Ornamental Pest Management

Training for Commercial Pesticide Applicators

Category 3b

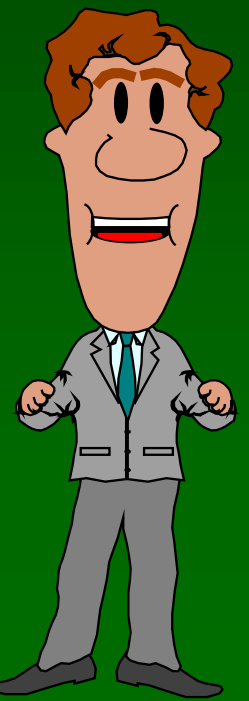
MSU Extension

Developed by Greg Patchan,
MSU Extension

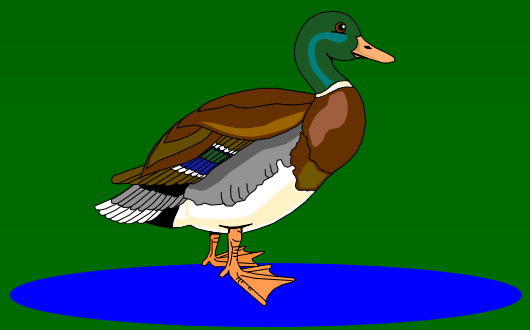
Principles of Pest Management

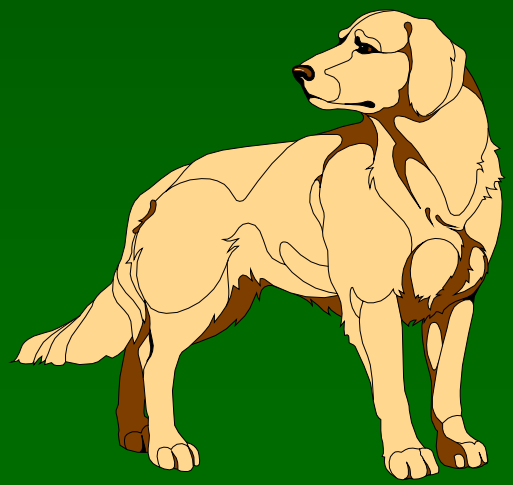
Chapter 1

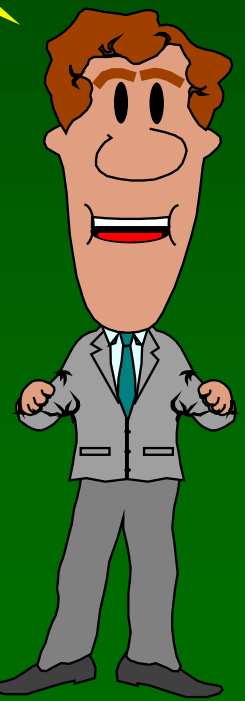
A pesticide applicator doesn't *just* apply pesticides. Social and legal responsibilities accompany the use of toxic materials.



Pesticide application must protect plant material from pest injury without harming nontarget organisms.





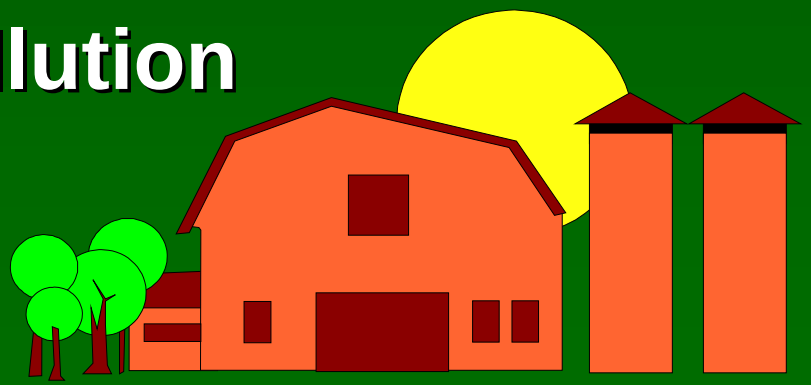


IPM

- **Use of all available strategies to manage pests**
  - Resistance, cultural practices, natural enemies, mechanical controls, pesticides
- **Achieve acceptable yield & quality with least environmental disruption**
- **Not anti- pesticide**

IPM developed because....

- No one method achieves long term pest management
- Pest management is a component of plant care
- It can reduce costs
- Failures, resistance, pollution occurred

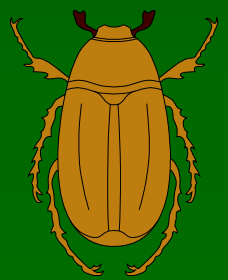


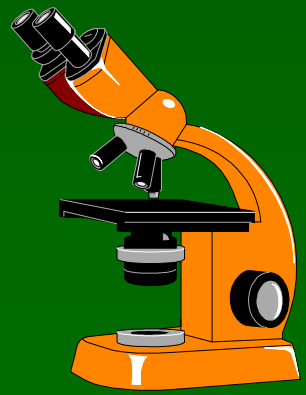
IPM Steps for Landscapes

- Detection of agents injuring plants
- Identification of agents injuring plants
- Economic significance
- Selection of management methods
- Evaluation and recordkeeping

Detection

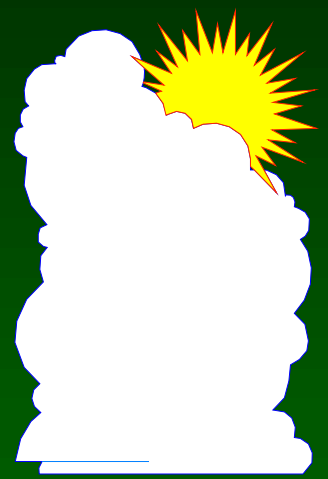
- **Benefits**
  - Low pest population
  - Discover population and life stages
  - Variety of management techniques available
  - Less toxic methods of management may be employed

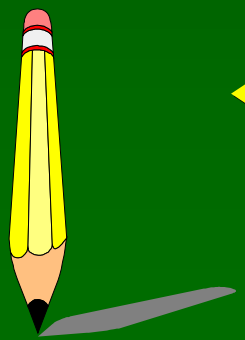




Monitoring

- **Scouting**
- **Traps**
- **Monitor weather**
- **Degree days (CAT Alerts)**
- **Phenology (Coincide)**
  - plant development relationships
- **Recordkeeping (data sheets)**



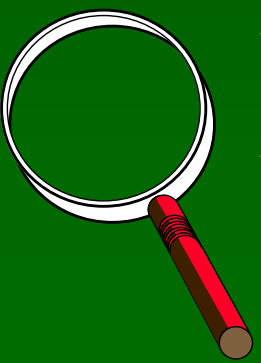


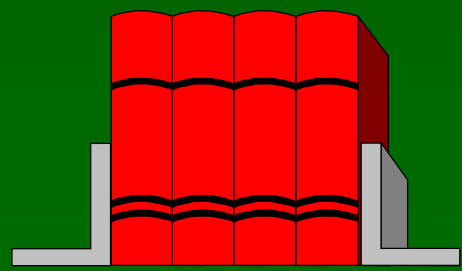
Identification

- **Know the healthy plant**
- **Know the agents damaging plants**
  - cultural, environmental
  - weeds
  - diseases
  - insects
  - animals

Diagnosing Plant Disorders

- Investigate the whole plant
- Symptoms
- Plant history
- Investigation tools
- References
- Diagnostic Lab
- Multiple causes possible

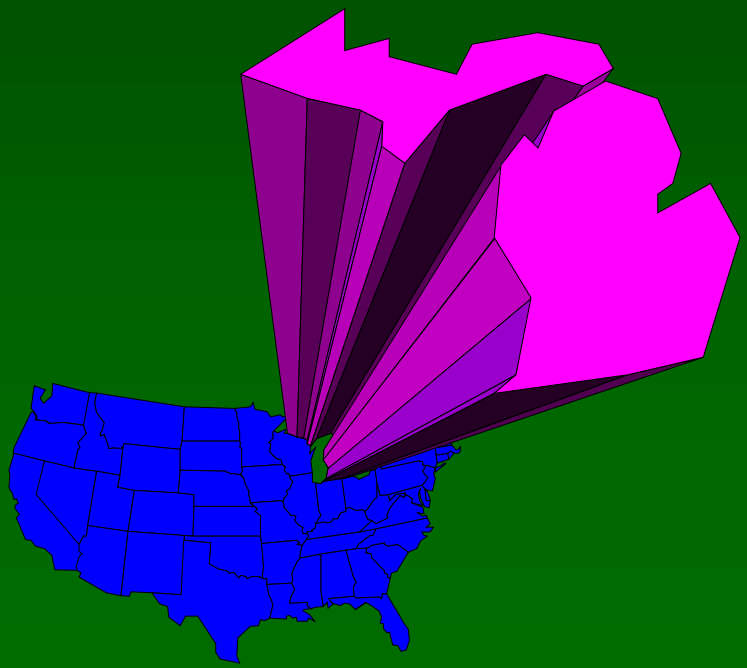




Economic Significance

- **Economic injury level**
  - cost vs benefit
- **Landscape injury level**
  - unacceptable injury
    - whose decision?
- **Action threshold**
  - pest level causing management action

Nursery stock must be certified ‘free’ from injurious insects and diseases.



MDA

Setting Landscape Injury Levels

- **Damage to plant health**
- **Damage to plant appearance**

Factors Influencing the Landscape Injury Level

- **Client tolerance of pest damage**
- **Landscape importance of host plant**
- **Pests' ability to reproduce & spread**
- **Expected pest reduction from natural and/or applied controls**

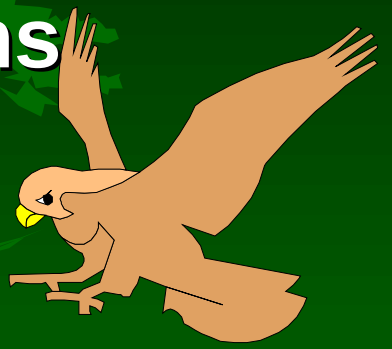
Setting landscape injury levels that reflect specific pest and host conditions is the cornerstone of IPM.

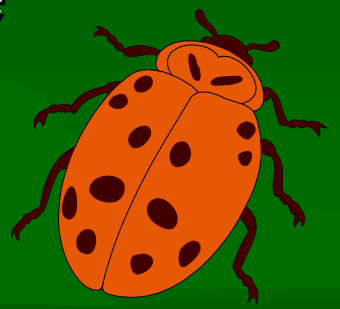
Selection of Methods

- **Many factors limit pest populations**
  - weather
  - natural enemies
  - plant defenses
  - controls implemented by people

Choose Management Methods…

- Least toxic to nontarget organisms
- Enhance natural controls
- May permanently limit the pest
- Least hazardous for the applicator
- Most likely to stay on the target site



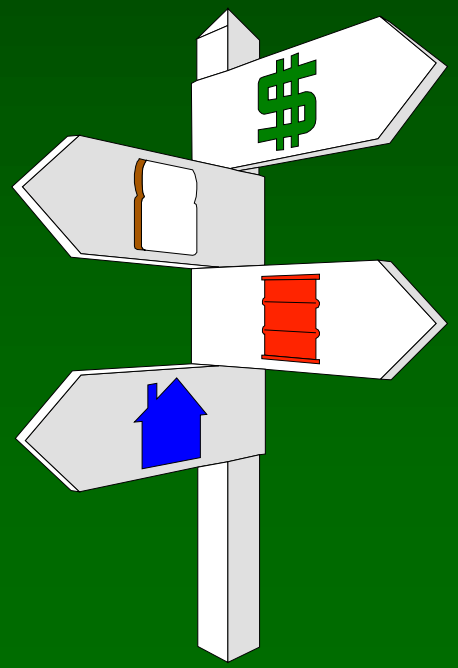


Factors That Limit Options

- **Budget**
- **Availability of equipment**
- **Availability of labor**
- **Time**
- **Availability of products**
- **Public/client acceptance of methods**

Evaluation

- **Were plants protected from serious injury?**
- **Negative consequences?**
  - environmental impacts
  - promotion of other pests
- **Practical?**
- **Cost?**

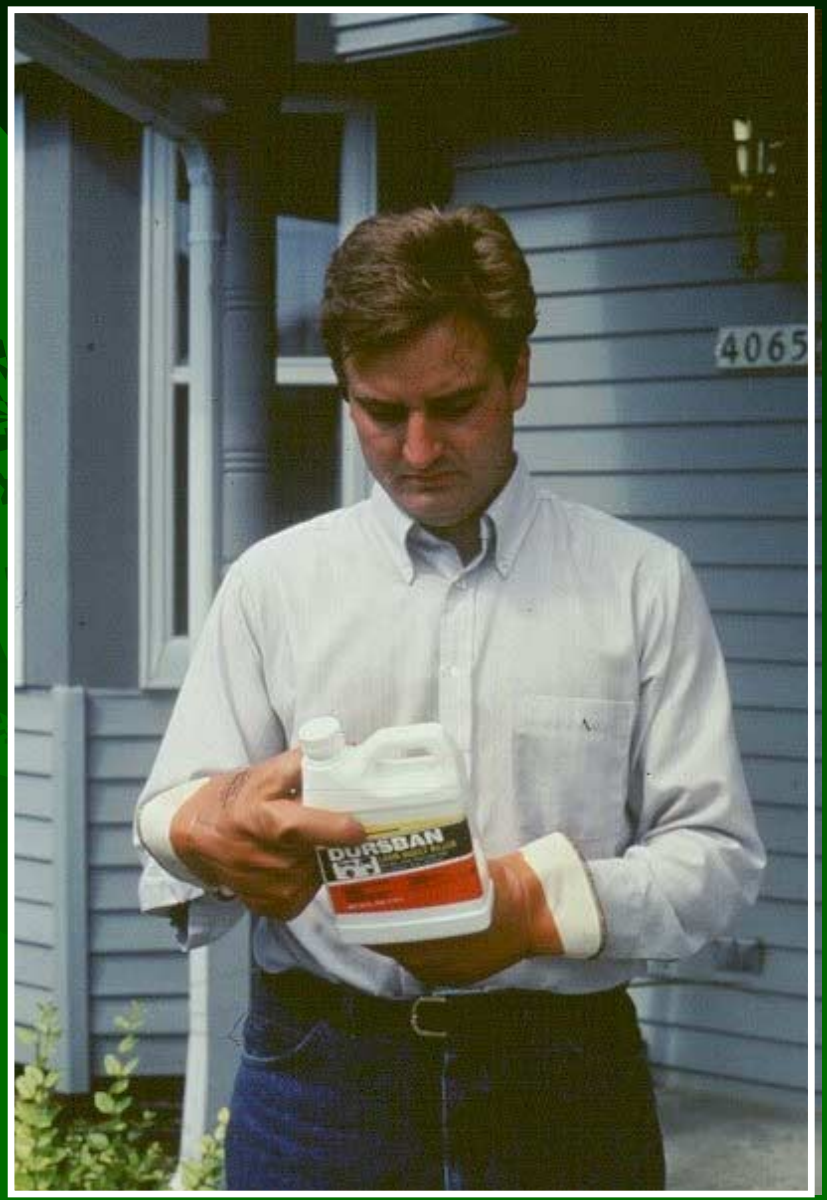


Ornamental Pest Management (Category 3B)

Pest Management Techniques

Chapter 2

Pesticides are commonly used for controlling pests but they are not the only tool.

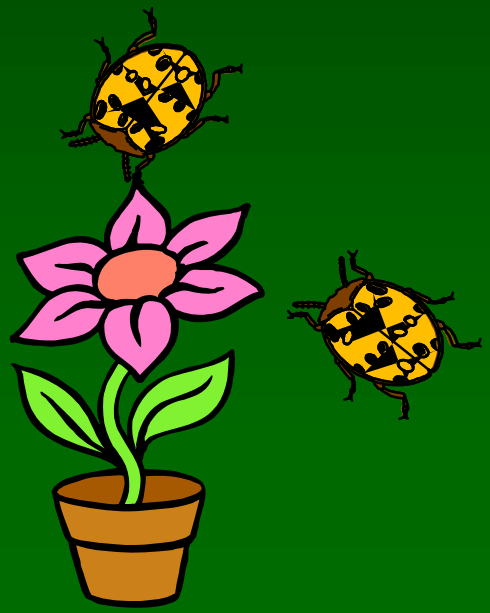


Pest Management Tactics

- Short term suppression
  - Pesticide application
- Long term maintenance of pest levels
  - Resistance
  - Environmental modifications
  - Cultural practices
  - Biological controls
    - ex. Japanese beetle management

Example: Japanese beetle management.

Host



Phone Call

Message

Plant susceptible to pest attack.

Plant Resistance

- Influence of overall plant health
  - Plant selection
  - Cultural care
  - Environmental modification

Plant Resistance

- Genetics
  - Species
    - cultivars
    - varieties

London plane tree and sycamore vary in their anthracnose susceptibility.

Cultural Controls

- Irrigation
- Drainage
- Soil fertility
- Soil aeration
- Shade
- Thinning
- Winter protection
- Enhance water penetration
- Reduce weed competition
- Sanitation

Black spot on roses.

Mechanical and Physical Controls

- Hand Removal
  - Egg masses
  - Weeds
- Traps
  - Moles

Mechanical and Physical Control

- Barriers
  - Rodent tree guards
  - Gypsy moth
- Repellants
  - Rodents

Biological Control

Spider

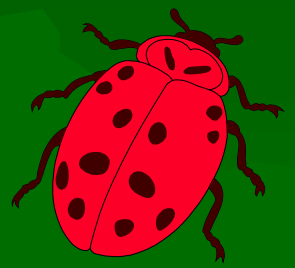
Lacewing

Biological Control

Parasitized caterpillar

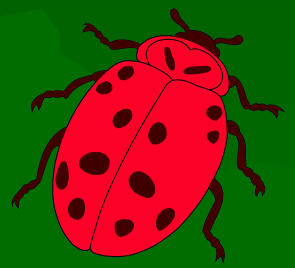
Biological Controls

- Encourage existing beneficials
  - Diverse landscapes
  - Reduce pesticide use, select “friendly” pesticides



Biological Controls

- Supplement natural enemy populations
  - Insect release
    - predators, parasites
  - Pathogen-based insecticides
    - *Bt*



Ornamental Pest Management (Category 3B)

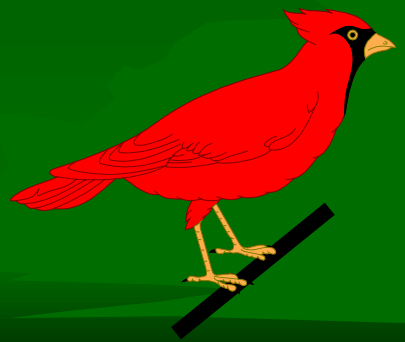
Application of Pesticides

Chapter 3


Choose the best pesticide.

Selecting a Pesticide

- Labeled for the pest
- Produces desired level of control
- Minimal disruption to the environment



Phytotoxicity

Selecting a Pesticide

- Not phytotoxic
- Compatible with plant management strategies
  - "Friendly" to beneficials
- Acceptable to the public, customers
  - Complex issue

Many pesticide choices.

Classifications of Pesticides

Classification	Targeted Pest
• Insecticide	Insects
• Acaricide	Mites, ticks
• Miticide	Mites
• Fungicide	Fungi
• Bactericide	Bacteria

Classifications of Pesticides

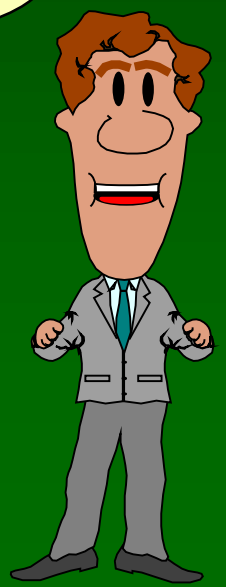
Classification	Targeted Pest
• Herbicide	Weeds
• Aquacide	Aquatic weeds
• Molluscicide	Snails and slugs
• Rodenticide	Mice, rats, rodents

Signal Word

- Toxicity Categories
  - Danger (I)
  - Warning (II)
  - Caution (III)
  - Caution (IV)

Pesticide Toxicity

Select “caution” pesticides when possible and avoid RUP’s!

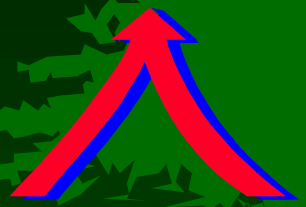


Pesticide Mode of Action

- Broad spectrum
- Residual pesticide
- Protectant
- Systemic
- Contact

- Pesticides are manufactured in many formulations.

Pesticide Formulations



- E, EC = emulsified concentrates
- WP = wettable powders
- F, FL = flowables
- G = granules
- Baits
- Injectables
- Implants
- WSP = water soluble packets

Pesticide Formulations

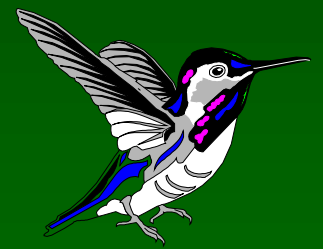
- Formulation
  - Application method
  - Risk when handling
  - Risk of moving off target
  - Advantages
  - Disadvantages

Application equipment should reflect the target plant, pest, and pesticide formulation.

Some pesticides are formulated as injections.

Pesticide Application Equipment

- Injection and implantation
  - Possible tree injury
  - Cost
  - Limited materials
  - No drift
  - Reduced injury to non-target organisms



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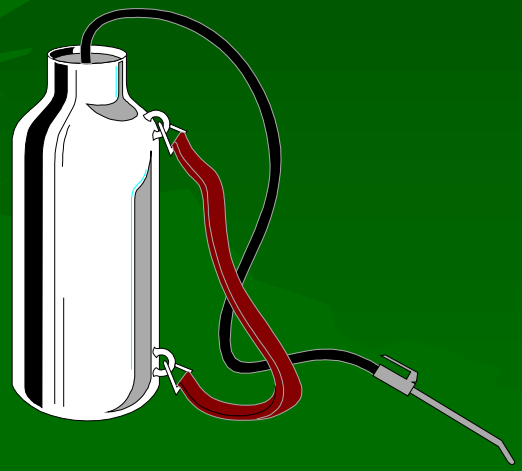
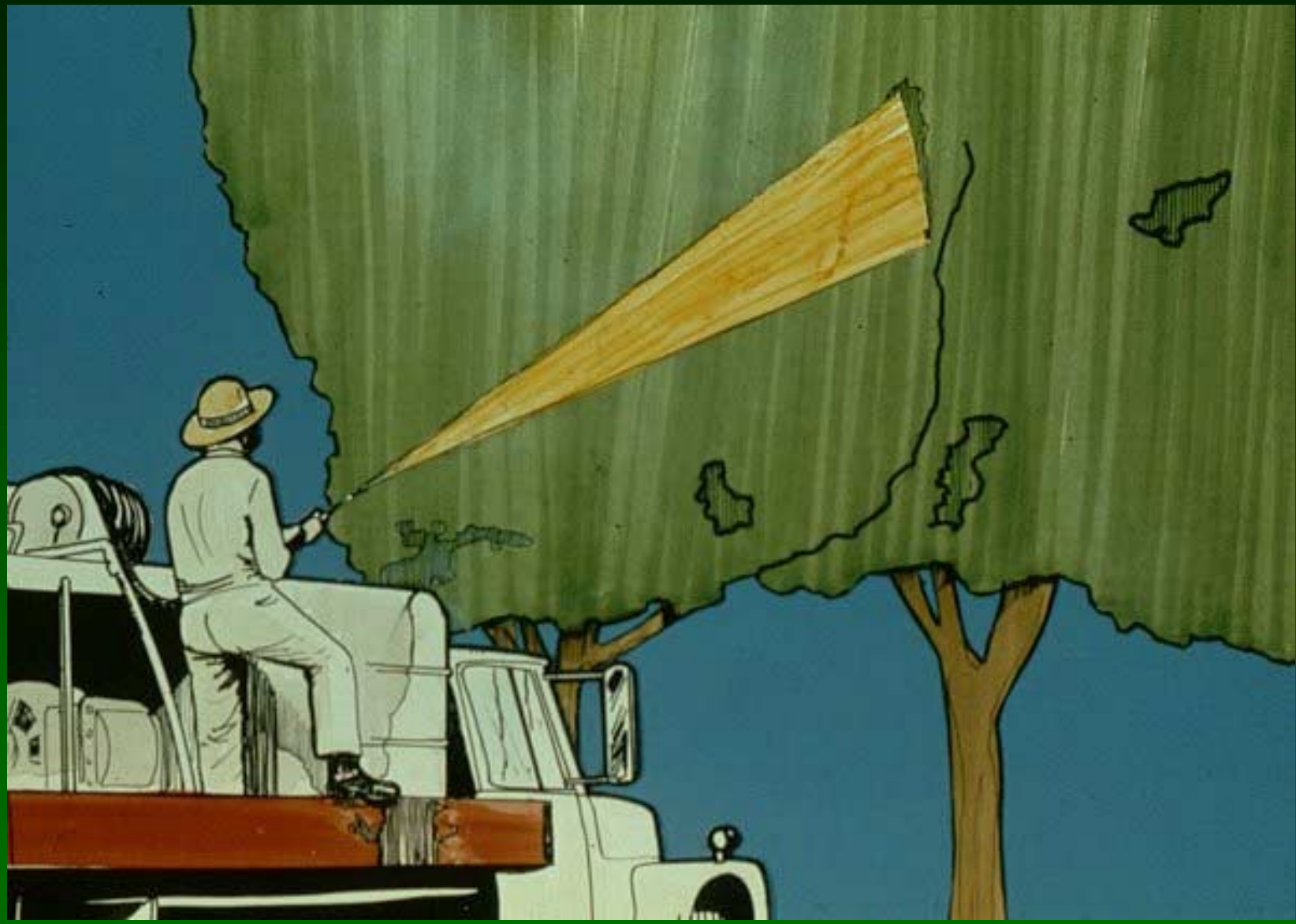
Pesticide Application Equipment

- Manual sprayers
  - Compressed air sprayers
    - Pressure drop off, settling, limited pressure & volume
  - Backpack sprayers
  - Wick applicators
    - “Targeted” application



Pesticide Application Equipment

- Power Sprayers
  - Small power sprayers
  - Hydraulic sprayers
    - Widely used for ornamentals, variable pressure, volume, drift?



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Pesticide Application Equipment

- Power Sprayers
  - Rotary (disk) nozzle sprayers
  - Mist blowers
    - Light weight, less water, drift?

Spray Application Techniques

- Select correct equipment
- Adjust nozzles, pressure, etc.
- Apply to where pests are located
- Obtain thorough coverage

Spray Application Tips

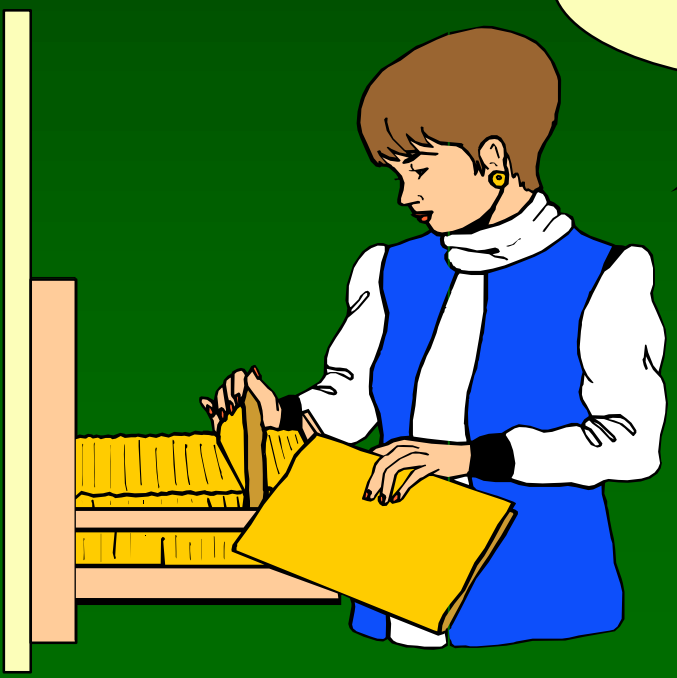
- Do *NOT* spray into or with the wind
- Use larger droplets in windy conditions
- Thoroughly coat treatment area
- For tall trees:
  - Use thin stream at top, changing to fan at bottom, apply from inside out, top to bottom
- Protect people, pets, wildlife, homes, etc.

Pesticide Record Keeping

- Name of applicator
- Address of application
- Name and concentration of pesticide
- Amount of pesticide
- Target pest
- Method and rate of application

Pesticide Record Keeping

Keep records for *at least one year* on general use pesticide applications. Keep RUP records for *three years.* Check with MDA for current regulations.



Ornamental Pest Management (Category 3B)

Pesticide Safety

Chapter 4

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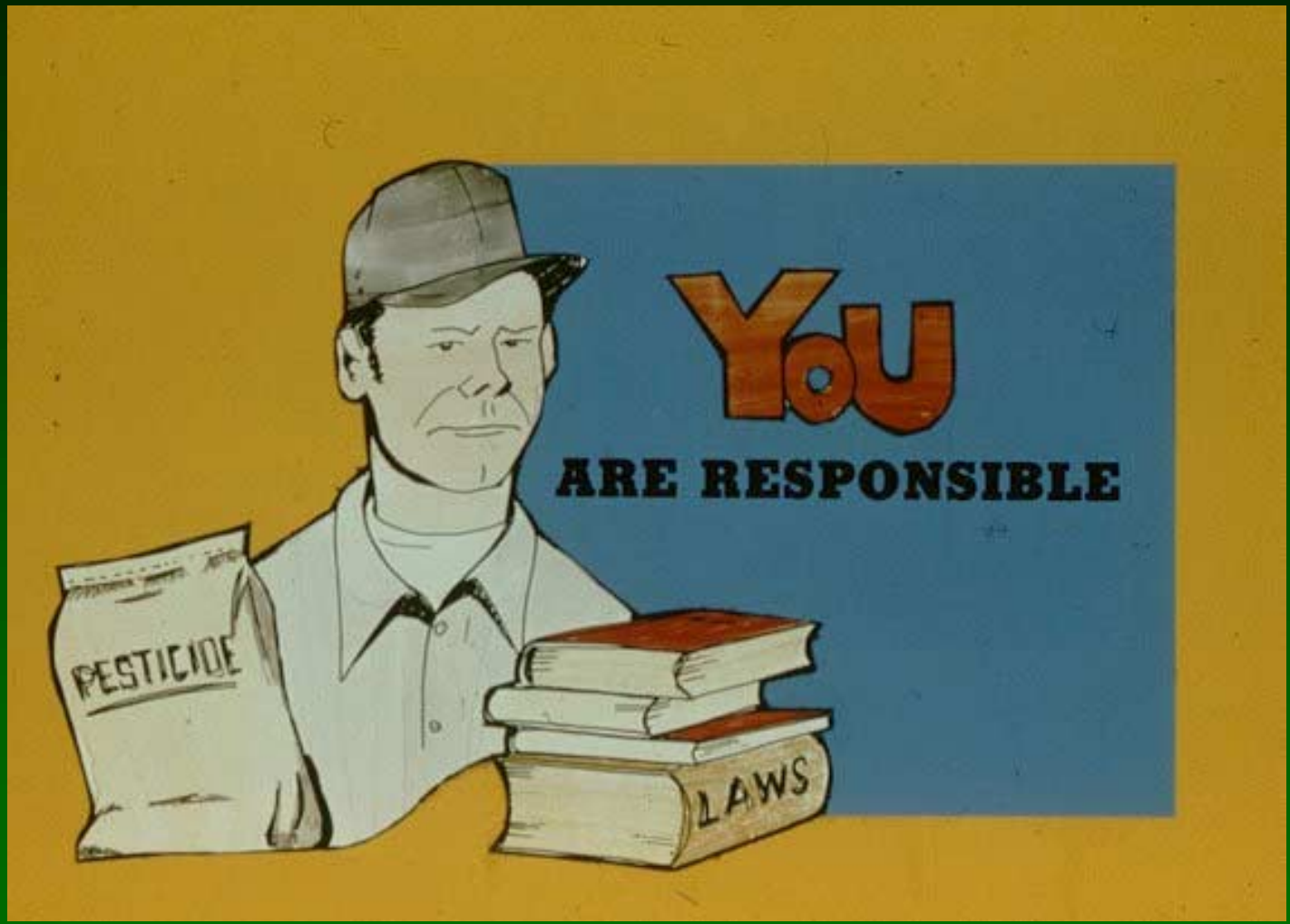

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Contact the MDA or MSU Extension to keep current with changing pesticide rules and regulations!

Read the label before selecting and applying any pesticide.

Applicator Safety

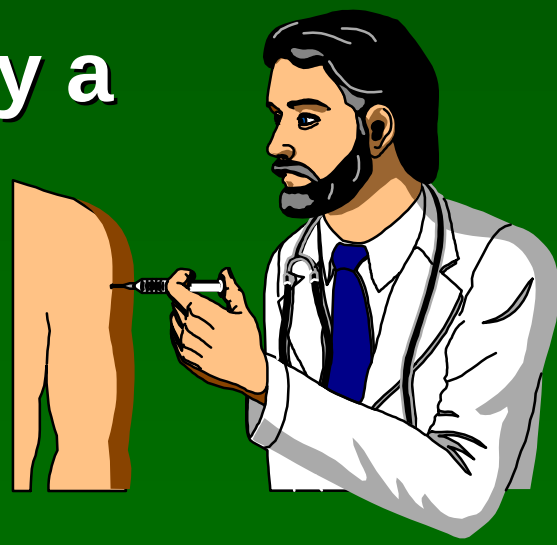
- You must comply with label guidelines - WPS
- Clean, service or replace gear regularly
- Wash gear and yourself

Applicator Safety

- Wear more gear during frequent applications or if pesticide sensitive
- Consider:
  - **Gloves, face and eye protection when mixing,**
  - **Plus hat and respirator for overhead applications.**

Applicator Cholinesterase Level

- For users of carbamate and organophosphate insecticides.
- Off season baseline level is required.
- Testing program implemented by a doctor.



Pesticide Poisoning

Most poisonings result from accidents, careless or ignorant use!

The best defense against harm is to be prepared!

First Aid and Safety Materials

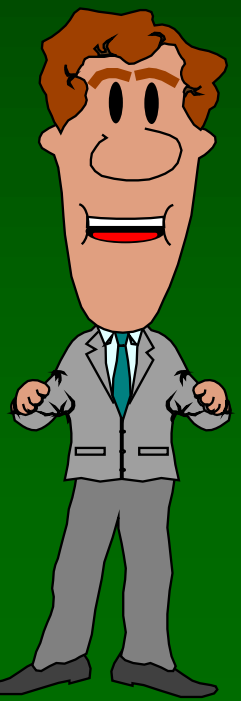
- **Pesticide label**
- **MSDS**
- **Syrup of Ipecac**
- **First aid kit**
- **Eye wash**
- **Detergent**
- **Clean water**
- **Rubber gloves**
- **Change of clothing**
- **Spill absorbent**
- **Fire extinquisher**
- **Poison Center phone**
- **Hospital contact**
  - Phone number
  - Doctor
  - Directions

Poisoning Symptoms

- **Vary with:**
  - Type of pesticide
  - Where exposed
  - Amount absorbed
  - Health of individual
- **Onset of symptoms can happen:**
  - Suddenly
  - Slowly

Remember, poisoning symptoms can be similar to other ailments such as heat exhaustion, asthma or food poisoning.

Never give alcohol!



Symptoms of Pesticide Poisoning

Poisoning Symptoms

- Headache
- Skin irritation
- Sweating
- Muscle twitching
- Coughing
- Respiratory irritation
- Chest pain
- Visual disturbance
- Abnormal pupils
- Nausea
- Confusion
- Convulsions
- Unconscious
- Death

First Aid Procedures

- Varies according to the type of exposure
- Symptoms may not occur immediately

First Aid Procedures

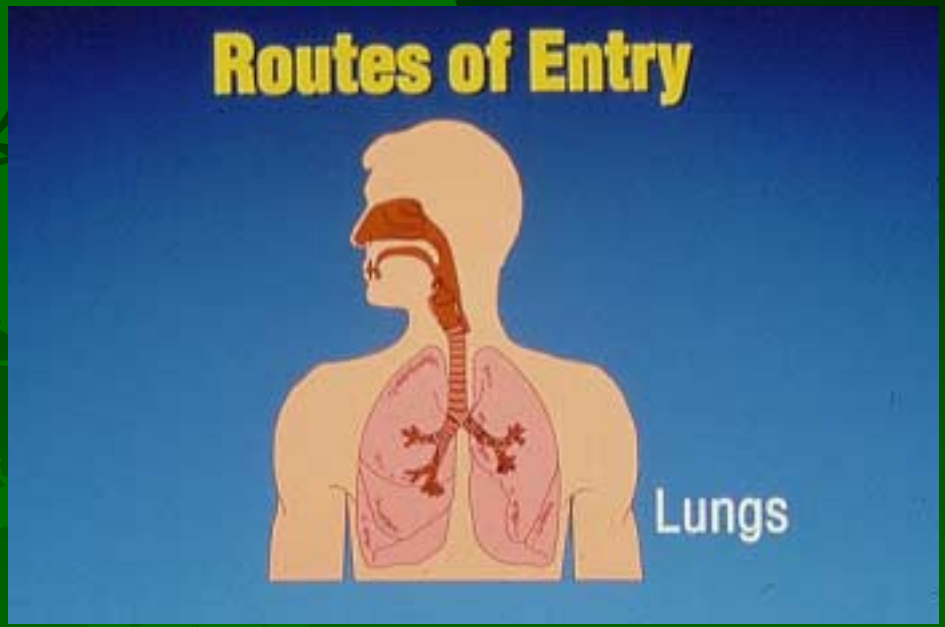
- After severe exposure *DO NOT put off first aid until you feel bad - Act immediately!*

Dermal Exposure

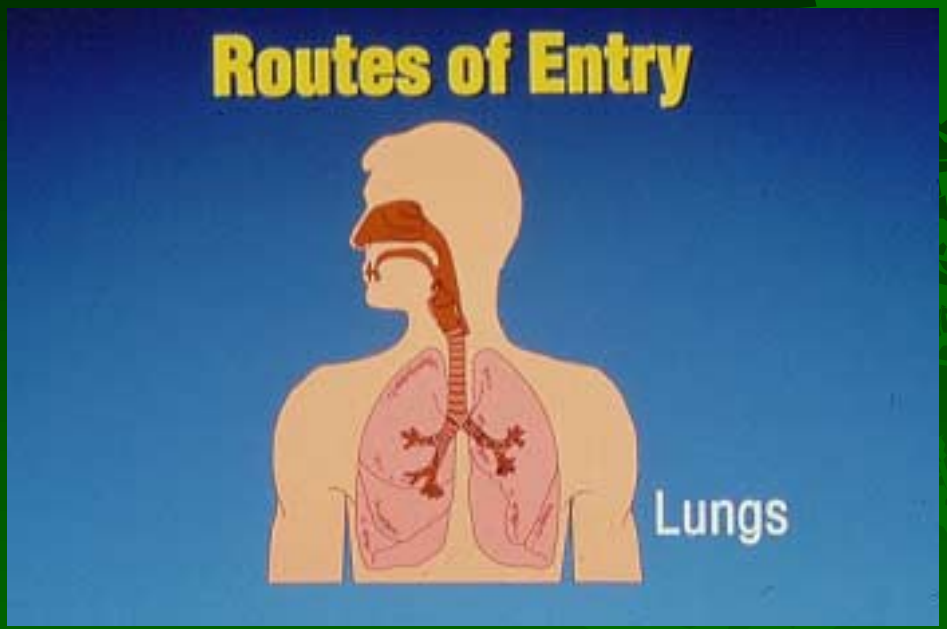
- Remove contaminated clothing
- Drench skin with water
- Wash thoroughly with soap
- Rinse completely
- Wash and rinse again
- Dry, wrap in blanket or clean clothing

Inhalation Exposure

- Get to fresh air
- Do not attempt rescue in enclosed area without proper respiratory gear
- Keep victim quiet



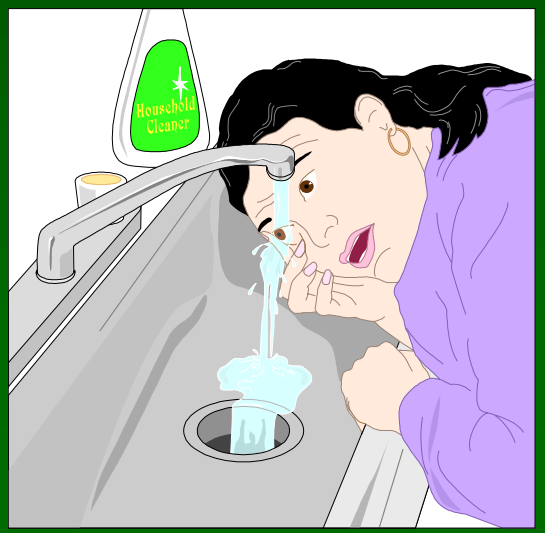
Inhalation Exposure



- Prevent chilling, don’t overheat
- Loosen tight clothing
- Resuscitate, if necessary
- Keep air passages clear

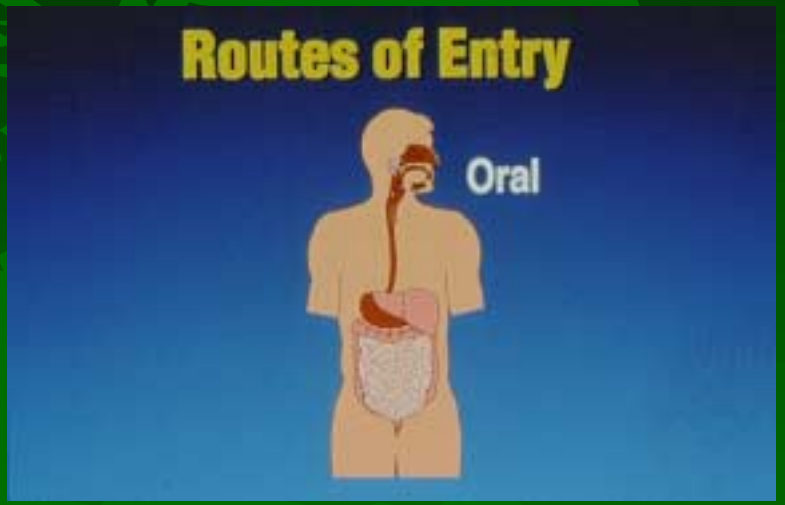
Eye Exposure

- Act immediately.
- Wash eyes with a gentle stream of water. Use large amounts of water.
- Continue washing for 15+ minutes.
- Use pure water only.



Oral Exposure

- **If pesticide has entered mouth, but not swallowed:**
  - Rinse thoroughly.



- **If swallowed:**
  - Follow label directions on whether to induce vomiting.

Never induce vomiting if:

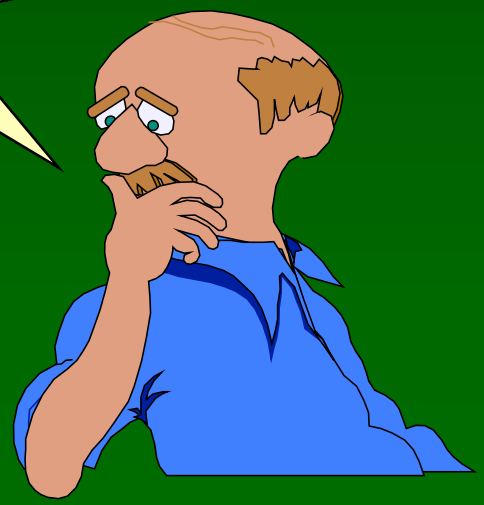
1. Victim unconscious

2. Having convulsions

3. Petroleum based product

4. Corrosive pesticide

5. Label specifies not to induce vomiting



Safe Pesticide Handling

Preventing **accidents when handling pesticides is the safest way to protect:**

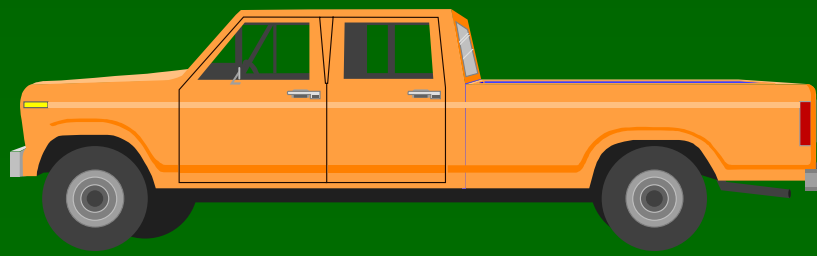
- Applicators

- The environment

- Nontarget organisms

Equipment Safety

- **Check for:**
  - Worn hoses
  - Leaks
  - Applicator accuracy
  - Truck and trailer safety
    - Brakes
    - Lights
    - Tires



Mixing and Loading Pesticides

- Attend tank while filling
- Follow label directions
- Wear protective clothing
- Don’t eat, smoke, chew gum
- Lighted, well ventilated area, shelter from wind

Mixing Pesticides Safely

- Keep fill hose out of solution
- Anti-siphon valve
- Pour below eye level
- Measure accurately
- Rinse measuring tools
- Triple rinse containers immediately

Triple Rinse and Pesticide Removal

Applying Pesticides Safely

- **Remove, cover or wash**
  - Pet dishes, toys, bird feeders, etc.
- **Clients should:**
  - Move cars, close windows
- **Beware of food plants**
- **Explain reentry intervals**

Applying Pesticides Safely

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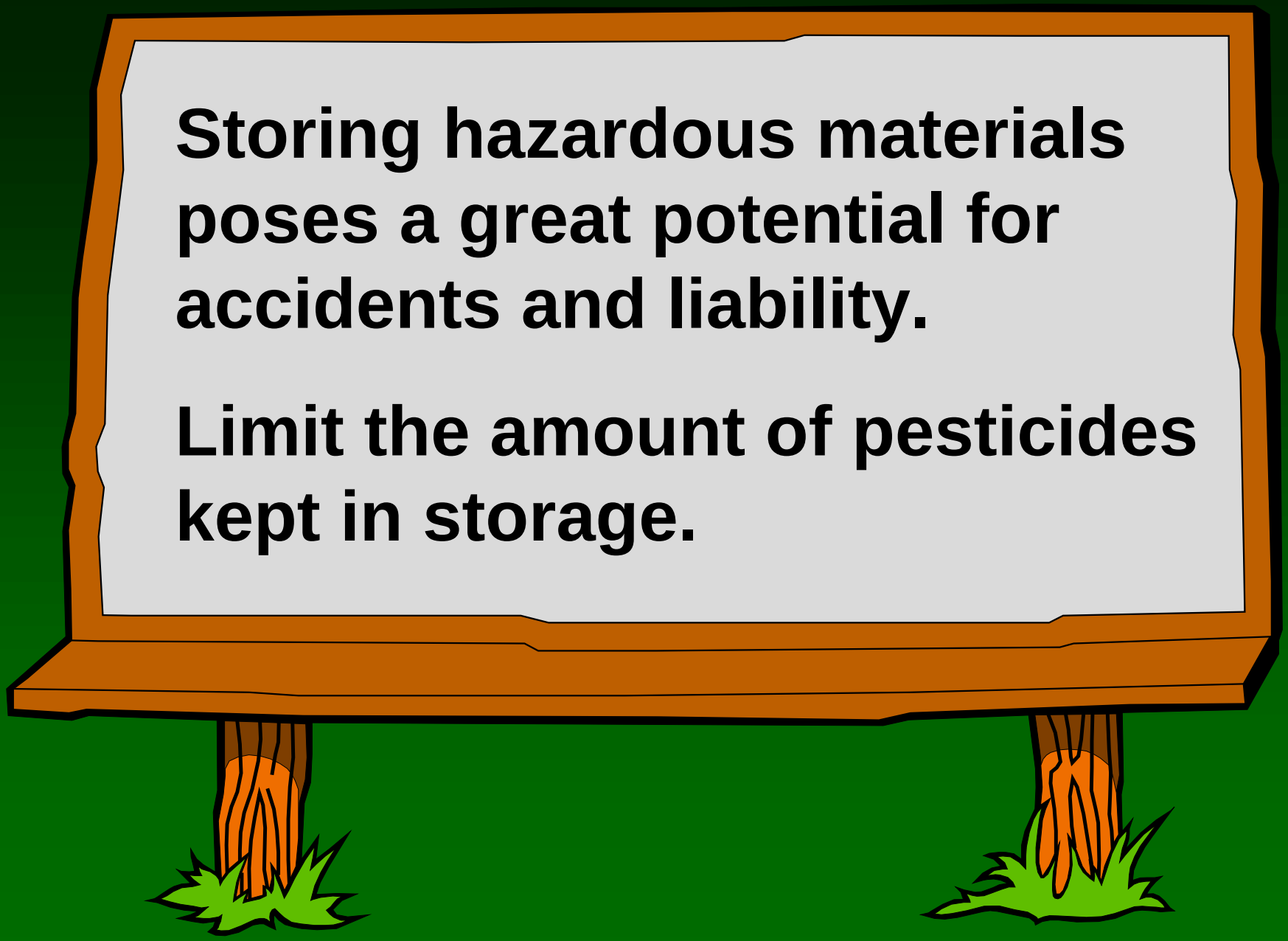

Storing hazardous materials poses a great potential for accidents and liability.
Limit the amount of pesticides kept in storage.

Chemical fires can be toxic. You may need to report storage of certain chemicals. Check with DNR (DEQ) or MSUE about SARA Title III requirements.

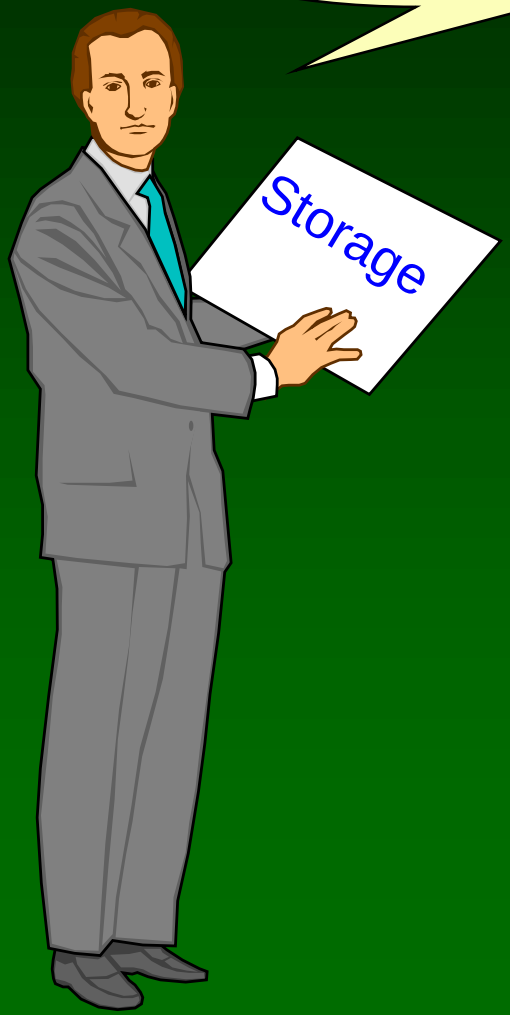
Exterior Pesticide Storage

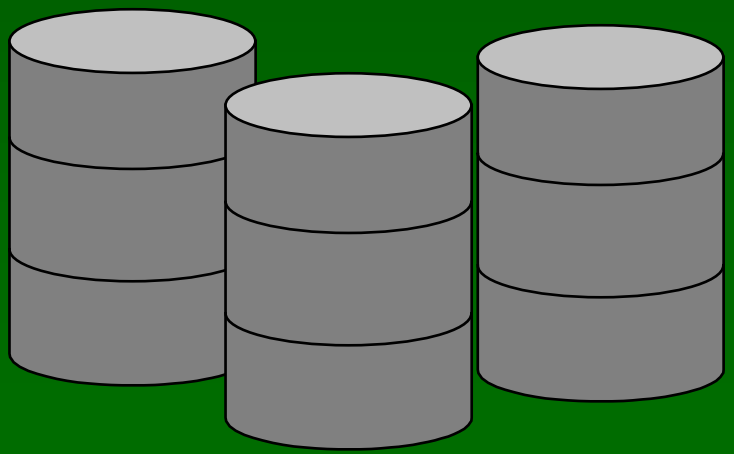
- Not near well
- Secured
- Ventilated
- Posted
- Fire-proof
- Secondary containment
- Separate storage for volatile herbicides

Interior Pesticide Storage

- Inventory sheet
- Moderate temperatures
- NO SMOKING
- Fire extinguisher
- Spill kit
- Protective clothing
- Emergency telephone numbers

Storage regulations may change.
Contact MDA or MSUE for updates.





Pesticide Containers

- **Keep in original container**
- **Protect labels**
- **Label all containers**
- **Do *NOT* use food containers**

Pesticide Containers

- Reseal open packages
- Use old or damaged first
- Mark mixing containers
- Triple rinse and puncture
- Buy refillables or recycle


Pesticide wastes can be a problem.
- Don’t stock up
- Mix only what is needed
- Apply leftovers according to the label
- Use material in open containers

Pesticide waste disposal is regulated. Contact the DNR (DEQ), MSUE or MDA for assistance.

Pesticide Spills

- **Control and stop the spill**
- **Contain the spill**
- **Clean up the spill**
- **Report the spill**
  - Contact MDA, MSUE, DEQ for latest procedures

Regulation 637

- Contracts
- IPM
- Protective gear
- Notification registry
- Posting
- Drift management
- Use standards
- Mixing and loading
- Washing equipment

Professional Applicator

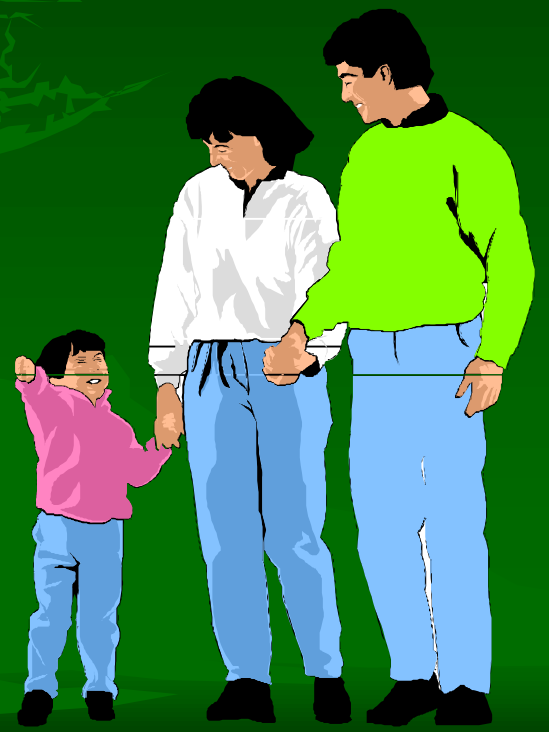
- Communicate
- Keep up to date
- Train employees
- Look and act professionally

Sell your skills and knowledge... consult!

Educate your customers!

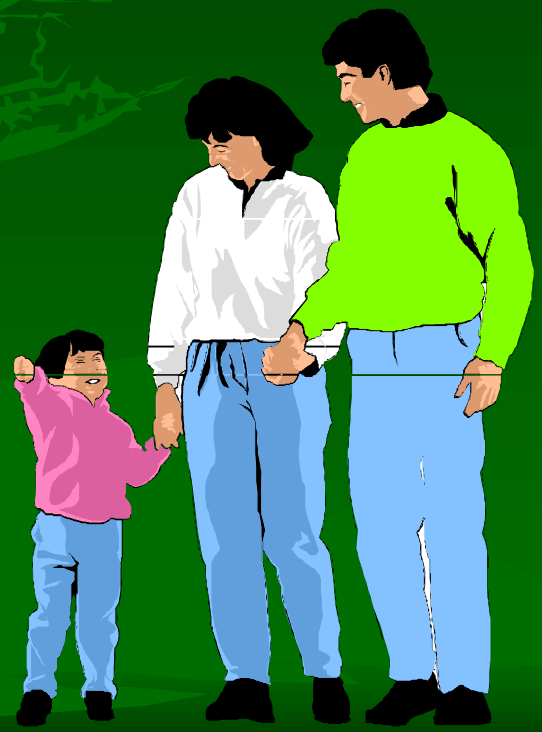
Educate Customers

- Not all organisms are pests
- Natural control allows some pests
- Is injury aesthetic or health threatening
- Timing for pest management



Educate Customers

- Plants must be inspected
- Targeted control tactics
- Pesticides may or may not be the best method of pest management



Ornamental Pest Management (Category 3B)

Non-Pest Disorders and Landscape Weeds

Chapter 5

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Environmental & Cultural Disorders

Most landscape plant injury is caused by poor growing conditions.

Weakened plants are more susceptible to pest attack than non-stressed plants.

Environmental and Cultural Disorders

- Construction
- Salt
- Dessication
- Mechanical damage
- Pesticides
- Compaction
- Drought
- Flooding
- Improper planting
- Improper cultural practices
- Poor plant selection

Tough environmental conditions.

Site too wet for this species.

Tough environmental conditions.

Poor planting technique.

Note the twine that has not decayed.

Herbicide injury through root absorption.

Black walnut trees and stunted white pine.

Excavation and construction activity caused this tree to die early.

Poor site conditions post-construction.

Flooded conditions suffocate roots.

Desiccation

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Cold temperature injury.

Lightening injury on oak.

Environmental and Cultural Disorders

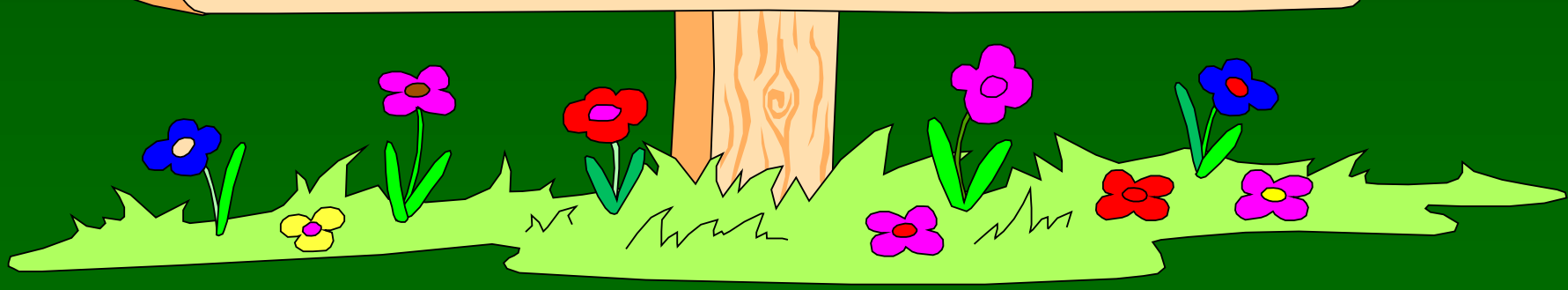
- Construction
- Salt
- Dessication
- Mechanical damage
- Pesticides
- Compaction
- Drought
- Flooding
- Improper planting
- Improper cultural practices
- Poor plant selection

Landscape Weed

WEED = any plant growing where it is not wanted.

Change the location and any plant can become a weed.

For example, bluegrass invading a flower bed is a weed.



Weeds Compete For:

- Growing space
- Water
- Nutrients
- Sunlight

Knotweed is tolerant of compacted soil.

Weeds are Indicators of Site Conditions

- **Hot soil**
  - Purslane, spurge
- **Compacted, wet**
  - Annual bluegrass
- **Wet, shady**
  - Rough bluegrass, horsetail
- **Deep shade**
  - Ground ivy, chickweed


Weeds can...
- Girdle plants
- Harbor pests
- Injure people

Vines can girdle established plants.

Weed Biology

- **Monocots: parallel leaf veins, growth points at/below soil level**
  - Grass family
    - Crabgrass, quackgrass
  - Sedge family
    - Nutsedge
  - Lily family
    - Wild garlic

Weed Biology

- Dicots: net-like leaf veins, diverse growing points
  - Composite family
    - Dandelions, thistles
  - Mustard family
    - Shepherd's purse
  - Carrot family
    - Wild carrot

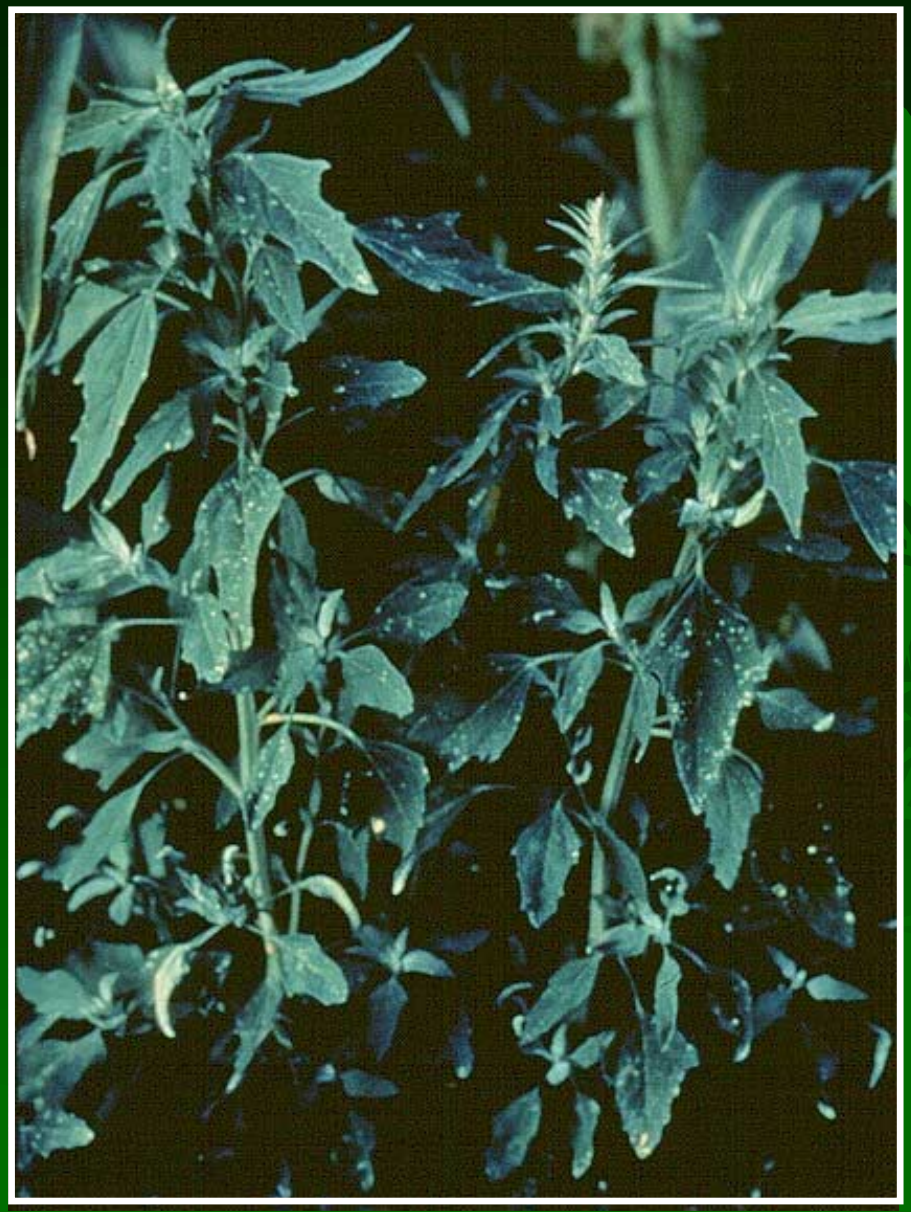
Many others

Stages of Weed Development

- 1. Seedling
  - Tender, vulnerable
- 2. Vegetative
  - Great uptake of water and nutrients
- 3. Seed production
  - Reduced uptake, energy directed to flowers, fruit
- 4. Maturity
  - Little uptake or energy production

Weed Life Cycles

- **Annual weeds: live one year**
  - **Summer annuals:** seed and die by winter.
    - Pigweed, crabgrass
  - **Winter annuals:** germinate in late summer, overwinter, produce seed, die the next season.
    - Chickweed, pennycress



Lambsquarter

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Weed Life Cycles

- **Biennial weeds: broadleaf plants with a two year life cycle**
  - vegetative growth first year
  - mature, seed and die in second year
    - Queen Anne's lace, bull thistle

Queen Anne’s lace.

Weed Life Cycles

- **Perennial weeds: live 3 or more years**
  - most persistent
  - difficult to control
  - propagules
    - rhizomes, stolons, bulbs, tubers
  - wide range of dicots and monocots
    - quackgrass, dandelion, poison ivy

Quackgrass

Dandelion

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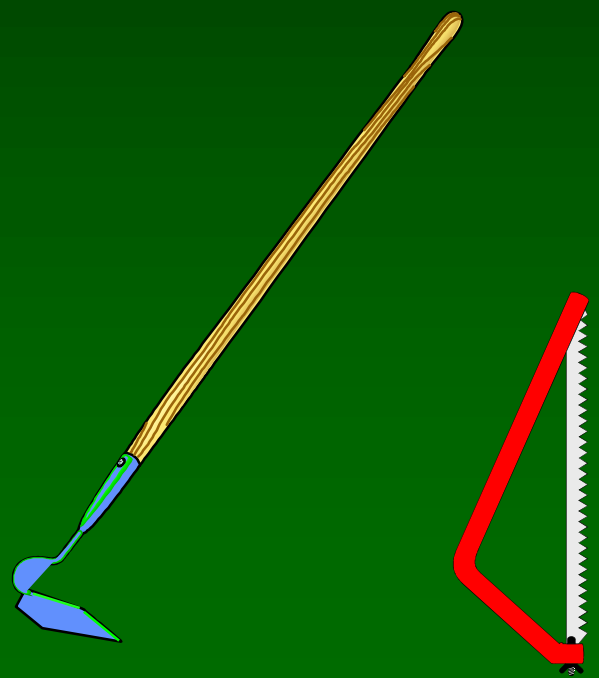
Scout, identify and inventory populations.

Managing Landscape Weeds

- **Maintain vigorous ornamentals**
- **Prevent seed production**
- **Prevent seed germination**
- **Limit emerged weeds early**
- **Limit susceptible stages of mature weeds.**

Alternative Weed Controls

- Sanitation
- Tillage
- Cultivation
- Cutting
- Mulching

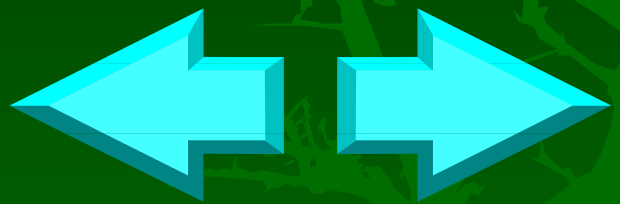


Herbicide

Chemical designed to control weeds. Plant, soil and weather conditions influence herbicidal activity.

Herbicide Characteristics

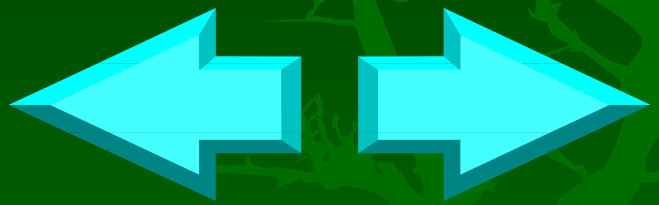
Contact



Systemic

Herbicide Characteristics

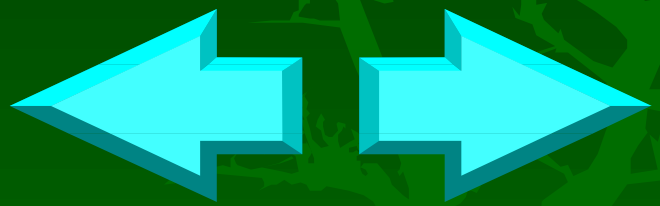
Persistent



Non Persistent

Herbicide Characteristics

Selective



Non Selective

Herbicide Characteristics

- **Application in relation to plant development**
  - Pre-plant
    - Before crop is planted
  - Pre-emergent
    - Before weeds emerge
  - Post emergent
    - After weeds emerge

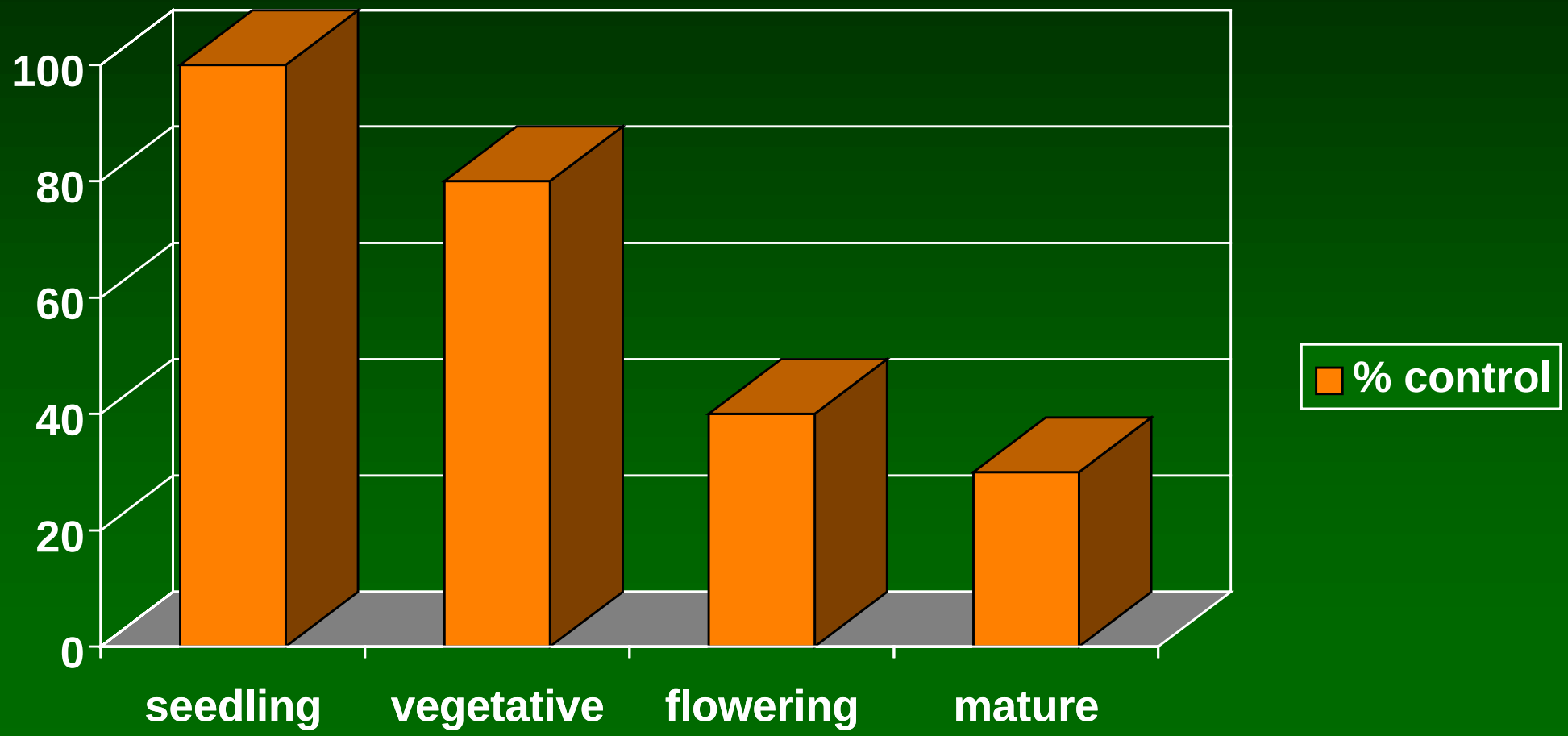
Herbicides and Plant Characteristics

- Growing points
- Leaf shape and orientation
- Wax and cuticle

Herbicides and Plant Characteristics

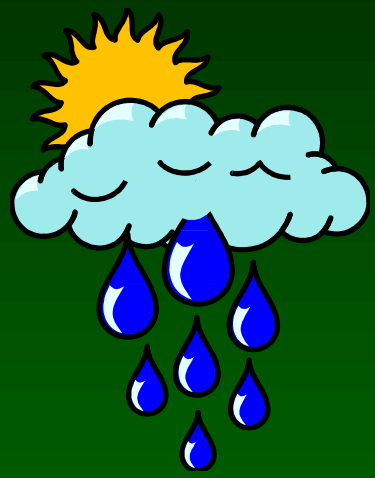
- Leaf hairs
- Deactivation
- Life cycle stage

Herbicide Effectiveness



Climatic Factors

- Relative humidity
- Light
- Precipitation
- Temperature



Ornamental Pest Management (Category 3B)

Biology and Management of Pests

Chapter 6

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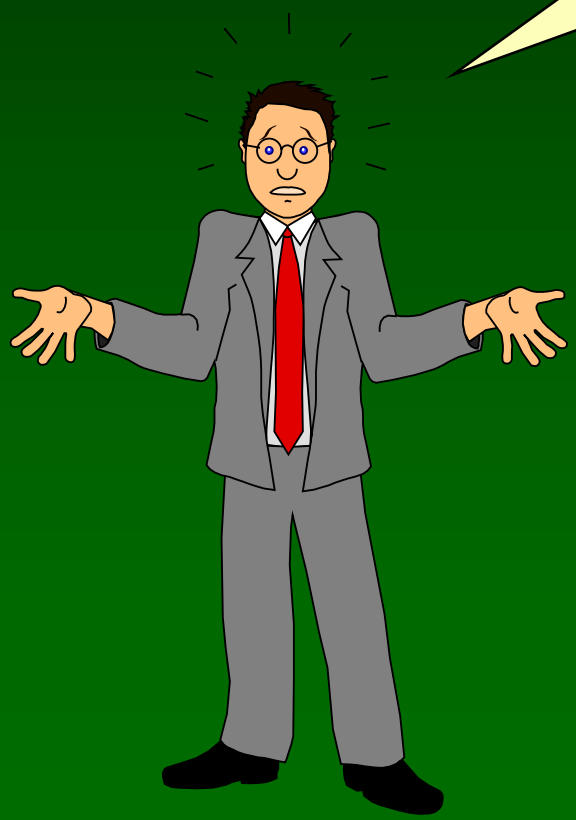
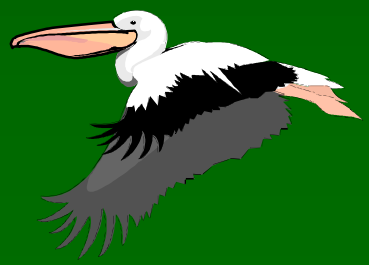
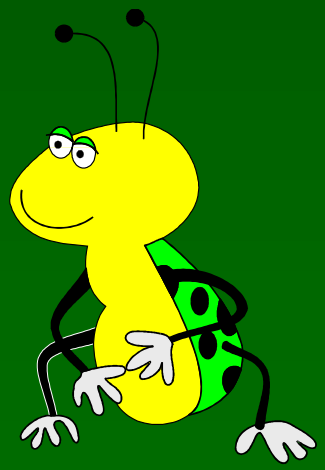
A “stab in the dark” approach to pest management is seldom effective.



It may injure desirable organisms.





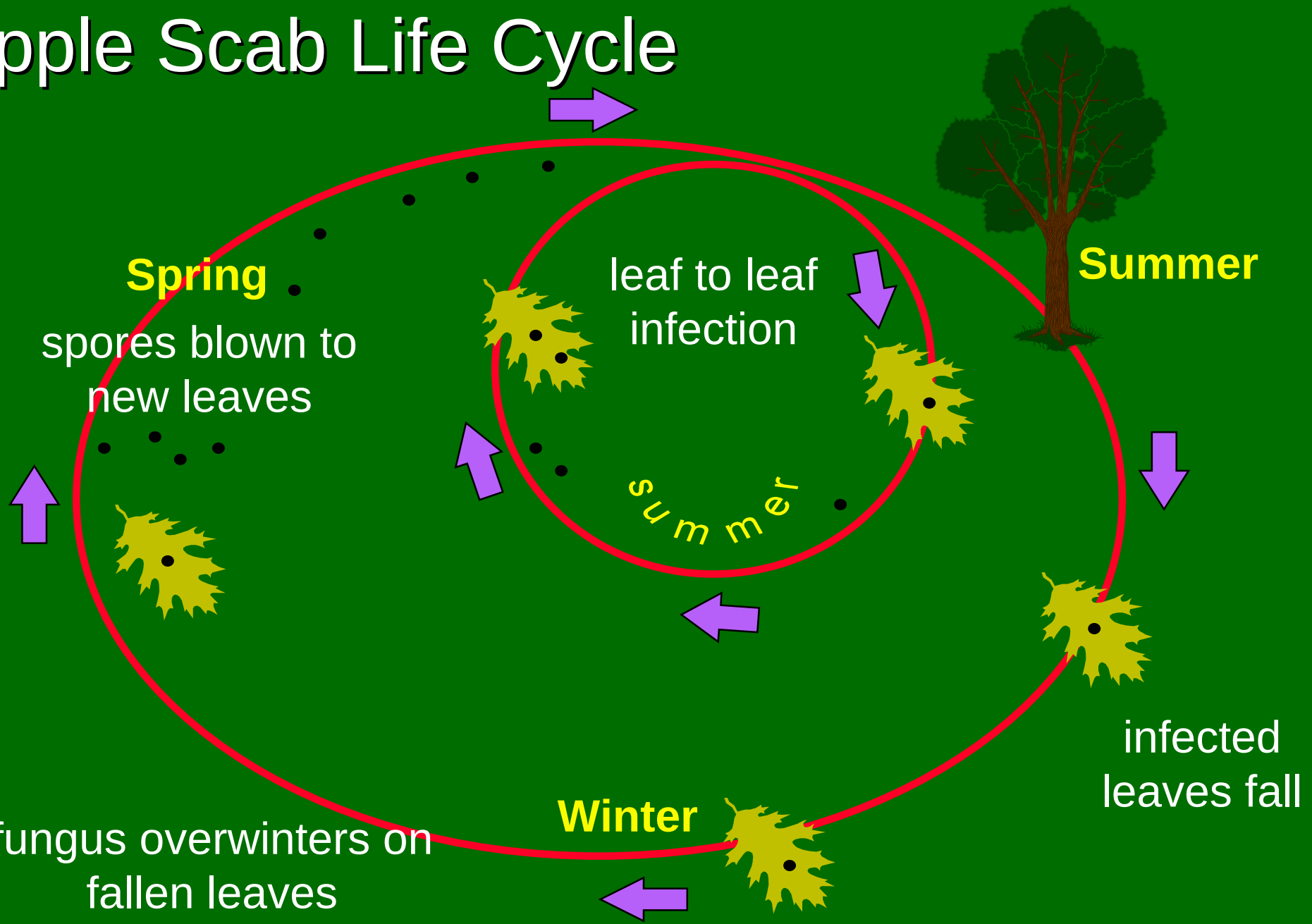
Effective Pest Management

- **Requires...**
  - Knowledge of pest life cycle
  - Feeding habits
  - Hosts
  - Environmental interaction
  - Reproductive behavior

Diseases of Ornamentals

- **Disease** = disturbance of normal plant function.
  - **Noninfectious** (abiotic)
    - Environmental
    - Cultural practices
  - **Infectious**
    - Fungi
    - Bacteria
    - Virus

Apple Scab Life Cycle



Plant Diseases

- **Grouped according to:**
  - Causal agent
  - Symptoms they produce

Disease Symptoms

- Leaf spots
- Scab
- Rusts
- Powdery mildew
- Mosaics
- Chlorosis
- Scorch
- Witches' broom

Disease Symptoms

- Anthracnose
- Cankers
- Blights
- Wilts
- Decline
- Galls
- Rots

Scab

Rust

Cedar-Hawthorne Rust

Cedar-Apple Rust

Powdery Mildew

Mosaic

Chlorosis: Oak and Maple

Witch’s broom caused by Anthracnose

Anthracnose on foliage and in woody tissue.

Fireblight on Mountain Ash

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Root rot problem on Rhododendron

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Common symptom of tree decline.

Monitoring Disease Activity

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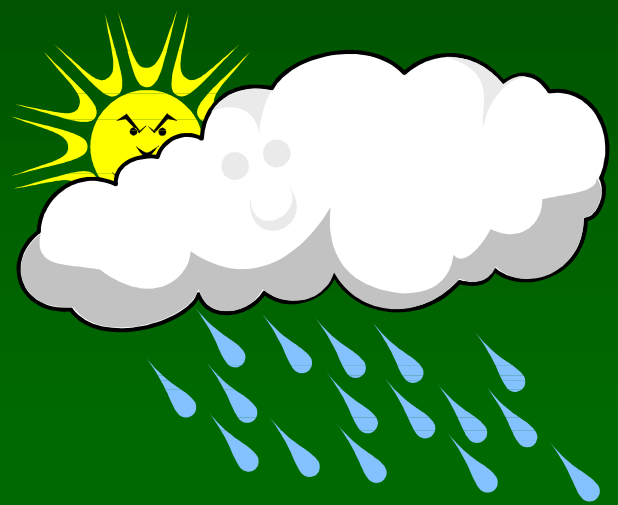
Host Susceptibility

- Plant selection
- Plant parts
- Vigor

Weather Conditions

- Humidity
- Rainfall
- Temperature



Microclimate

- Shade
- Wind
- Salt
- Location
- Crowding

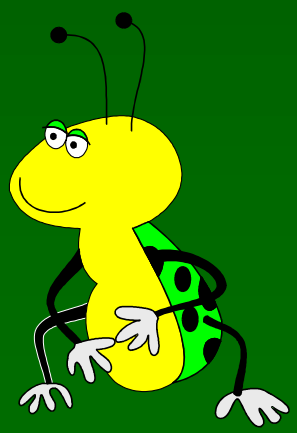
Infectious Disease Management

- **Resistance**
  - Superior species, cultivars, varieties
- **Avoidance**
  - Appropriate site conditions
- **Elimination**
  - Sanitation; some fungicides
- **Protection**
  - Most fungicides

Although cultural and environmental disorders are most common, “bugs” are perceived as the likely cause of a problem.

Insects of Ornamentals

- Capable of wide variety of injury
- May go through several life stages
- Activity and injury often seasonal
- Classified by physical characteristics
- Classified by behavior



Insect Classification by Feeding Behavior

- Piercing - sucking
- Leaf-chewing
- Tent and case-making
- Gall-forming
- Root-feeding
- Boring

Piercing-sucking Insects

- Aphids
- Leafhoppers
- Plant bugs
- Mealybugs
- Thrips

Piercing-sucking Insects

Aphids

Piercing-sucking Insects

Pine Needle Scale

Piercing-sucking Insects

Magnolia Scale

Piercing-sucking Insects

Sooty mold grows on the honey dew secreted from piercing-sucking insects.

Piercing-sucking Insects

Plant Bug

Piercing-sucking Insects

Leaf Hopper Injury

Leaf-Chewing Insects

- Caterpillars
- Sawflies
- Leafminers
- Leaf beetles
- Weevils

Leaf-Chewing Insects

Eastern Tent Caterpillar

Leaf-Chewing Insects

Pine Sawfly

Leaf-Chewing Insects

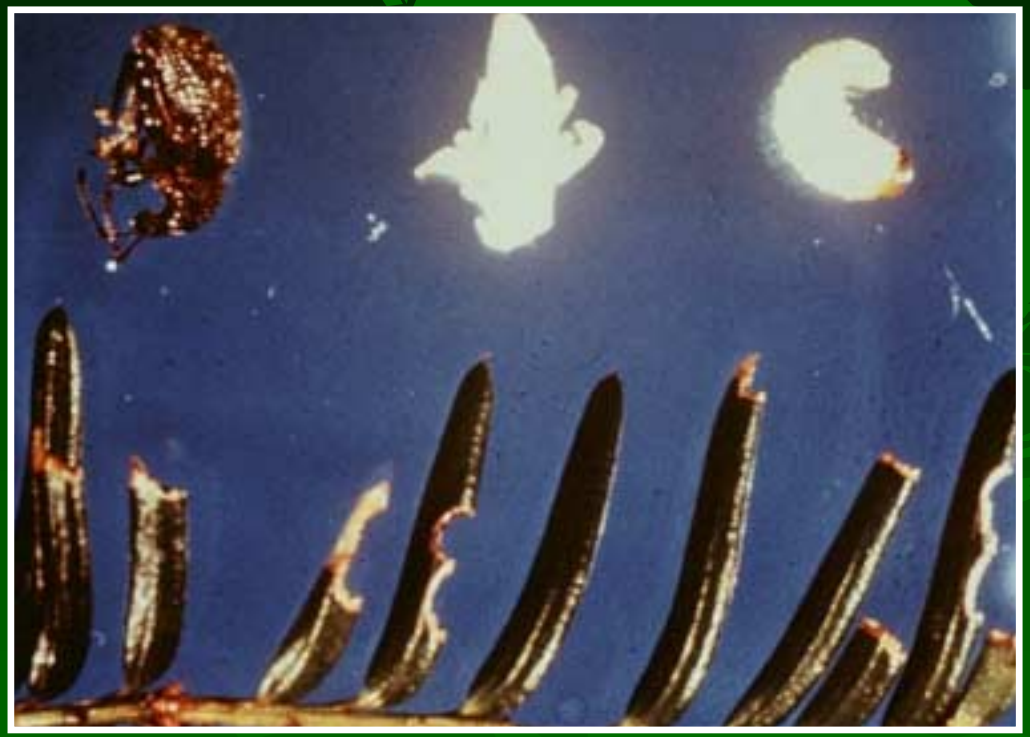
Oak leaf miner
(moth)

Birch Leaf Miner
(sawfly)

Leaf-Chewing Insects

Japanese Beetle

Leaf-Chewing Insects



Black Vine Weevil:
Adult, pupae, larvae (legless), and foliar damage

Leaf-Chewing Insects

White grub of Japanese beetle: a root feeder.

Maple Bladder Gall

Cooley Spruce Gall

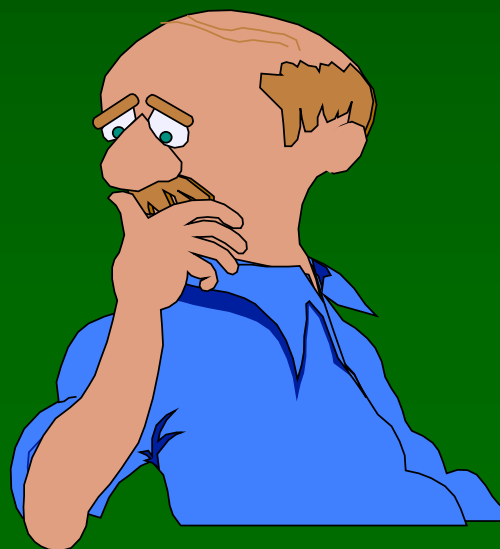
Bronze Birch Borer exit hole

Insect Management

- Protection for insects:
  - Pupal stage
  - Waxy coating
  - Galls
  - Bark
  - Leaf tissue
  - Soil

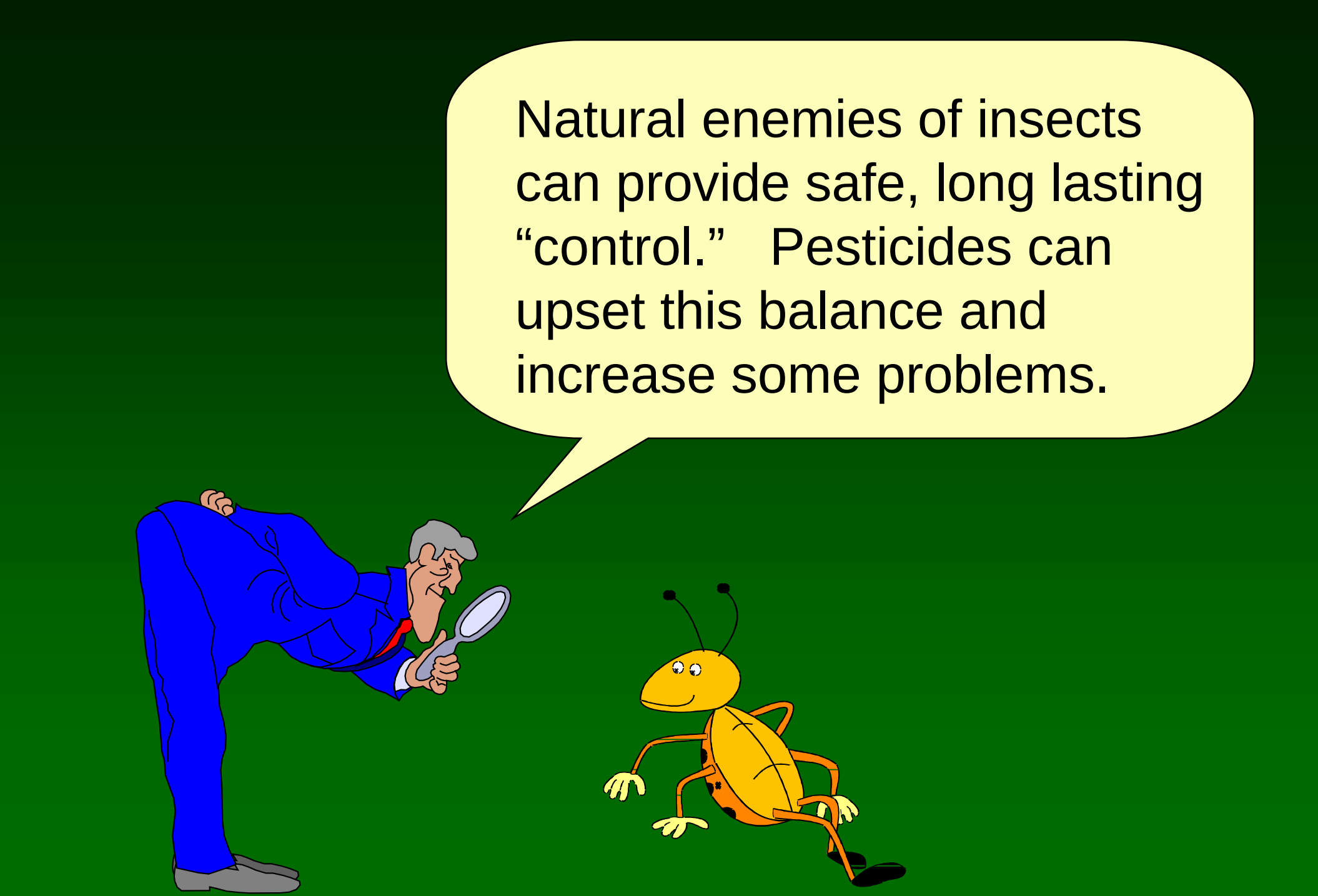
Insect Management- Consider:

- Susceptible life stage
- Damaging stage
- Period of feeding
- Weather conditions
- Number of generations
- Host tolerance
- Natural enemies



Non-Chemical Insect Controls

- Improve plant vigor
- Encourage natural enemies
- Select plants with resistance
- Modify the environment


Natural enemies of insects can provide safe, long lasting “control.” Pesticides can upset this balance and increase some problems.

Insecticides

- **Avoid problems:**
  - Monitor plants for insects
  - Protect beneficials
  - Time for appropriate life stage
  - Avoid preventative pesticide treatments
  - Use the least toxic materials

Mites

- Not insects (eight legs)
- Rasp leaf cells and suck contents
  - Causes bronzing
- Some form webs or galls
- Weather dependent - prefer hot spots
- Rapid population build up
- Paper test

Spider mites

Webbing

Bronzing

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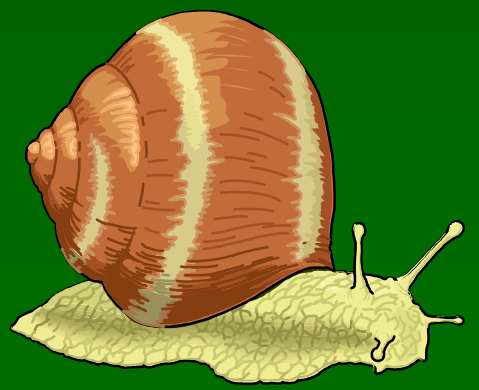
Nematodes

- Microscopic worms
- Commonly attack roots or vascular system
- Symptoms: wilting, stunting, dieback
- Resistance
- Few nematicides
- Detection - MSU Lab

Snails and slugs leave irregular holes in foliage where they feed and slime trails where they've traveled.

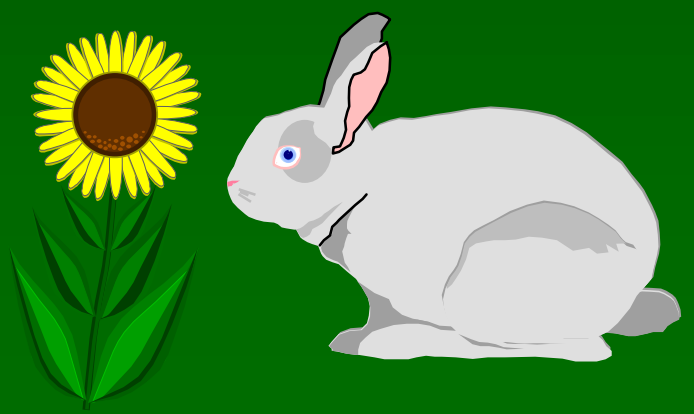
Snails and Slugs

- Soft bodied animals
- Weather and site dependent
- Slime trail
- Not controlled by insecticides
- Sanitation and traps



Vertebrates

- **Cause damage by:**
  - Chewing
  - Rubbing
  - Drilling

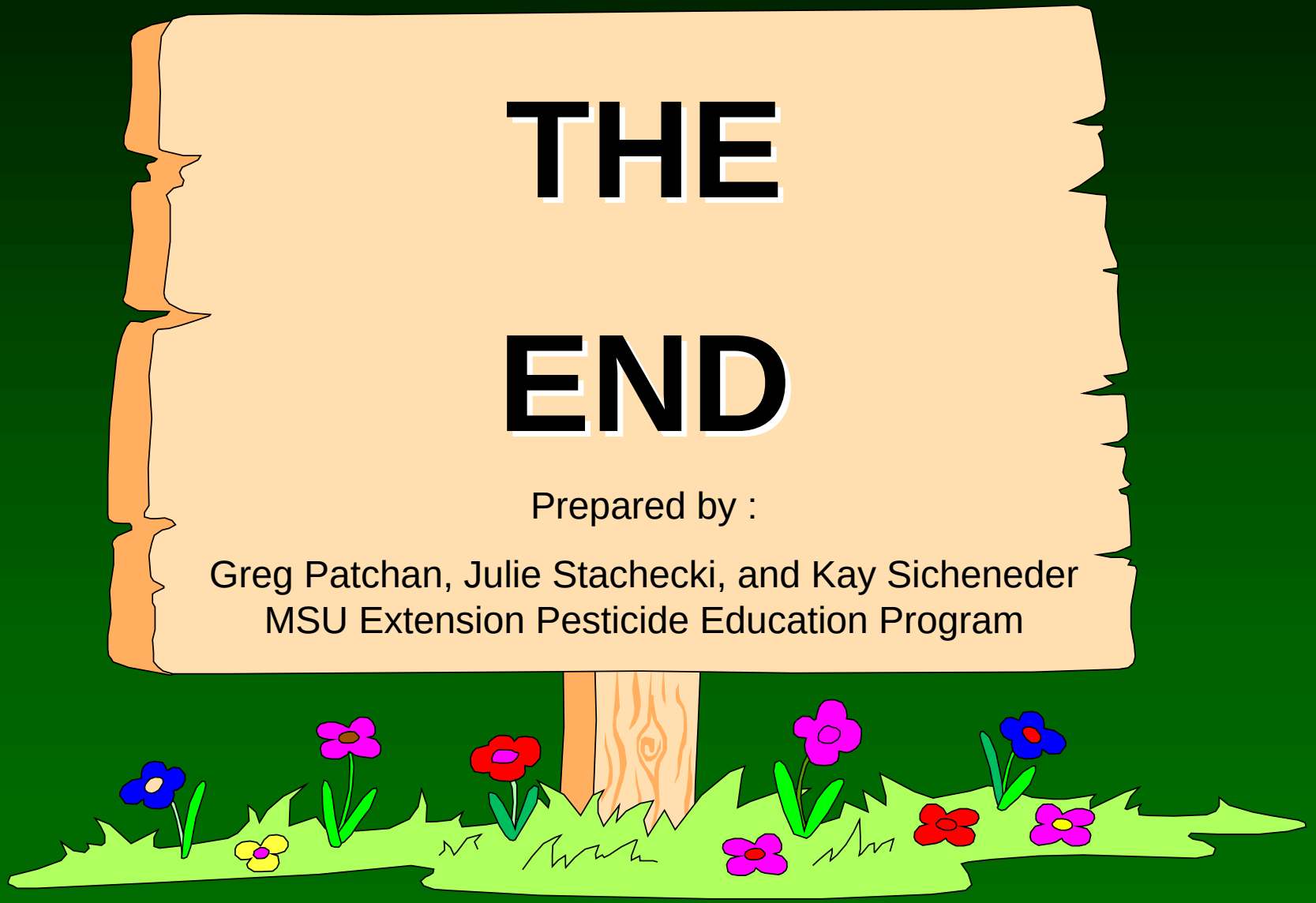


Squirrel damage

Rabbit damage

Wildlife control in urban areas can be difficult. Consider using barriers, repellants and pest removal tactics.

Excluding mice, moles and chipmunks, trapping vertebrates is regulated by MDNR.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END
Prepared by :
Greg Patchan, Julie Stachecki, and Kay Sicheneder
MSU Extension Pesticide Education Program