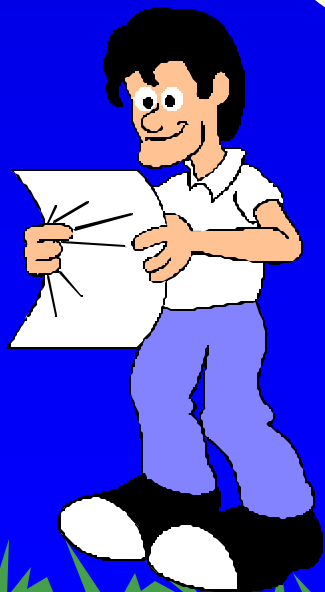


Chapter 4

Plant Growth Regulators



A plant growth regulator is a chemical that alters a plant's vegetative growth or reproductive characteristics.

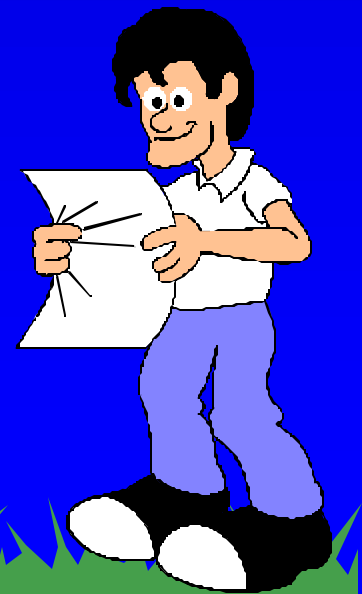


Growth Regulators

- **Anti- gibberellins or inhibitors**
 - inhibits production of hormone that controls cell elongation
- **auxin type**
 - similar to natural plant chemicals
 - ♦ 2,4-D, dicamba
 - growth regulators at sub lethal dose



Growth regulators are regulated by FIFRA as pesticides. Handle accordingly.



Tree Growth Regulation

- **Gibberellin inhibitors block cell elongation**
- **Soil or trunk injected**
 - move in xylem to growth points
- **Activity depends on....**
 - tree species
 - application rate
 - environmental conditions
 - trimming severity



Tree Growth Regulation

■ Sprout inhibitors

- incorporated into wound dressing materials
- inhibit production of suckers or water sprouts

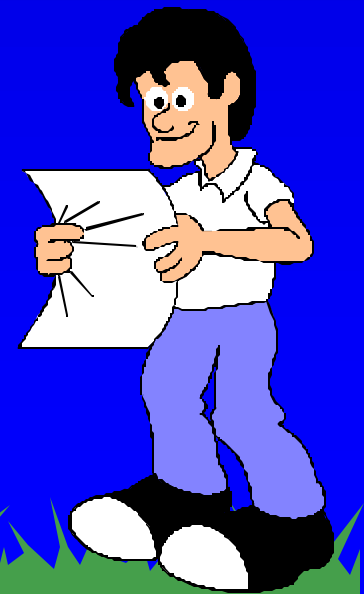


Roadside Turf Regulation

- **Suppress seedhead development**
- **Reduce growth...**
 - for 2 to 6 weeks
 - applied in spring before seedhead formation
 - treated turf is often darker green
 - different grasses respond differently



Broadleaf herbicides can often be mixed with growth regulators. Check labels carefully.



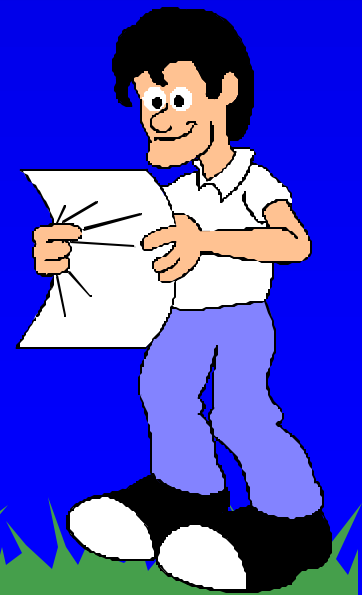
Roadside Turf Regulation

■ **Selecting & using regulators...**

- results from the type of regulator
- rates vary by species
- timing affects results
- growth stage affects results
- environmental conditions impact results



Rates are crucial. Small changes can have major impacts. Read label carefully.



Chapter 5

Other Right- of- Way Pests



Pests

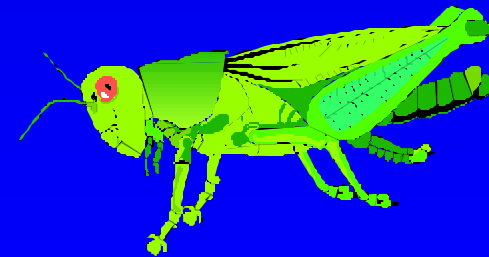
- **Plants are the major right-of-way pests.**

- **Others could include...**
 - insects
 - diseases
 - vertebrates



Insect Pest Management

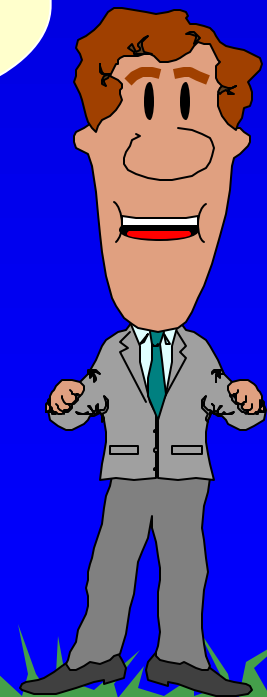
- **Insects can damage or destroy desirable plants**
 - sucking sap, defoliation, boring
- **To control insects, you should understand....**
 - insect biology
 - insect life cycles



Periodically inspect for signs of insects and symptoms of their damage.

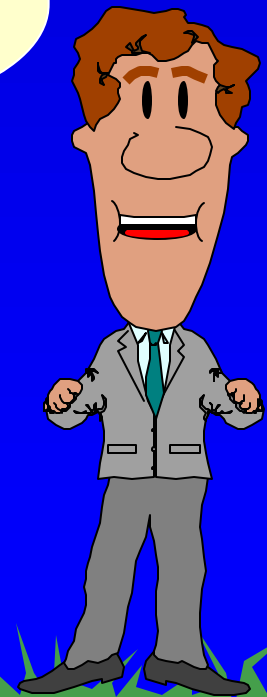
Damaging insects have...

- chewing mouthparts
- piercing-sucking mouthparts



Manage insects with the principles of IPM.

Life cycles are important in designing an IPM approach.



Metamorphosis

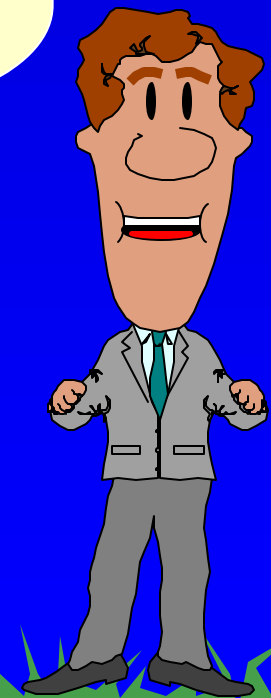
- **None, no change**
- **Gradual**
 - young nymphs resemble adults and feed in same habitat
- **Complete**
 - egg, larval, pupal, adult
 - not all life stages may feed the same



Early life stages...

- small larvae
- first nymphs

Are easier to control.



Chewing Mouthparts

■ Types of insects

- grasshoppers, beetles, caterpillars, borers, grubs

■ Signs of activity (damage)

- missing foliage, skeletonized foliage, bore holes, frass, sawdust, dying grass, no roots



Piercing- sucking Mouthparts

■ Types of insects

- aphids, scales, plant bugs, leaf hoppers, * mites

■ Signs of activity (damage)

- honeydew, sooty mold, distorted foliage, foam, encrustations

♦ * not a true insect



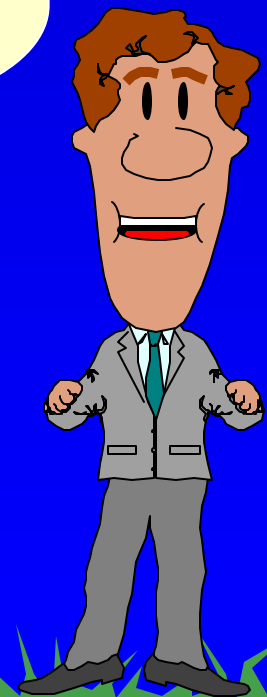
Insect Control Methods

- **Host resistant**
- **Biological control**
- **Cultural control**
- **Mechanical control**
- **Sanitation**
- **Chemical**

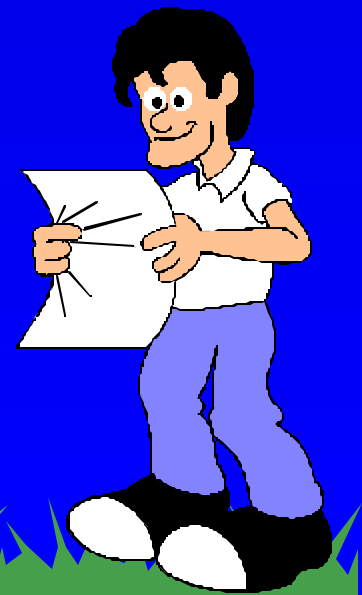


Many insects attack weakened or stressed plants.

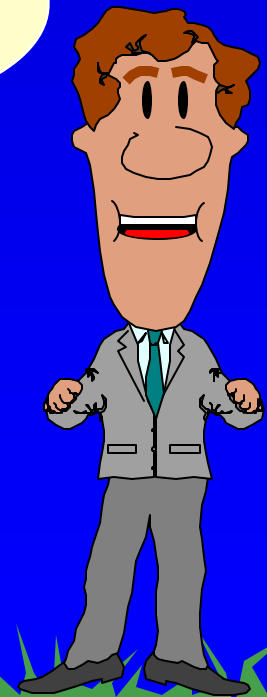
Healthy plants withstand pest attacks.



Plant selection is crucial for reducing plant and pest problems!



Disease is any
departure from normal
plant growth..



Causes of Disease

- **Virus**
- **Bacteria**
- **Fungi**
- **Environmental factors**
- **Cultural practices**



Symptoms of Disease

■ Over- development

- galls, swellings, leaf curls

■ Under- development

- stunting, lack of chlorophyll, incomplete development

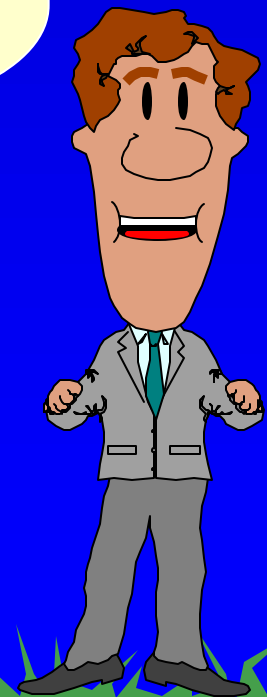
■ Death of tissue

- blights, leaf spots, wilting, cankers

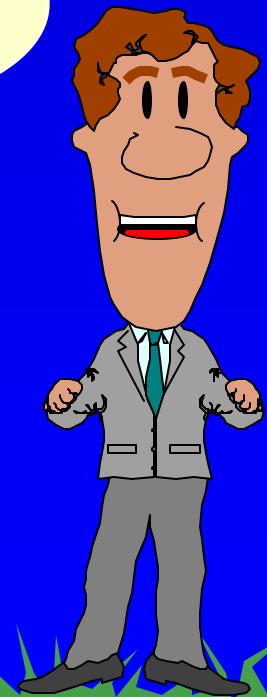


Remember, different
causes can produce the
same symptoms!

Healthy plants live longer!



Avoiding using the same
spray equipment for
herbicides and pest
management.



Pests in Wood

- **Wood structures can be invaded and damaged by...**
 - insects
 - fungi
- **To treat wood, you must be certified in category 2A**



Vertebrate Pests

- **Animals with a backbone**
 - mice, rats, beavers, rabbits, deer, woodchucks
- **For control, permits are required from MDNR**
 - check before acting
 - small rodents exempt



Vertebrate Control

■ Mechanical

- traps

 - ◆ non- target hazard

■ Sanitation

■ Chemical

- non- target hazard

