Soil Sterilization** – Use of 1-2 mil thick plastic for 4-6 weeks can reduce inoculum density by heating the top 6" of the soil to lethal temps.
- **Biocontrol** – suppressive soils



UC Statewide IPM Program
© 2002 Regents, University of California

Plant Disease Control

Principles of Plant Disease Management

Plant protection

- Practical disease avoidance and the use of pesticides
 - Use of Biocontrol and Fungicides
 - Plant at a time of year that does not favor disease
 - Provide adequate plant spacing – avoid crowding
 - Provide adequate fertilization and irrigation – do not over feed plants!
 - Group plants according to their nutrient and water needs
 - Handle plants and plant parts carefully during transplanting, harvest
 - Avoid injury to the plants – make proper pruning cuts, use care when harvesting



Plant Disease Control

Principles of Plant Disease Management

Resistant Varieties

- The most reliable, effective , and economical way of controlling plant diseases
- Contain resistance genes within the plant
 - **Horizontal resistance**
 - physical barriers, synthesis of toxins, plant systemic immune response (Salicylic acid), mild infections
 - **Vertical resistance** – one gene - one protein, no infection
- **Resistance** – crop can endure an attack by a pathogen (Penetration, no colonization)
- **Tolerant** - a crop can live with disease or infection (colonization occurs, mild infections)
- **Immunity** – a crop would not be attacked by a pathogen (Penetration does not occur)
- Improper planting of a resistant variety may negate traits and even may break the resistance gene!



Photographer - Kent Loeffler
Cornell University, Dept. of Plant
Pathology, 2004

Plant Disease Control

Principles of Plant Disease Management

Integrated Management (IM)

- Uses all pertinent information regarding crop, pathogens, history of disease, varietal resistance, environmental conditions, land, labor, and costs of treatment
- Main goals of IM:
 1. Eliminate or reduce inoculum
 2. Reduce the effectiveness of initial inoculum
 3. Increase resistance within the host
 4. Delay the onset of disease
 5. Slow the secondary cycles
- Uses several methods in which routine use provides disease control



Plant Disease Control

Management of Fungal Diseases

Fungicides

- serves as a protectant
- timing is critical
- observe and take careful notes regarding pest outbreaks and pesticides applied

Resistant varieties

- powdery mildew and vascular wilts (VFW)

Certified planting stock

Garden Sanitation

- Rid garden of plant debris by tilling, practices that aid breakdown

Proper irrigation and drainage – match the water penetration rate with application rate

Crop rotation – reduces initial inoculum

Plant Disease Control

Management of Bacterial Diseases

Resistant varieties

Certified planting stock – Avoid plants that have suspicious bumps, cankers, abnormal growth

Garden Sanitation

- Rid garden of plant debris by tilling, practices that aid breakdown

Proper irrigation – Sprinkler irrigation increases bacterial diseases, avoid wet locations

Crop spacing – High density plantings have increased canopy humidity

Crop rotation – reduces initial inoculum

Plant Disease Control

Management of Viral Diseases

Certified planting stock – Avoid plants that have suspicious bumps, cankers, abnormal growth

Garden Sanitation

- Rid garden of plant debris and **weeds** by tilling, practices that aid breakdown

Resistant varieties

Reduce the presence of vectors– Use insecticides, sticky cards, pheromones, etc.

Worker Sanitation– Clean tools and hands after handling virus infected plants

Plant Disease Control

Management of Nematodes

Crop rotation to Non-host plants— reduces nematode populations

Resistant varieties

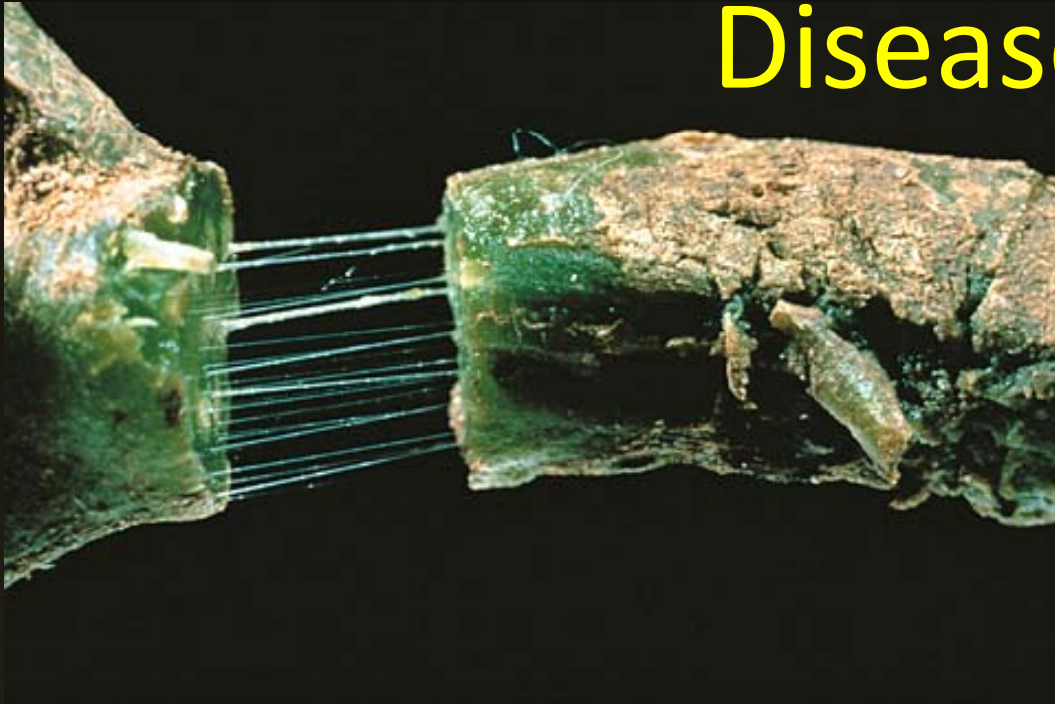
Certified planting stock — Avoid plants that have suspicious bumps, cankers, abnormal growth

Garden Sanitation

- Rid garden of plant debris by tilling, practices that aid breakdown

Solar Sterilization of soil— Reduces population of nematodes

Symptoms and Signs of Bacterial Diseases



Symptoms and Signs of Fungal Diseases

