

Integrated Pest Management

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Reasons for IPM

- Not primarily for pesticide reduction
- Plant health is the goal
- Manage pests at acceptable levels, rather than eliminate them
- Need to weigh social, economic, and environmental costs

Pests in the Landscape

- Rodents
- Diseases
- Slugs and Snails
- Environmental Conditions
- Mites
- Birds
- Insects
- People



Aesthetic Injury Threshold

- The amount of injury the gardener will tolerate to plant materials

Economic Control Threshold

- The amount of injury the plant will tolerate without economic damage

Integrated Pest Management Options

- Regulatory Controls
- Genetic Controls
- Cultural Controls
- Chemical Controls
- Mechanical Controls
- Biological Controls

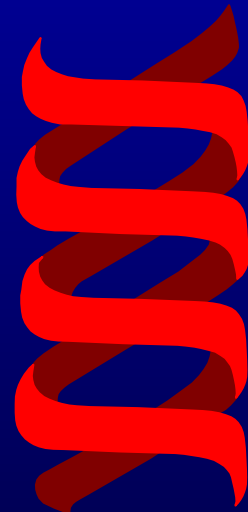
Regulatory Controls

- Exclude potential problems by
 - Large-scale cooperative efforts
 - Inspections
 - Quarantines



Genetic Controls

- Autocidal
 - Modifying the pest populations so they become self-destructive
- Host Resistance
 - Plants resistance to pests



Natural and Biological Controls

- Natural controls include environmental factors, plant resistance, and predatory insects
- Remember effects of pesticides on beneficial insects

Biological Controls

- Predators
- Parasites
- Competitors



Biological Controls

- Spider mites
 - Predatory mites, minute pirate bugs, Stethorus ladybird beetles, predatory thrips
- Aphids
 - Parasitic wasps, ladybird beetles, sylphid flies, lacewings
- Scales
 - parasitic wasps, ladybird beetles, lacewings

Biological Controls

- Leaf beetles
 - Parasitic wasps, fungus disease, spiders, stink bugs
- Bark beetles
 - Fungus diseases, parasitic wasps, clerid beetles
- Gall midges
 - Parasitic wasps, predatory midges
- Tip moths
 - Parasitic wasps, tachinid flies

Biological Controls

- Tussock moths
 - Parasitic wasps, virus disease, tachinid flies, spiders, paper wasps
- Leafrollers
 - Parasitic wasps, tachinid flies, spiders, paper wasps
- Leafminers
 - Damselfly bugs, stink bugs, parasitic wasps

Biological Controls

- *Bacillus thuringiensis*
 - Bacterial disease of certain insects
 - Essentially non-toxic to higher animals
 - No withdrawal period
 - Usually for caterpillars only
 - Insects must eat treated plants, so thorough coverage is essential

Biological Controls

- Insect-Parasitic Nematodes
 - Roundworms that are parasites of insects
 - These are mainly experimental for now

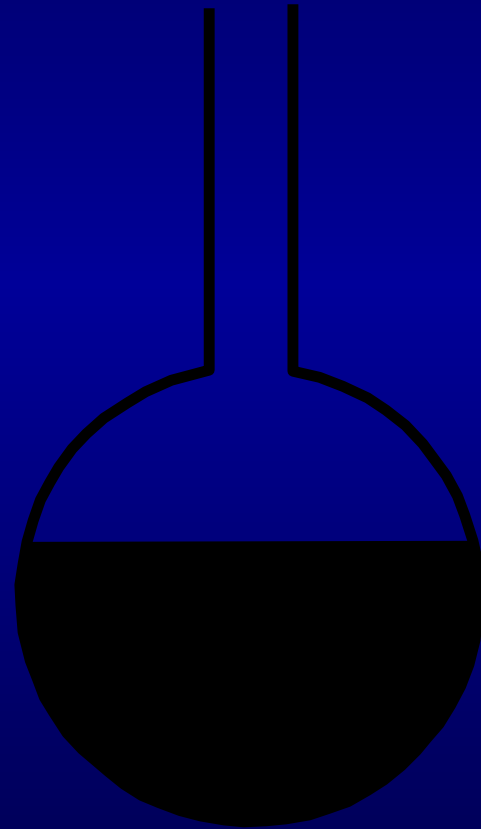
Cultural Controls

- Planting time
- Pest-free plants
- Prune correctly
- Maintain plant vigor
- Species diversity
- Resistant varieties
- Burning
- Mulching
- Sanitation
- Cultivation
- Eradication



Chemical Control

- Organic controls
- Synthetic controls
- Biorational controls



Chemical Controls

- Oils
 - Highly refined oils
 - Kill by suffocation
 - Best applied before bud break
 - Fairly safe to humans and pets
 - Many plants are injured by oils

Chemical Controls

- Insecticidal Soaps
 - Best for small, soft bodied insects, including aphids, mites, psyllids
 - Very safe to applicator, pets, wildlife, and beneficial insects
 - Some plants are injured by soaps
 - Thorough application is necessary

Chemical Control

- Systemic pesticides
 - Absorbed by plant and move within the plant
 - Best for hard-to-reach pests
 - Most are for foliar application
 - Trunk injections are becoming rare

Chemical Control

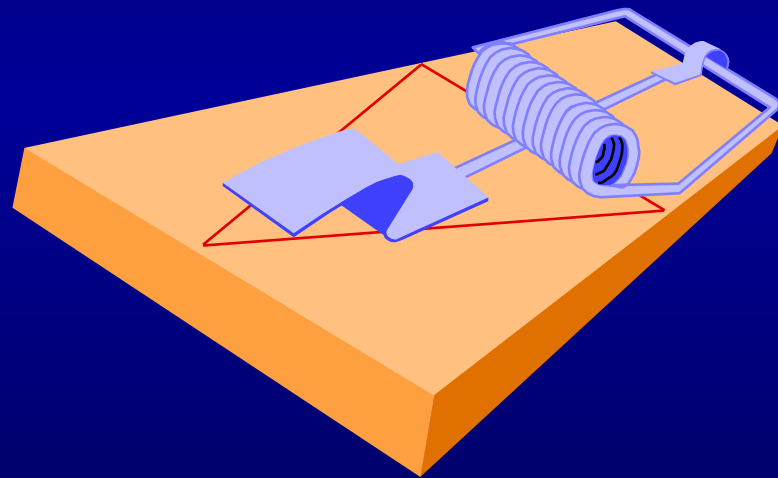
- Spray Adjuvants
 - Buffering agents -- control pH
 - Surfactants -- control surface tension, allowing better spread of pesticide
 - Stickers -- provide better adherence to foliage

Chemical Control

- Pesticide Phytotoxicity
 - Fungicides or insecticides may damage plants
 - High temperatures aggravate injury
 - Water stress may increase sensitivity
 - Contamination of sprayer by herbicides (not a true phytotoxicity)
 - Incompatibility of mixed pesticides
 - Wettable powders worse than liquids
 - Application of excessive amounts

Mechanical Controls

- Pheromone traps
- Light traps
- Bait traps
- Screens



Mechanical Control

- Insect Traps
 - Pheromone Traps -- attract insects with sex attractants, usually used to monitor flight times to time spraying
- Light Traps
 - “Bug Zappers” -- of little use