

# IPM for Turf on School Grounds



Center of Expertise for School IPM



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Pesticide Safety, Integrated Pest Management  
and Your School

Center of Expertise for School IPM



Protecting the health of  
children is a top priority





# IPM Basics

Pesticides

Physical & Mechanical  
Controls

Cultural & Sanitation  
Practices

Education &  
Communication





# Benefits of School IPM

- ▶ **Smart:** addresses the root cause of pest problems
- ▶ **Sensible:** provides a healthier learning environment
- ▶ **Sustainable:** better long-term control of pests





# Presenters



## **Kim Pope Brown**

- Pesticide Safety Education Coordinator for LSU AgCenter
- B.S. Auburn U. in Agronomy and M.S. from LSU in Plant, Soils and Environmental Science
- Responsible for training commercial pesticide applicators, assisting with private pesticide applicator trainings, updating study and exam materials in Louisiana
- Previously, Kim was the assistant pesticide safety education coordinator at Auburn University



## **Alec Kowalewski, PhD.**

- Turfgrass Specialist at Oregon State U. since 2012..
- Masters and Ph.D. from Michigan State U.
- Research interests: improving the environmental and economic sustainability of turf grass management.
- Previously taught at Abraham Baldwin Ag. College
- Research Scientist at the U. of GA Turf Breeding Program
- Served as Operational Consultant at the 2008 Olympic Games in Beijing, China.



# IPM for Turfgrass in Schools

Kim Pope Brown  
Pesticide Safety Education Coordinator  
LSU AgCenter





# Integrated Pest Management

- ▶ Integrated Pest Management, or IPM, is a science-based, decision-making process that identifies and reduces risks from pests and pest management related strategies.
- ▶ IPM uses site assessment, monitoring and pest prevention in combination with a variety of pest management tactics to keep pest levels with acceptable limits and numbers.

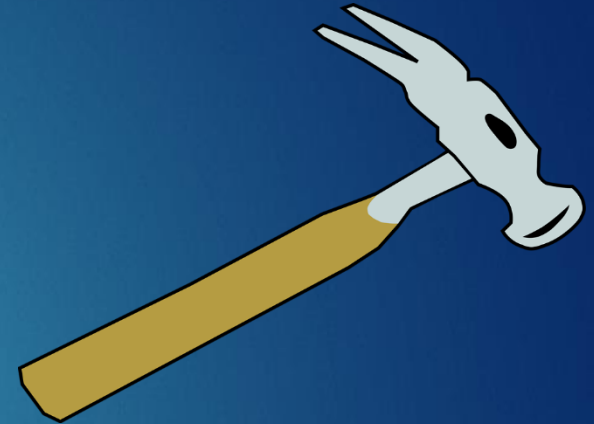
# Integrated Pest Management

- ▶ Integrated Pest Management (IPM) is an environmentally friendly, common sense approach to controlling pests.
- ▶ IPM is a decision-making process that utilizes all available pest management strategies, including cultural, physical, biological and chemical control to prevent economically damaging pest outbreaks and to reduce risks to human health and the environment.”  
(Wisconsin)
- ▶ No monitoring, no inspection, no IPM



# Control Options

- ▶ Biological
- ▶ Mechanical
- ▶ Cultural
- ▶ Physical
- ▶ Genetic
- ▶ Regulatory
- ▶ Chemical



# Goals of IPM

- ▶ Helps to keep a balanced ecosystem
- ▶ Promotes a healthy environment
- ▶ Reduce misapplication
- ▶ Can save money
- ▶ Pesticides can be ineffective
- ▶ Maintains a good public image





# Why is IPM important?

- ▶ Healthier learning environment for our children.
- ▶ Better long-term control of pests.
- ▶ Reduced liability





# Challenges

- ▶ Communication
- ▶ Limited budget
- ▶ Limited resources
- ▶ Limited space
- ▶ Large number of sites
- ▶ Large number of pests
- ▶ High traffic areas
- ▶ Poor landscaping/development







# Steps in IPM:

- ▶ Scout and inspect routinely
- ▶ Determine cultural practices that can increase turf health and vigor
- ▶ Determine acceptable thresholds
- ▶ Time pesticide applications to the most vulnerably stage of the pest

# Pest Identification is Critical

- ▶ Always identify the pest before taking any action
- ▶ Misidentification results in a lack of knowledge = ineffective control of the real pest
- ▶ It may not be a pest
- ▶ It may be a beneficial
- ▶ Is the pest really causing a problem?





# Considerations for Pesticide Use

- ▶ Identify the pest and select the appropriate product
- ▶ Select the least toxic pesticide
- ▶ Avoid developing resistant pest populations
- ▶ If using pesticides, use the correct application rate (dose) and timing

# Developing a Specific Management Plan

- ▶ Different areas of school grounds will require a different level of management
- ▶ Identify what the area is going to be used for
- ▶ Issues that might arise in the area
- ▶ Identify major pests
  - ▶ Research and have a plan for how to deal with the pest issue



# Choosing the right turf

- ▶ Purpose of turf – plans for the area
- ▶ Match grass with growing area
  - ▶ Shade
  - ▶ Soil type
  - ▶ Traffic
  - ▶ High maintenance vs. low maintenance

# Weed Control in Lawns

- ▶ Most important concept in weed control is proper turf grass management

Thin Turf



=

Weedy Turf





# Negative Effects of Compaction

1. Poor conditions for plant growth
  - ▶ Lower soil oxygen, poor drainage, physical impedance
2. Increased weed populations
  - ▶ Goosegrass, poa annua, spurge
3. Increased injury – hard surface



Fields get worn out and compacted when they are not fertilized or aerified enough.



# Don't Guess

Soil Test for  
Accuracy!

# Sampling

- ▶ Use Clean Equipment
  - ▶ Soil probe or shovel
- ▶ Each sample should represent one area
  - ▶ Athletic field is different from a general turf area
- ▶ Sample approximately the top 4 inches; without thatch
- ▶ Mix together samples from one area
- ▶ Soil sample kit



SOIL TEST RESULTS										RECOMMENDATIONS		
L A B No.	Sample Designation	Crop	S o i l Group*	pH**	Phosphorus	Potassium	Magnesium	Calcium	LIME-STONE	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
					P***	K***	Mg***	Ca***				
Pounds/Acre									Tons/Acre	Pounds/Acre		
23638	A Hardee See Comment 1 See Comment 2	Centipede	2	6.2	L 14	L 78	H 100	H 1669	0.0	40	40	40
23639	Steadham See Comments 2,3,4,5	St. Augustine	2	5.3	H 82	M 131	H 143	H 1208	1.5	80	0	40
23640	J Gordy See Comment 2 See Comment 6	Zoysia	3	6.4	VH 81	M 126	H 267	H 2459	0.0	80	0	40
23641	T Neal See Comment 2 See Comment 7	St. Augustine	3	5.9	VH 139	L 98	H 194	H 2495	0.0	80	0	80

Comment No.1: Per 1,000 sq. ft. apply 8 pounds 13-13-13 or equivalent when spring growth begins.

Comment No.2: Final remark - For small areas, comments give examples of ways to meet the fertilizer recommendations. Other fertilizer grades or materials that supply equivalent amounts of plant nutrients may be used with equal results. If you need assistance in calculating amounts of other materials to use, contact your county agent or fertilizer supplier. A pint of dry fertilizer is approximately 1 pound.

Comment No.3: Soil acidity (low pH) can be corrected with either dolomitic or calcitic lime.

Comment No.4: Per 1,000 sq. ft. apply 8 pounds 13-13-13 or equivalent when spring growth begins and apply 1 pound N (3 pounds 34-0-0 or equivalent) in mid-summer. If more growth or better color is desired, make additional applications of 1 pound N at 2-month intervals. A pint of dry fertilizer is approximately 1 pound.

...equivalent to 50 pounds per 1,000 sq. ft.

...5, or equivalent low phosphorus fertilizer, when spring growth begins and apply ... in mid-summer. If more growth or better color is desired, make additional ... intervals. A pint of dry fertilizer is approximately 1 pound.

# Routine Soil Test

\* 1. Sandy soil (CEC < 4.6 cmol<sub>c</sub>kg<sup>-1</sup>)

\* 2. Loams and Light clays (CEC = 4.6-9.0 cmol<sub>c</sub>kg<sup>-1</sup>)

\*\* 7.4 or higher - Alkaline ----- 6.6-7.3 - Neutral ----- 6.5 or lower - Acid ----- 5.5 or lower - Strong Acid

\*\*\* Extractable nutrients in pounds per acre

If soil group = 1, 2 or 3, Method of Analysis = Mehlich-1. If soil group = 4, Method of Analysis = Miss/Lancaster.

\* 3. Clays and soils high in organic matter (CEC > 9.0 cmol<sub>c</sub>kg<sup>-1</sup>)

\* 4. Clays of the Blackbelt (CEC > 9.0 cmol<sub>c</sub>kg<sup>-1</sup>)

Approved by: *Green Huluka*

Print Date: 30 August 2010

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# 14 Essential Mineral Nutrients

## ▶ PRIMARY NUTRIENTS

Nitrogen (N) – growth/green color

Phosphorus (P) – root development

Potassium (K) – drought tolerance – disease resistance

## ▶ SECONDARY NUTRIENTS

Calcium (Ca) – cell walls

Magnesium (Mg) – center of chlorophyll molecule

Sulphur (S) – color, protein synthesis

## ▶ MICRONUTRIENTS

Iron (Fe) – color without growth

Manganese (Mn)

Copper (Cu)

Zinc (Zn)

Boron (B)

Molybdenum (Mo)

???

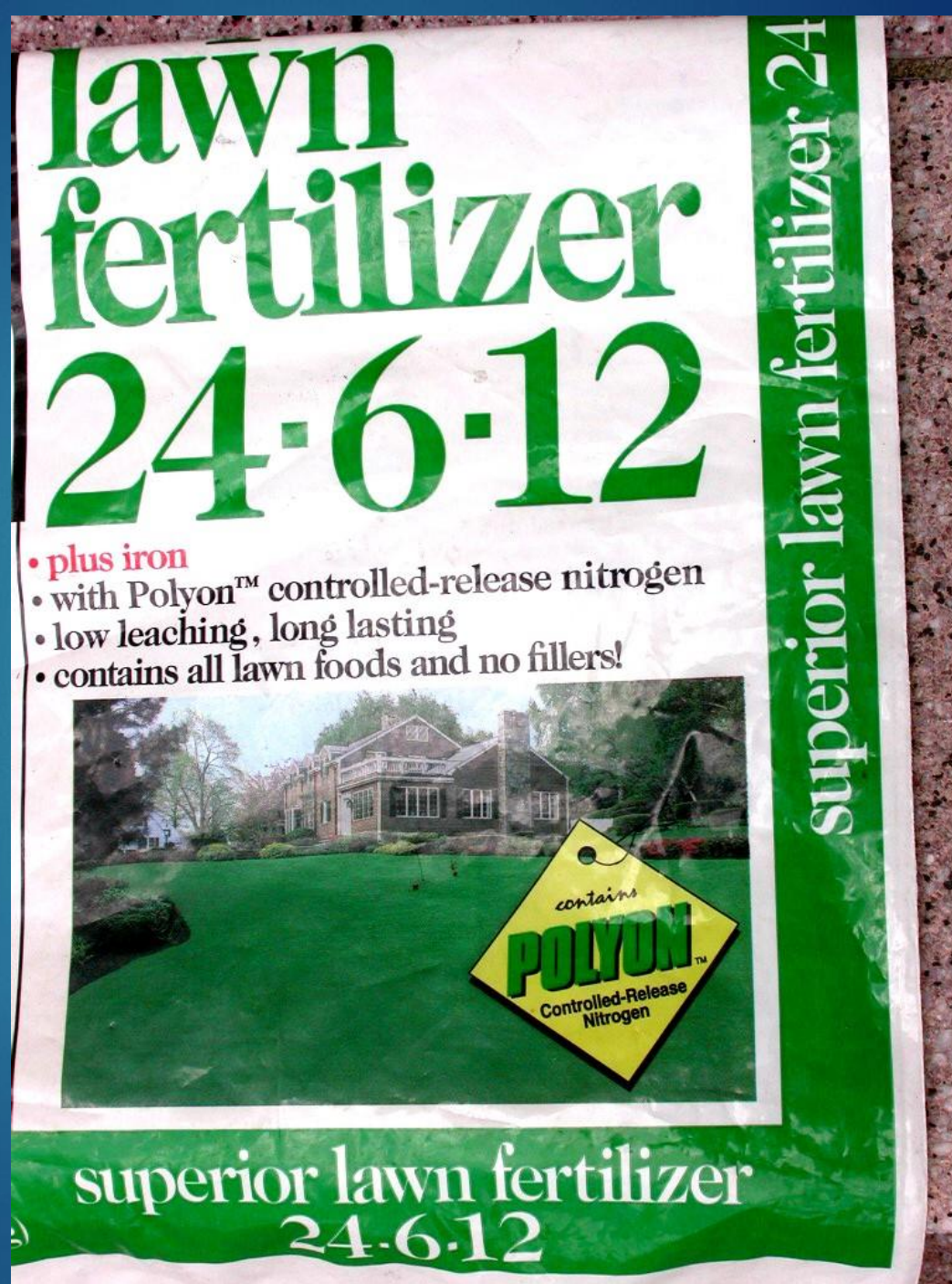
Chlorine (Cl)

Nickel (Ni)



Example:  
Analysis 24-6-12

Ratio 4-1-2

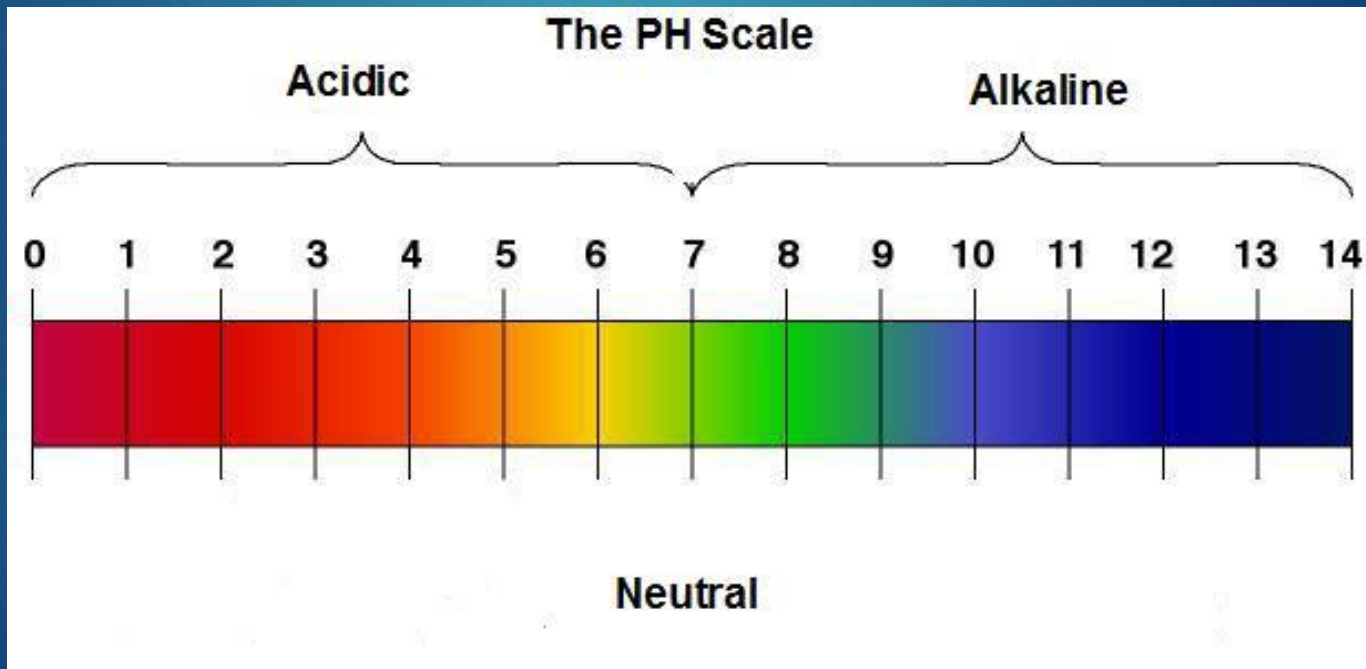


# Micronutrients

Micronutrient	
boron (B)	Formation of plant cell walls and the transport of sugars
chlorine (Cl)	Influences photosynthesis, the division & the opening & closing of stomates
copper (Cu)	Necessary for photosynthesis & influences the lignin content & strength of cell walls
iron (Fe)	Involved in the production of chlorophyll
molybdenum (Mo)	Involved in the formation of proteins and the use of N & S by turfgrasses; also affects the production of pollen
manganese (Mn)	Necessary for photosynthesis & is involved in the formation & breakdown of N-containing compounds

# Soil pH

- ▶ Describes the soils acidity or basicity
  - ▶ Acid soils have a pH below a pH 7
  - ▶ Basic or alkaline soils have a pH above a pH 7





# THE INFLUENCE OF SOIL pH ON THE AVAILABILITY OF 12 PLANT NUTRIENTS

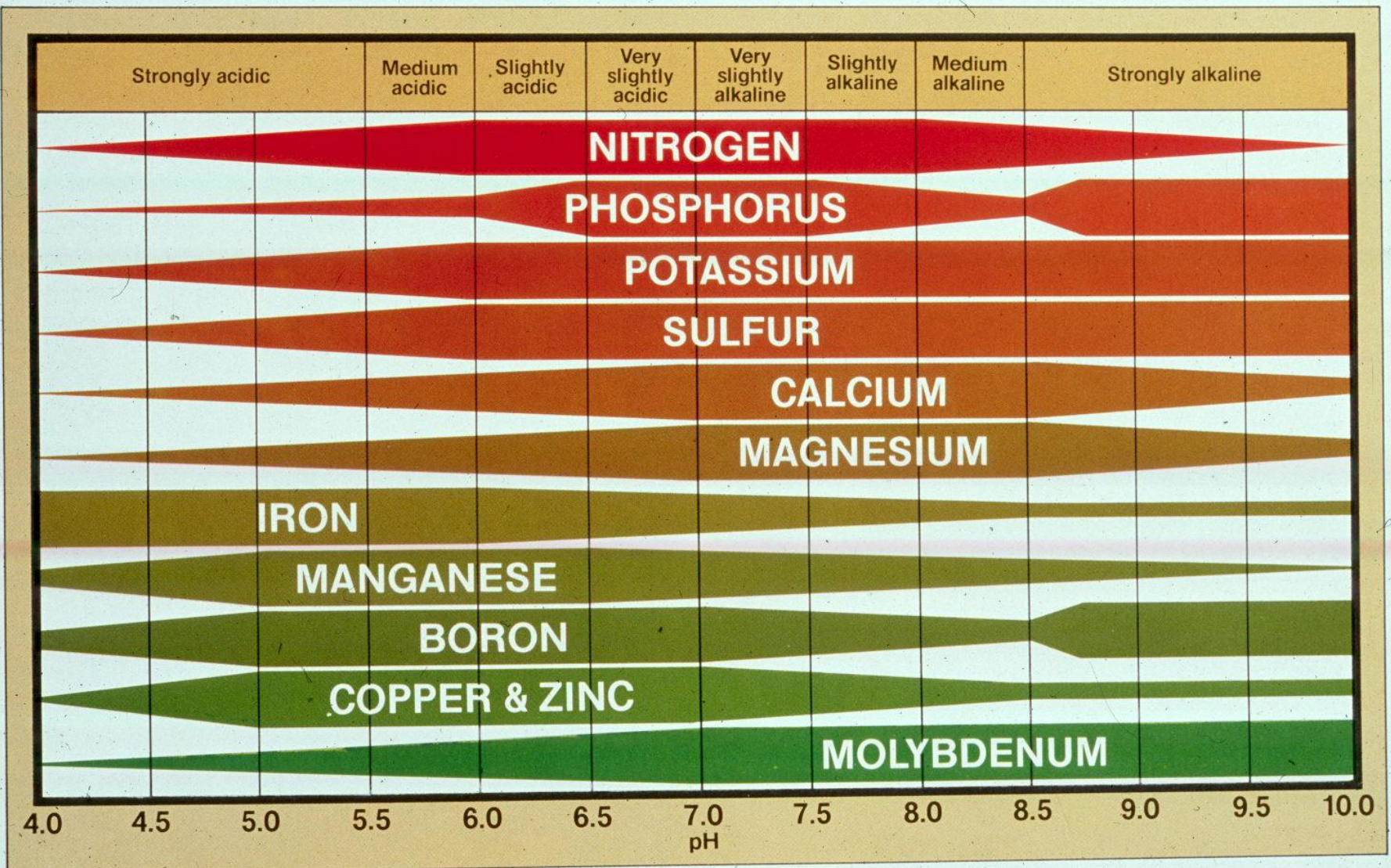






Photo: Dave Han,  
Auburn University



# Managing Soil pH

- ▶ Soil test
- ▶ Add lime to raise soil pH
- ▶ Eliminate/reduce the use of acid forming fertilizers – if soils are too acidic
- ▶ To increase acidity – apply fertilizer containing sulfur-coated urea, ammonium nitrate, ammonium sulfate



# Recordkeeping

- ▶ IPM requires data to form management decisions
- ▶ Monitor
- ▶ Identify & record potential pest problems
- ▶ Determine the degree of the problem
- ▶ Keep a log book
- ▶ Time constraints may limit detailed records of pest occurrences, but basics are helpful
- ▶ Record action steps taken

# Record Keeping

- ▶ Identify problems and problem areas
- ▶ Keep monitoring records
- ▶ Determine degree of pest infestation
- ▶ List management strategies
- ▶ Keep evaluation records
- ▶ Get feedback from school personnel
- ▶ Keep records on all chemical products (pesticides & fertilizers) used on school properties for 3 years.



# Record Keeping

- ▶ Brand Name/Product Name
- ▶ EPA Registration Number
- ▶ Total Amount of Pesticide Applied
- ▶ MM/DD/YYYY
- ▶ Time of Application
- ▶ Location of Treated Area
- ▶ Site
- ▶ Size of Area Treated
- ▶ Name of Certified Applicator & Certification Number
- ▶ Active Ingredients
- ▶ Restricted Entry Interval (REI)

# Successfully Managing Records is Important

- ▶ To support better management decision making
- ▶ To reduce operating costs
- ▶ To improve efficiency and productivity
- ▶ To ensure regulatory compliance
- ▶ To minimize litigation risks
- ▶ To safeguard vital information
- ▶ To preserve memory
- ▶ To foster professionalism





# Record Keeping

## Pesticide Use Log Sheet

Date	Time of Application	Pesticide name	EPA Registration Number	Application method	Concentration and Quantity used	Specific area treated	Target pest

Record the time of year a weed species appears, its abundance and its impact on the landscape.

- ▶ This will help determine:
- ▶ Which weeds and how many of each can be tolerated without the weeds impairing the landscape.
- ▶ Whether or not management strategies are effective.
- ▶ Appearance of new weed species.
- ▶ Weed population size.

# A Few Pests.....

- ▶ Ticks
  - ▶ Disease Transmission ~ 12 species
    - ▶ Rocky Mountain spotted fever
    - ▶ Lyme disease
    - ▶ Babsiosis
    - ▶ Ehrlichiosis
    - ▶ Powassan encephalitis



bugwood.org



# Tick Management

- ▶ Landscape Management – Vegetative modifications to render the environment less suitable for tick survival & hosts
  - ▶ Increase sunlight & lower humidity
- ▶ Management of Host – Exclusion of hosts by fencing, host reduction, & by management of host habitat

## References:

- ▶ Connecticut Tick Management Handbook
- ▶ [extension.org](http://extension.org)

### Tick Sampling

A “tick drag” or “tick flag” may be used to determine if ticks are present. To construct a tick drag, attach one edge of a square yard piece of white, heavy flannel or corduroy material to a 3 foot long wooden dowel and tie a rope to each end of the wooden dowel. Curtain weights can be attached to the opposite end to help hold the cloth to the ground. Drag the cloth over the lawn and leaves and check for ticks. A “tick flag”, which is easier to use on vegetation, is similar to a tick drag, but is built just like a flag. Only a small proportion of the ticks present will be picked up this way, so several drags should be done before concluding there are few or no ticks. Tick drags will not work when the grass or vegetation is damp or wet. **Precautions to avoid tick bites should be taken when sampling for ticks.**





# Monitor for Pest Problems

Different methods for different pests



Outdoor turf and field pest monitoring methods

- ▶ Soil cores
- ▶ Floatation cups
- ▶ Insect drags
- ▶ Transects
- ▶ Pheromone traps
- ▶ Pitfall traps
- ▶ Sticky traps
- ▶ Insect nets
- ▶ Light traps
- ▶ Grids

# Disease Monitoring

- ▶ ID Grass species affected
- ▶ Prior history?
- ▶ Visual inspection



Top to bottom: Rust, Brown Patch, Anthracnose, grey snow mold (right)



# Turfgrass IPM for Schools

## Monitor and Inspect

- ▶ Number of inspections
- ▶ Methods of sampling for pests
- ▶ ID key turf species, locations, pests, non-target sp.
- ▶ Soil samples: compaction and site moisture drainage.
- ▶ Keep records of known plant stressors, environmental concerns, turfgrass pest densities, and natural enemies present.

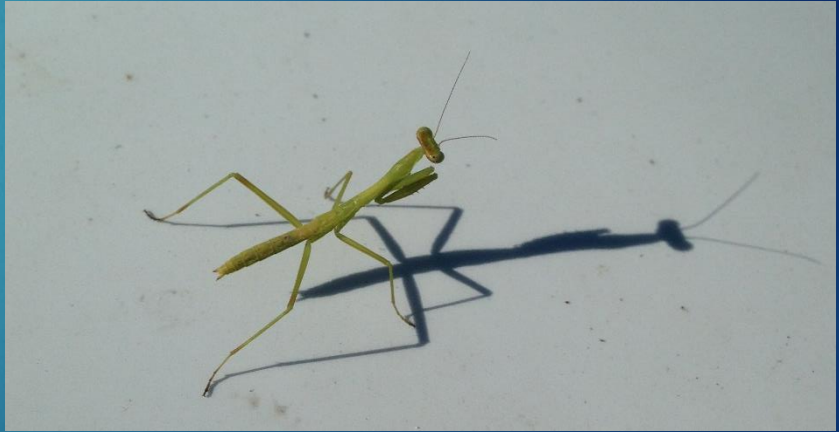


# Protect Beneficial Insects

- ▶ Recognize beneficial insects
- ▶ Valuable allies in pest management
- ▶ They may not actually be causing a problem









# Milky Spore

## ▶ Milky Spore Disease

- ▶ A bacterial white grub pathogen
- ▶ Grubs ingest spores with soil during feeding
- ▶ Colonizes grub's body fluid
- ▶ Grubs starve in 4 weeks
- ▶ Forms white spores
- ▶ Spores can survive for years





**THANK YOU**

**Kim Pope Brown  
Pesticide Safety Education Coordinator  
LSU AgCenter**





# Best Management Practices for Turfgrass



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**OSU**

**Oregon State**  
UNIVERSITY

Extension Service



# Best Management Practices for Turfgrass

- ▶ Primary Cultural Practices
  - ▶ Mowing
  - ▶ Fertilization
  - ▶ Irrigation
  
- ▶ Secondary Cultural practices
  - ▶ Cultivation
  - ▶ Inter-seeding
  - ▶ Pest Management

# Best Management Practices for Turfgrass

- ▶ Primary Cultural Practices

- ▶ Mowing

- ▶ Fertilization

- ▶ Irrigation

- ▶ Secondary Cultural practices

- ▶ Cultivation

- ▶ Inter-seeding

- ▶ Pest Management...

- ▶ Broadleaf weeds

- ▶ Insects

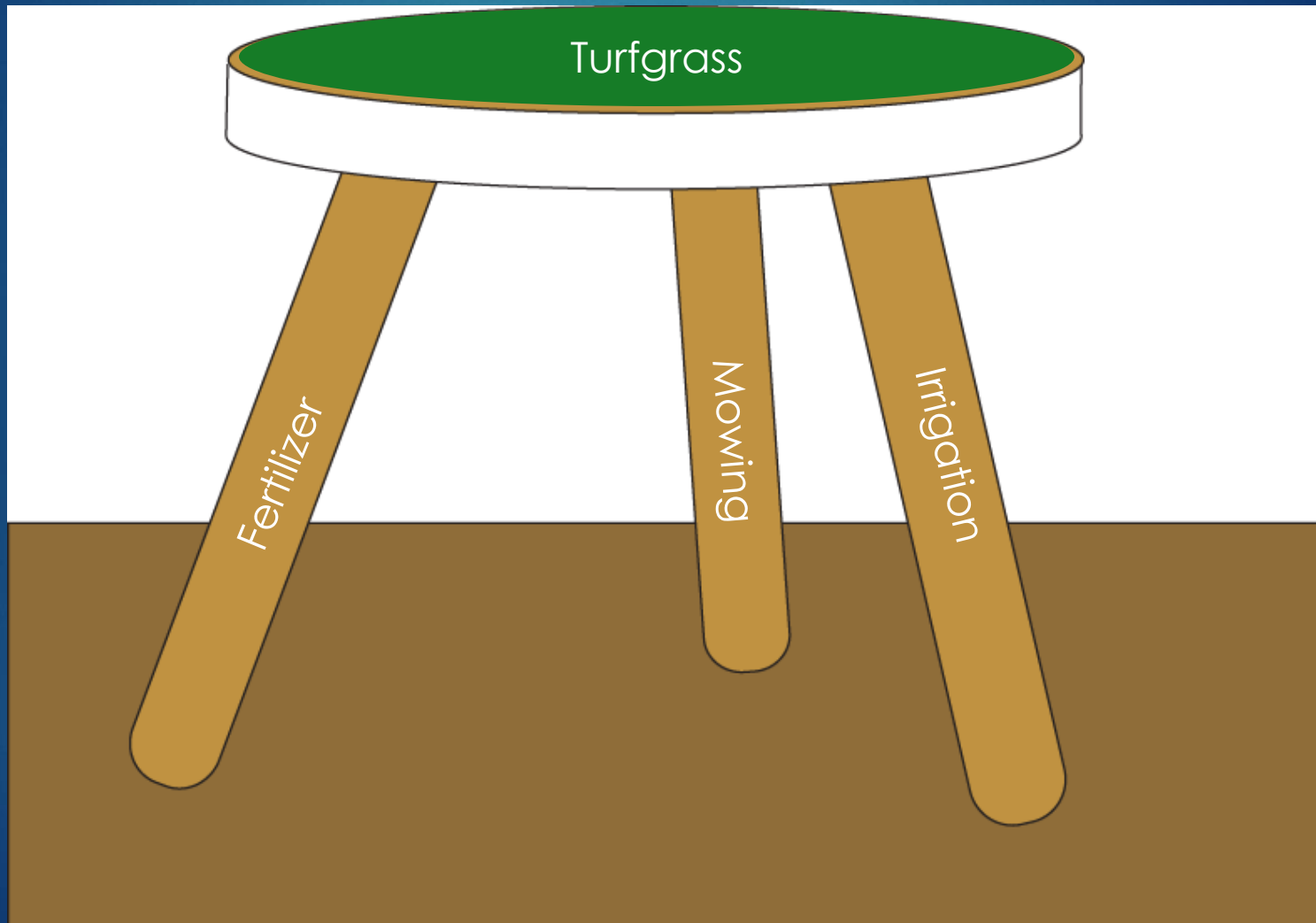


# Primary Cultural Practices

1. Mowing
2. Fertilizing
3. Irrigation

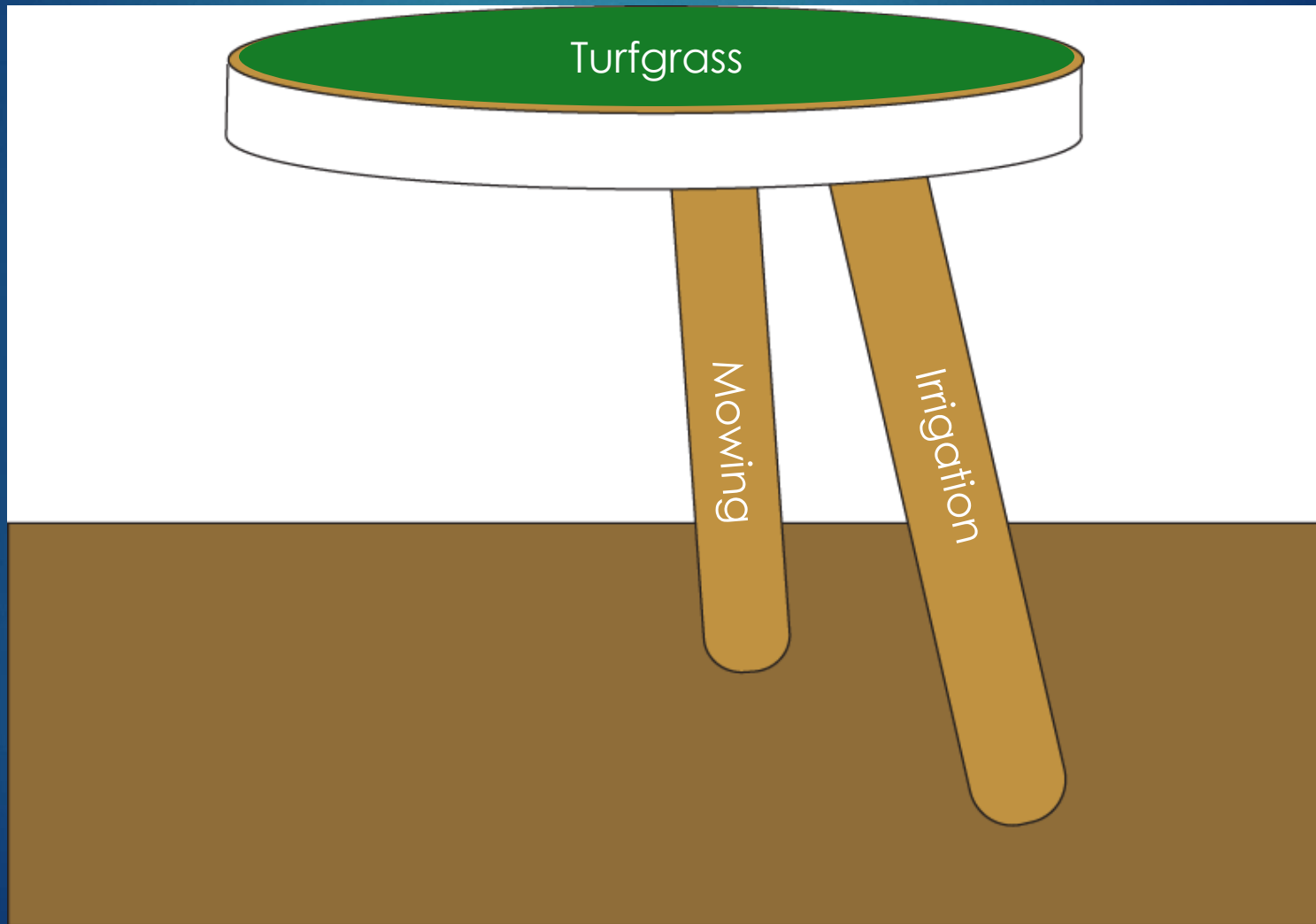


# Primary Cultural Practices

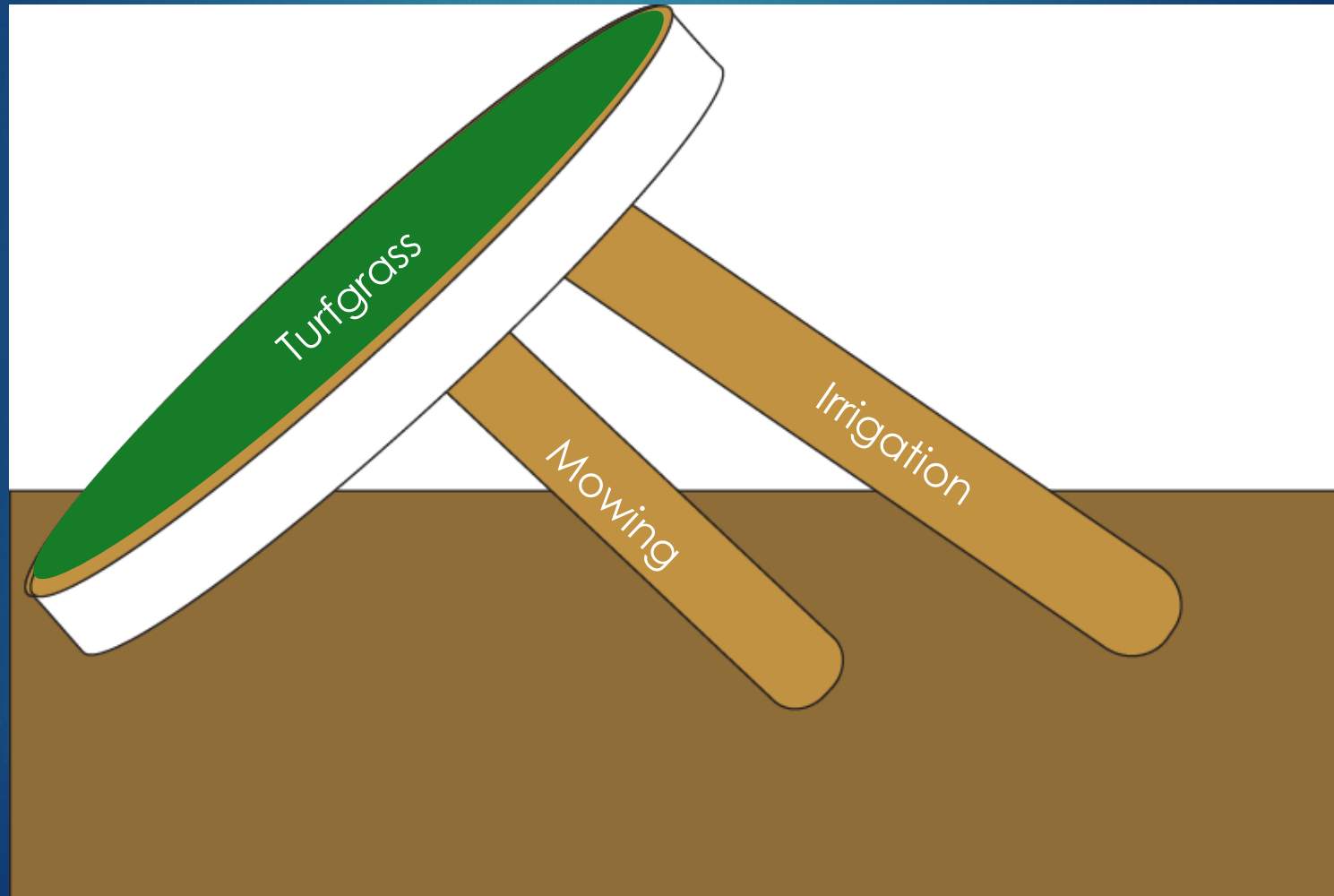




# Primary Cultural Practices



# Primary Cultural Practices



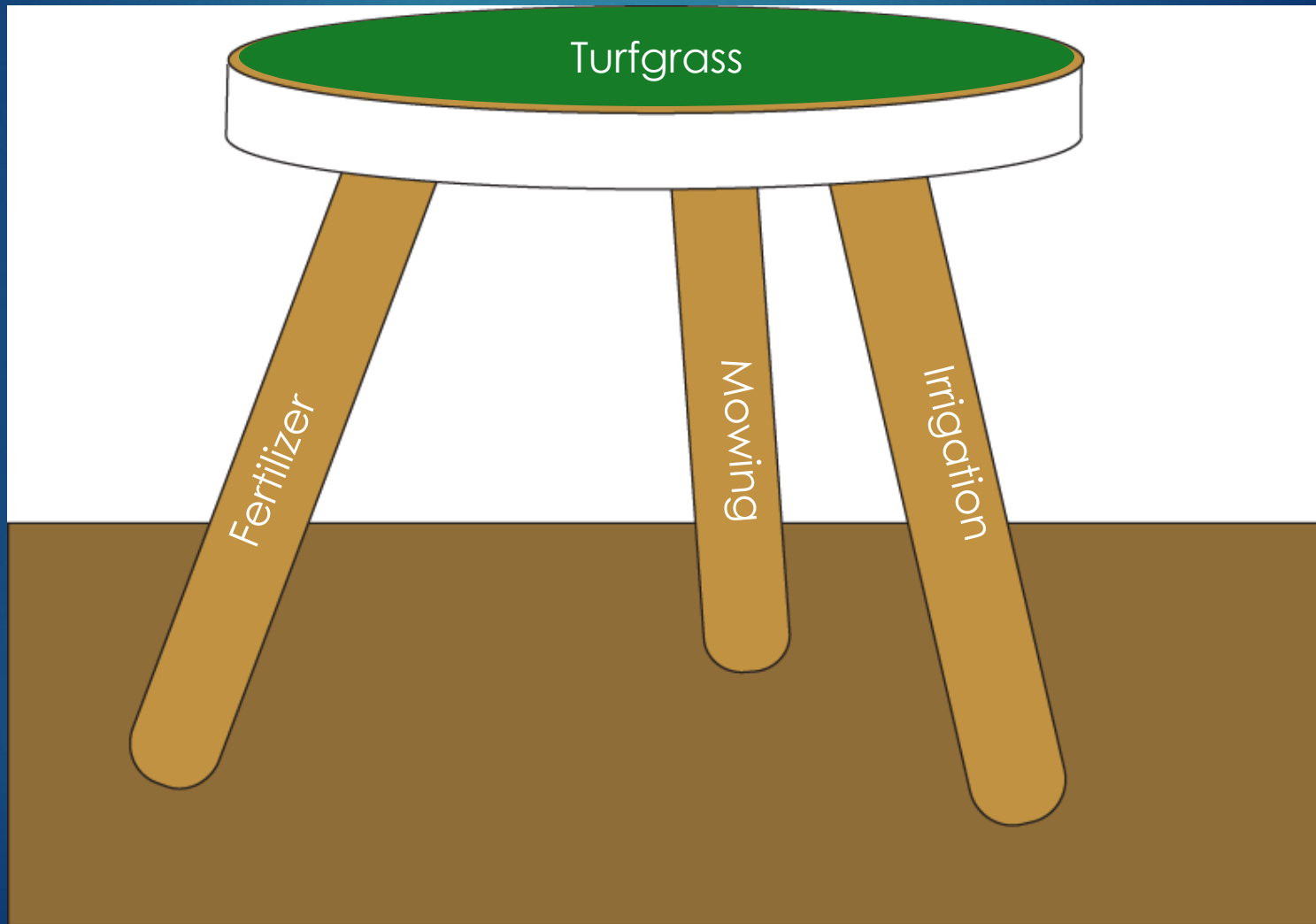


BARNSBURY RD  
WESTMINSTER WAY





# Primary Cultural Practices





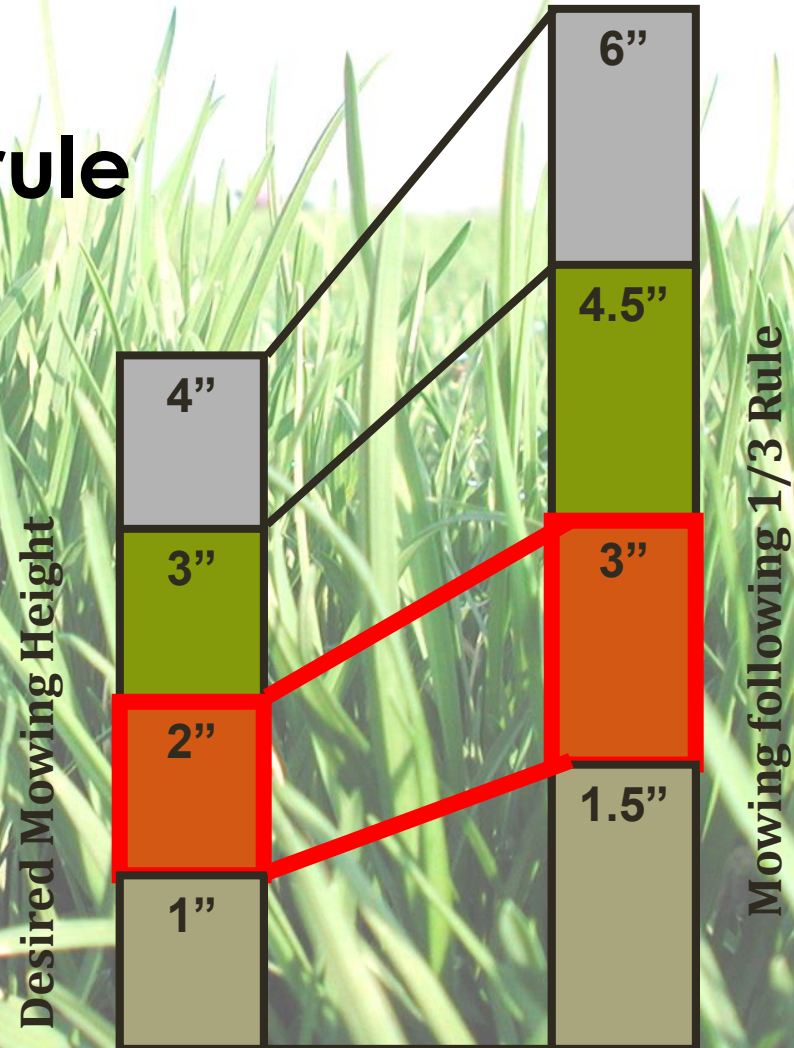


# Mowing



# Mowing

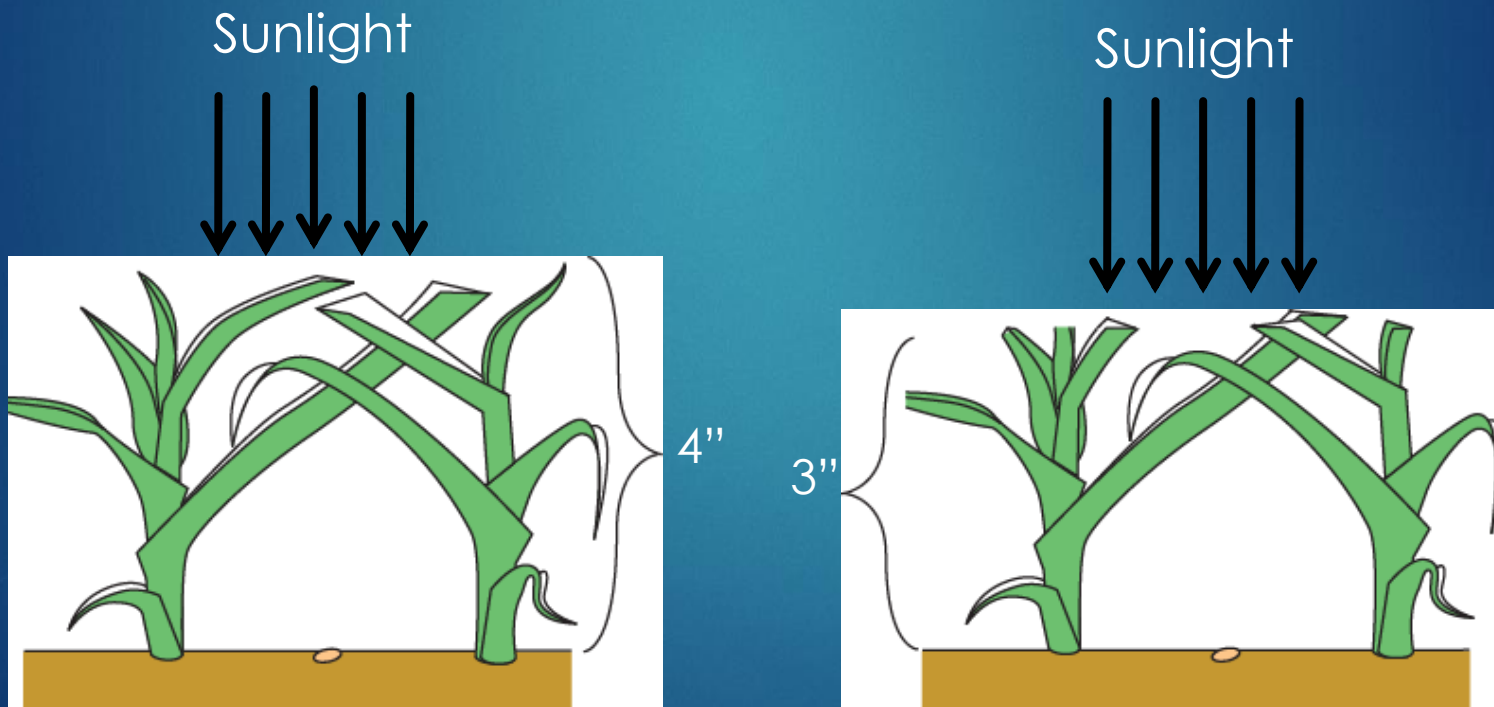
## ► The one-third rule





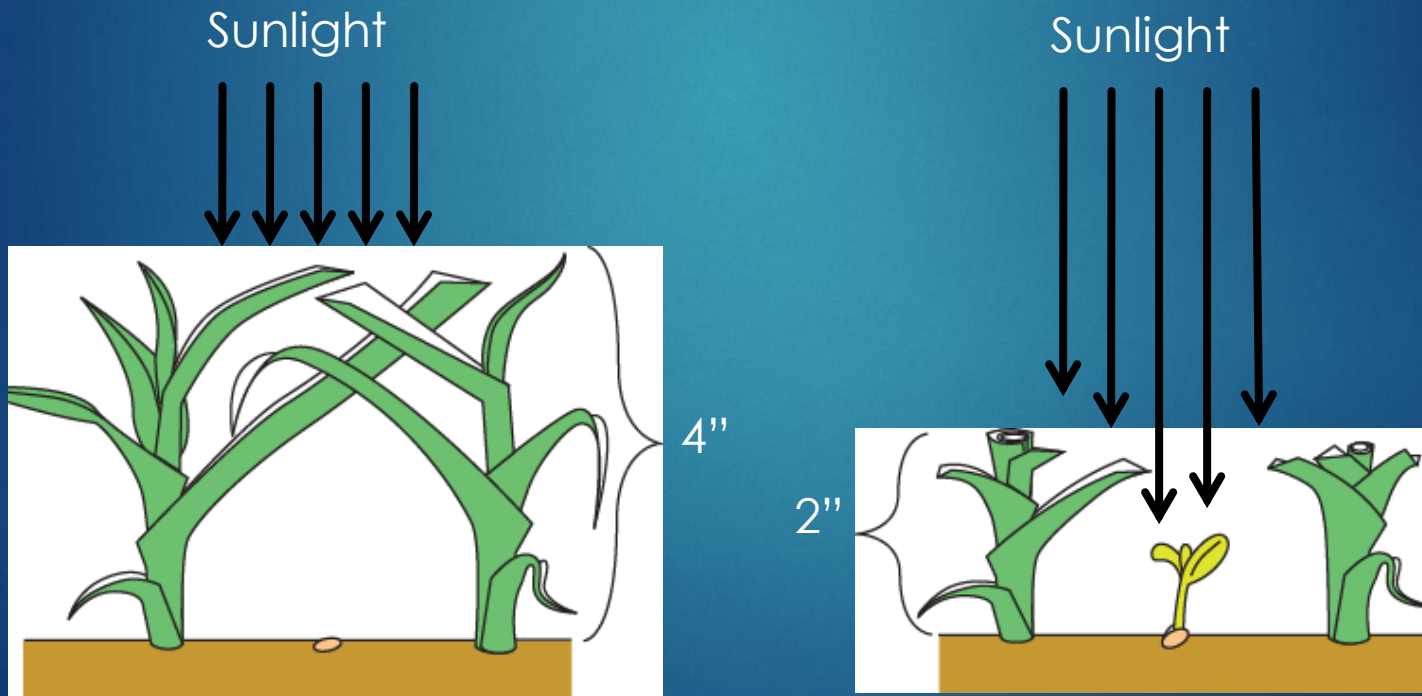
# Mowing

- ▶ The one-third rule
  - ▶ Prevent weed seed germination



# Mowing

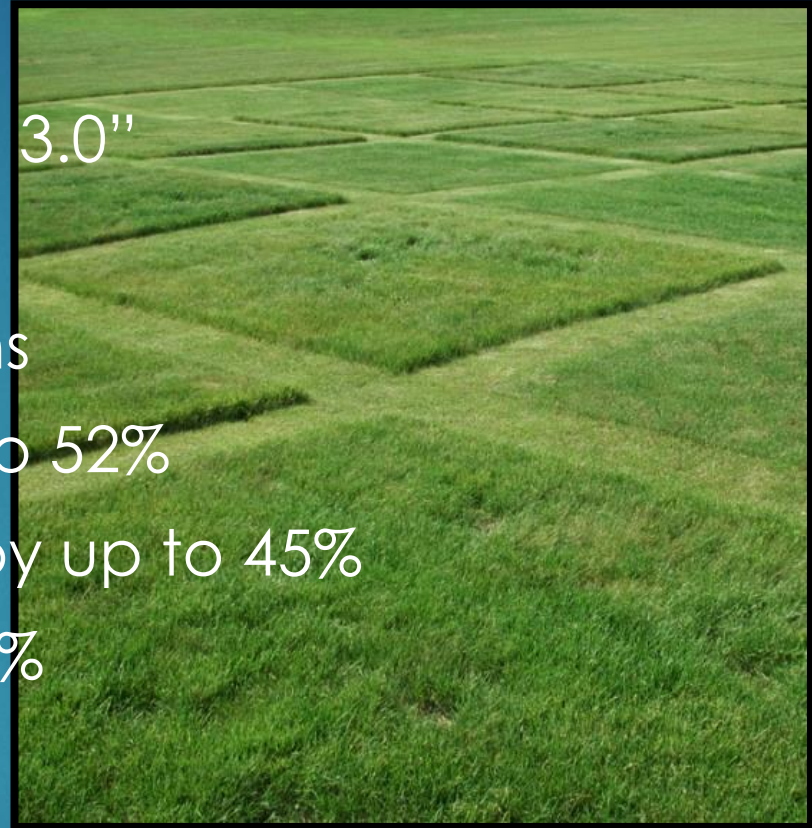
- ▶ The one-third rule
  - ▶ Prevent weed seed germination





# Mowing

- ▶ Raising the height from 1.5" to 3.0"
  - ▶ Improved turfgrass quality
  - ▶ Reduced weed populations
    - ▶ Crabgrass cover by up to 52%
    - ▶ Dandelion populations by up to 45%
    - ▶ White clover by up to 58%



Kentucky bluegrass, perennial ryegrass and fine fescue mixture



06/02/2014



# Mowing



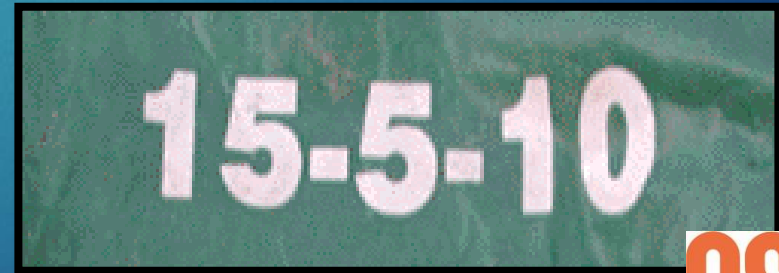
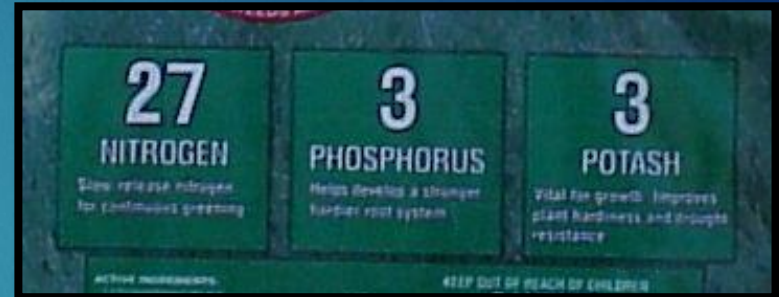
# Fertilization





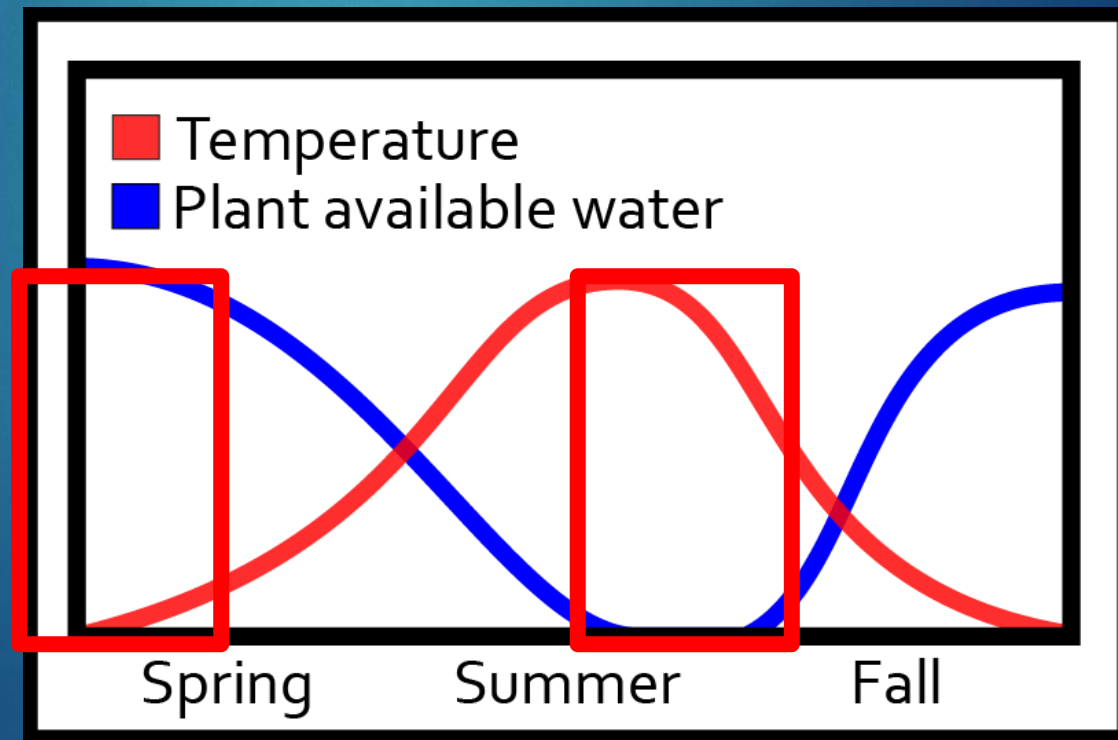
# Fertilization

- ▶ Select a fertilizer designed for turfgrass
  - ▶ Primary nutrient (N-P-K)
    - ▶ High N
    - ▶ Low P
    - ▶ 10:1



# Fertilization

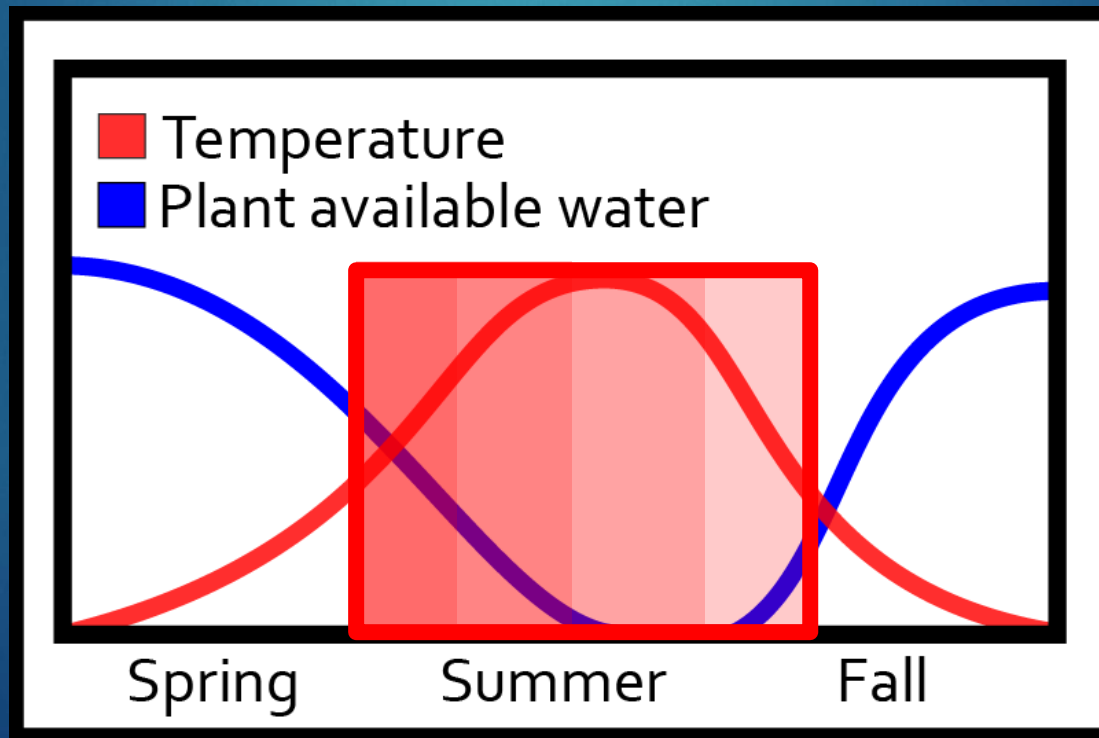
- ▶ Quick release (urea: 46-0-0)
  - ▶ 1.1 lbs/1,000 sq ft
  - ▶ 0.5 lbs N/1,000 sq ft





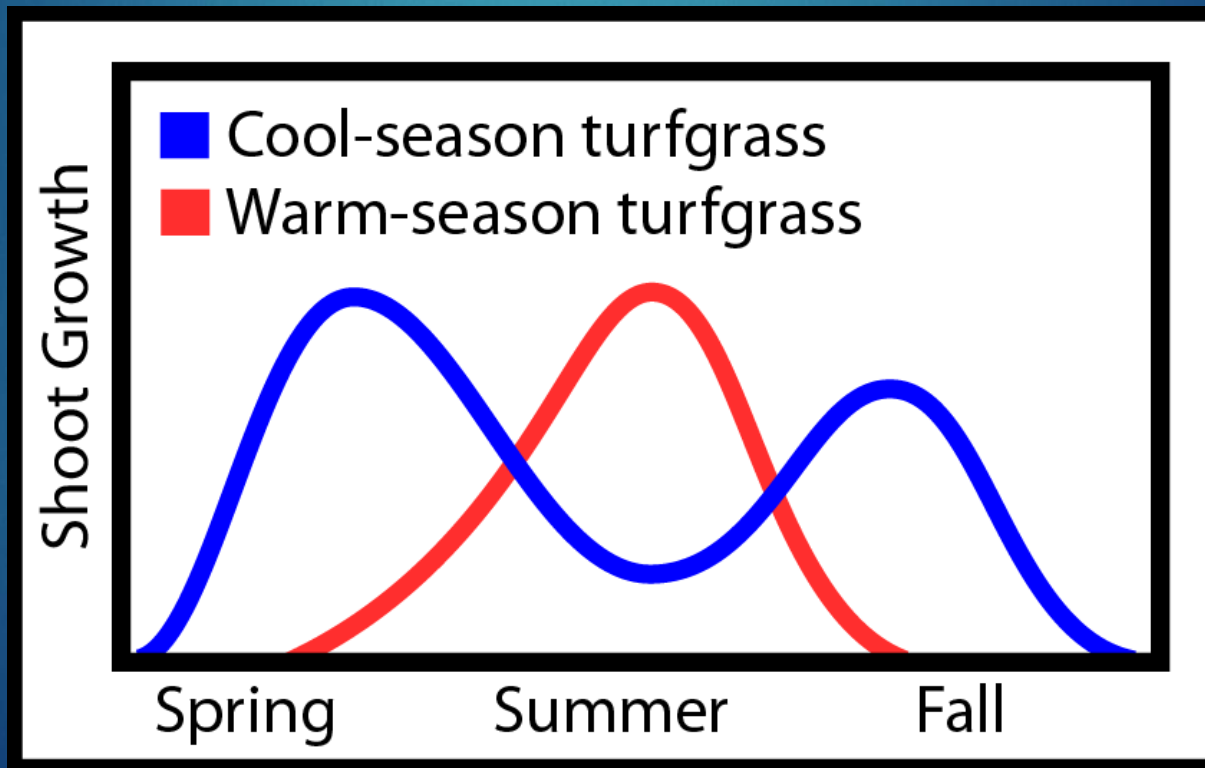
# Fertilization

- ▶ Slow release (compost: 3-2-2)
  - ▶ 100 lbs /1,000 sq ft (1/4 inch)
  - ▶ 3 lbs N/1,000 sq ft



# Fertilization

- ▶ Timing....
  - ▶ 4 lbs N/1,000 sq ft annually





# Fertilization

- ▶ 4 lbs N/1,000 sq ft
  - ▶ Reduced weed populations...
    - ▶ White clover by up to 62%
    - ▶ Dandelion by up to 66%
    - ▶ Crabgrass by up to 35%



# Fertilization





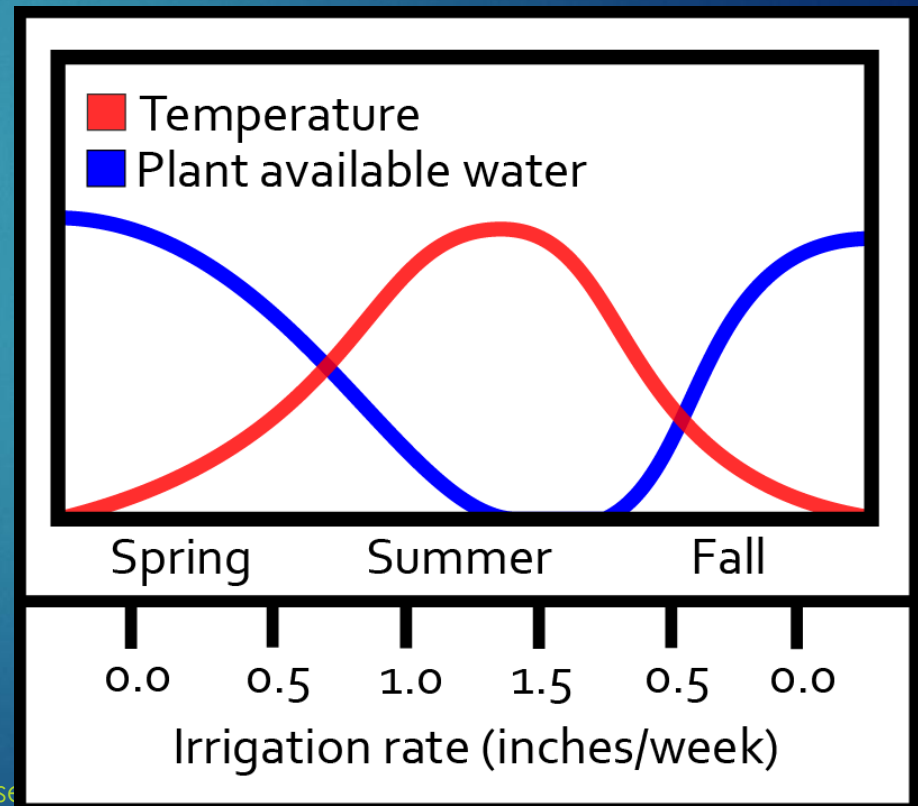
# Irrigation





# Irrigation

- ▶ Adjust your rates with the seasons
  - ▶ Spring
    - ▶ 0.0-0.75 inch week
  - ▶ Summer
    - ▶ 0.75-1.5 inch week
  - ▶ Fall
    - ▶ 0.0-0.75 inch week



# Irrigation

- ▶ Check your rates
  - ▶ 20 minutes
    - ▶ 0.1 inch
    - ▶ 0.25 inch
    - ▶ 0.5 inch





# Irrigation

- ▶ Twice as much is not twice as good
  - ▶ Moss





# Irrigation

- ▶ Weeds associated with over irrigation...
  - ▶ Annual bluegrass
  - ▶ Rough bluegrass



Rough bluegrass



Annual bluegrass



# Irrigation

- ▶ Weeds associated with drought conditions...
  - ▶ Summer annuals
    - ▶ Knotweed
    - ▶ Wood sorrel
    - ▶ Crabgrass



Crabgrass



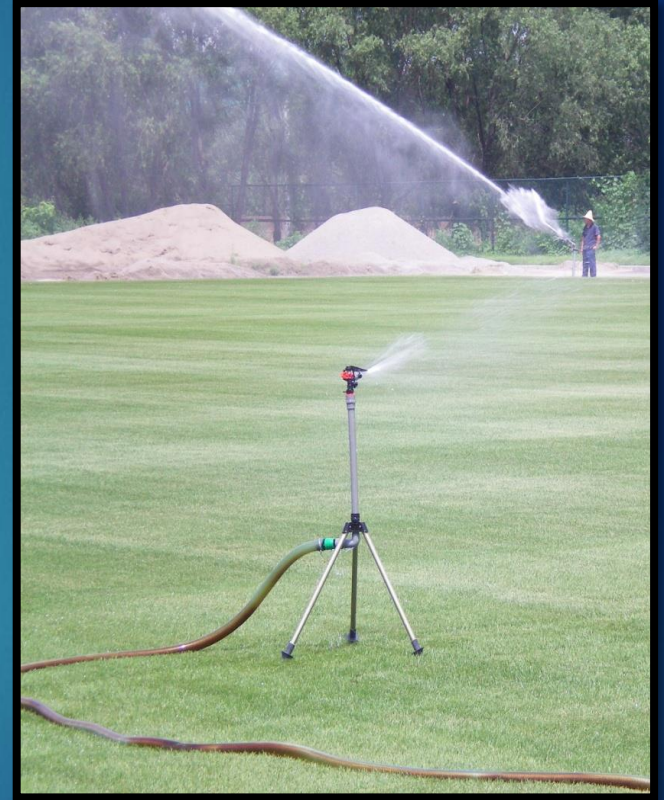
woodsorrel



Knotweed



# Irrigation





# Weed Management





# Weed Management

- ▶ Broadleaf weeds

- ▶ Dandelion

- ▶ Clover





# Weed Management

- ▶ Pest Triangle

- ▶ Pest

- ▶ Dandelion

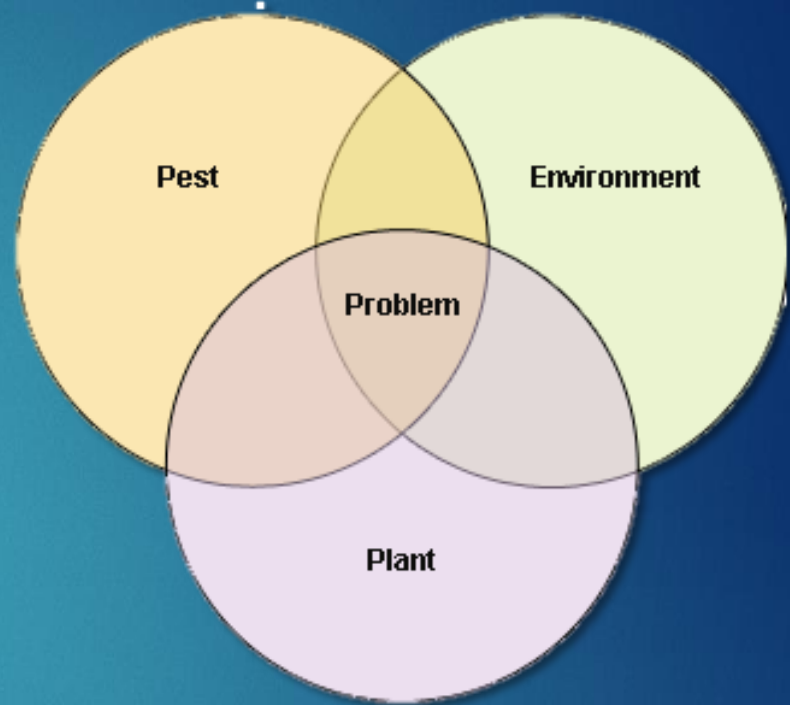
- ▶ Plant

- ▶ Turfgrass

- ▶ Environment

- ▶ Drought stress

- ▶ Low mowing height



# Dandelion

- ▶ Post emergence herbicides (curative)
  - ▶ 3-way broadleaf herbicide
    - ▶ 2,4-D
      - ▶ MCPP
        - ▶ Dicamba



Common dandelion



False dandelion



Broadleaf plantain



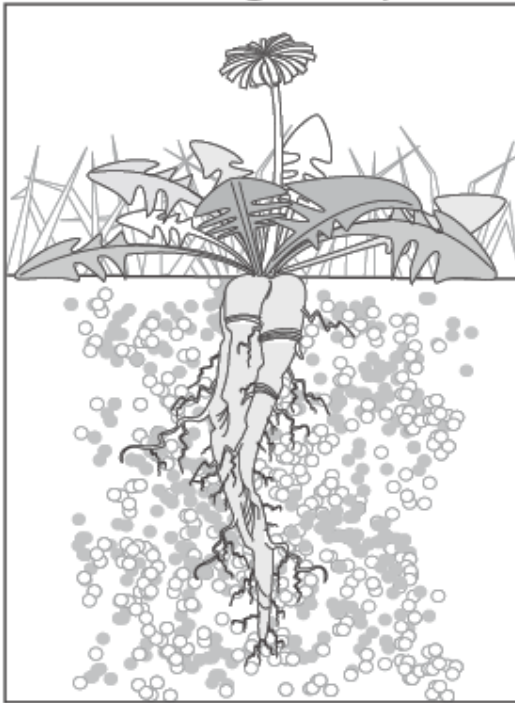
Sow thistle



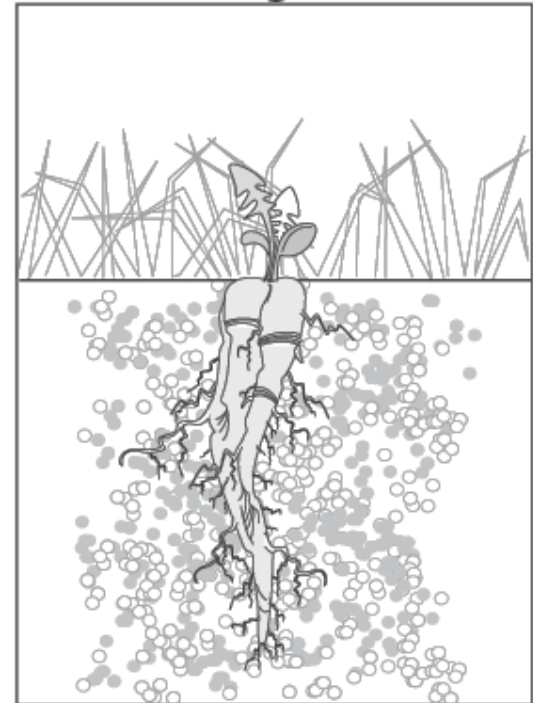
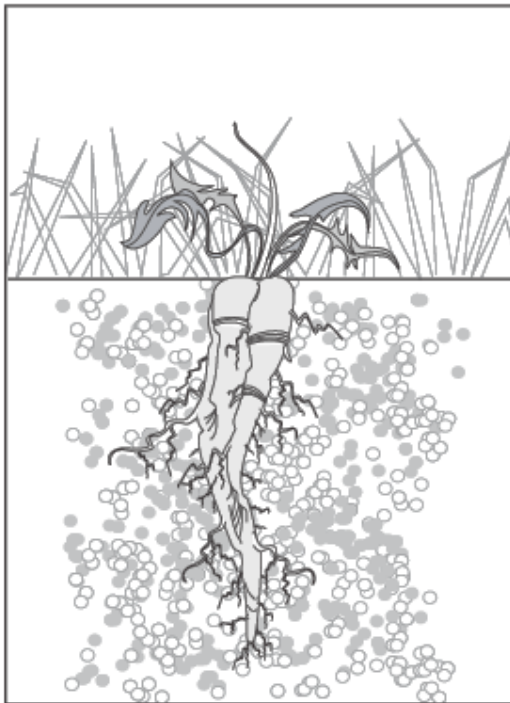
# Dandelion

- ▶ Apply in the fall (October 4 = 10/4 Good Buddy)

Spring Spray



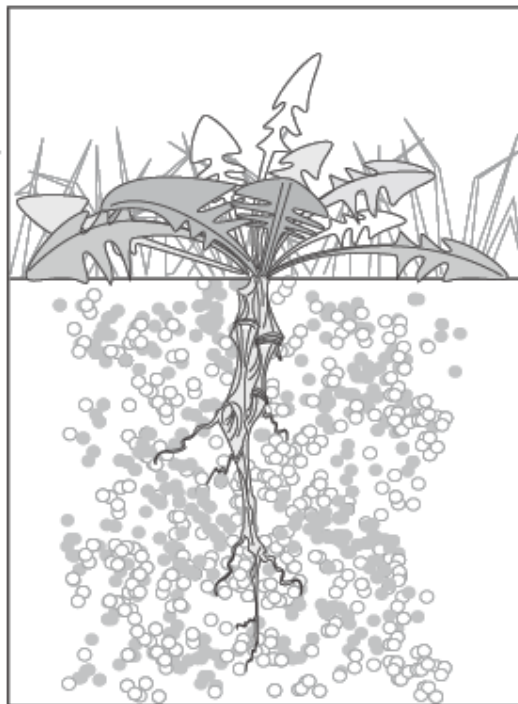
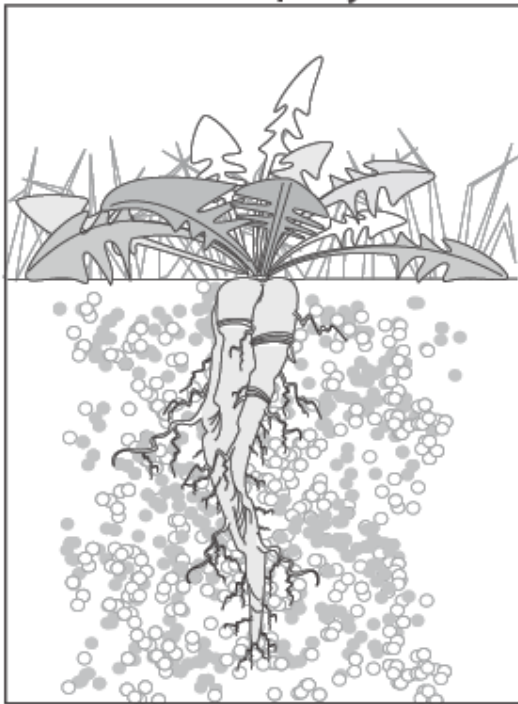
Following Summer



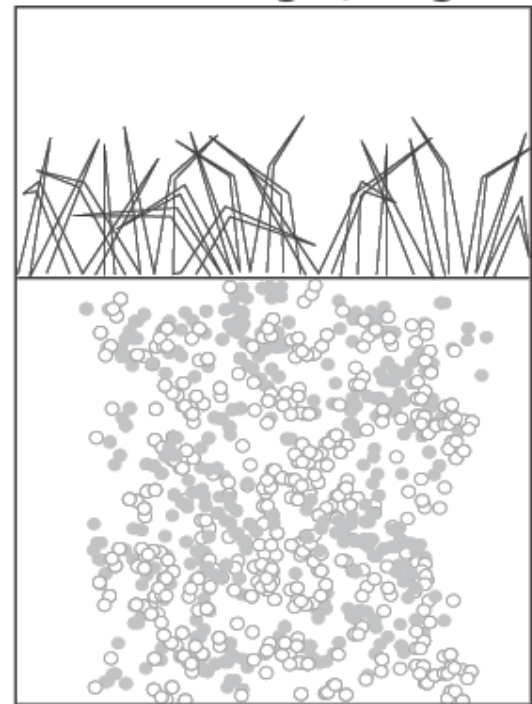
# Dandelion

- ▶ Apply in the fall (October 4 = 10/4 Good Buddy)

Fall Spray



Following Spring





# Weed Management

- ▶ Broadleaf weeds
  - ▶ Dandelion
  - ▶ Clover



# Weed Management

- ▶ Pest Triangle

- ▶ Pest

- ▶ White clover

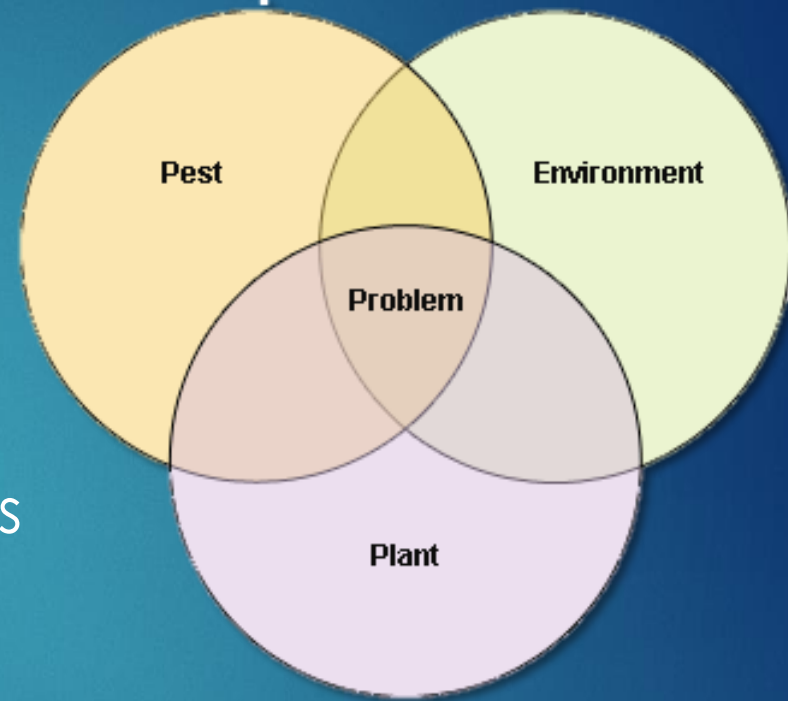
- ▶ Plant

- ▶ Kentucky bluegrass

- ▶ Environment

- ▶ Low fertility (N)

- ▶ Low mowing height





# Clover

- ▶ Post emergence herbicides (curative)
  - ▶ 3-way broadleaf herbicide
    - ▶ Triclopyr
      - ▶ 2,4-D
      - ▶ MCPP



White clover



Chickweed



English daisy

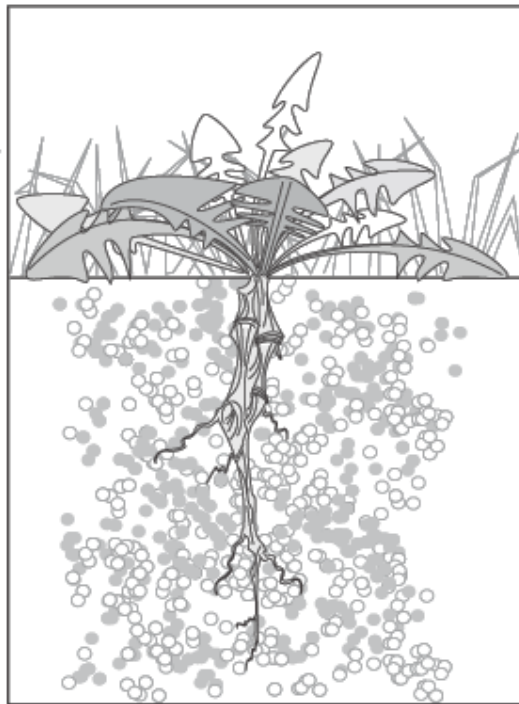
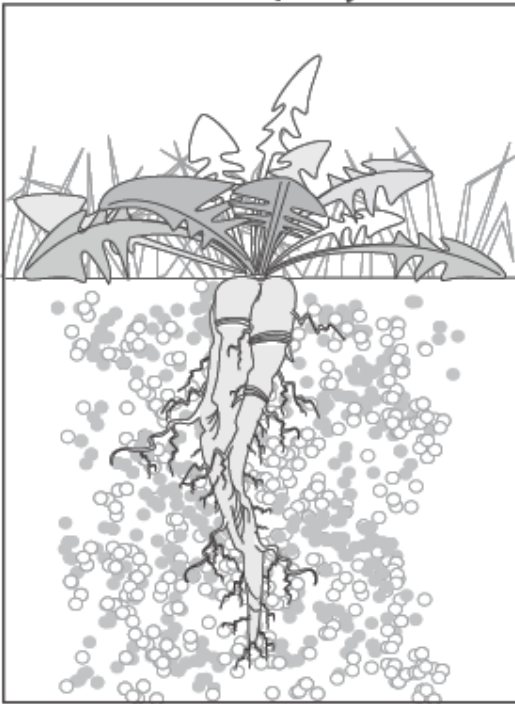


Wild violet

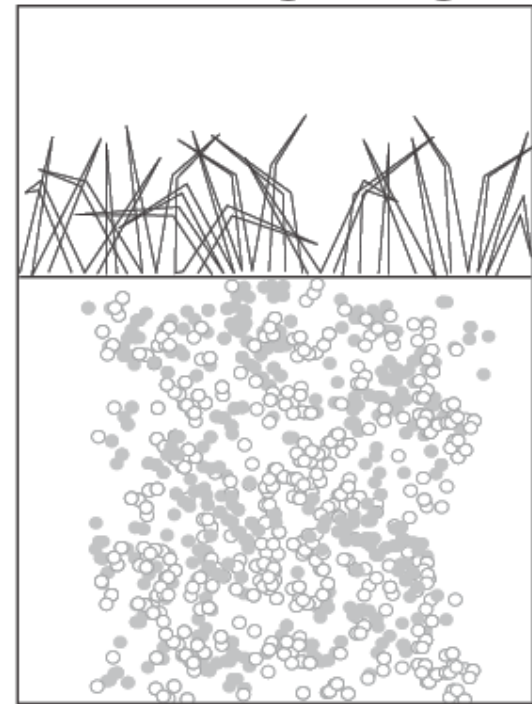
# Clover

- ▶ Apply in the fall (October 4 = 10/4 Good Buddy)

Fall Spray



Following Spring





# Weed Management



# Insect Management





# Insect Management

- ▶ Foliar feeding...

- ▶ Armyworm
- ▶ Cutworm
- ▶ Chinch bugs
- ▶ Billbugs

- ▶ Root feeding...

- ▶ Grubs
- ▶ Leather jackets
- ▶ Mole crickets



Fall armyworm



Billbug



Japanese beetle



European crane fly

# Insect Management

- ▶ Foliar feeding...
  - ▶ Irritant sampling



Fall  
armyworm



Chinchbug



Adult  
Billbug



Exception: Mole cricket  
(root feeding)



# Insect Management





# Insect Management

- ▶ Root feeding...
  - ▶ Shovel sampling



White grub:  
Japanese beetle



White grub:  
Billbug larvae



European  
crane fly



# Insect Management

## ▶ Economic action thresholds



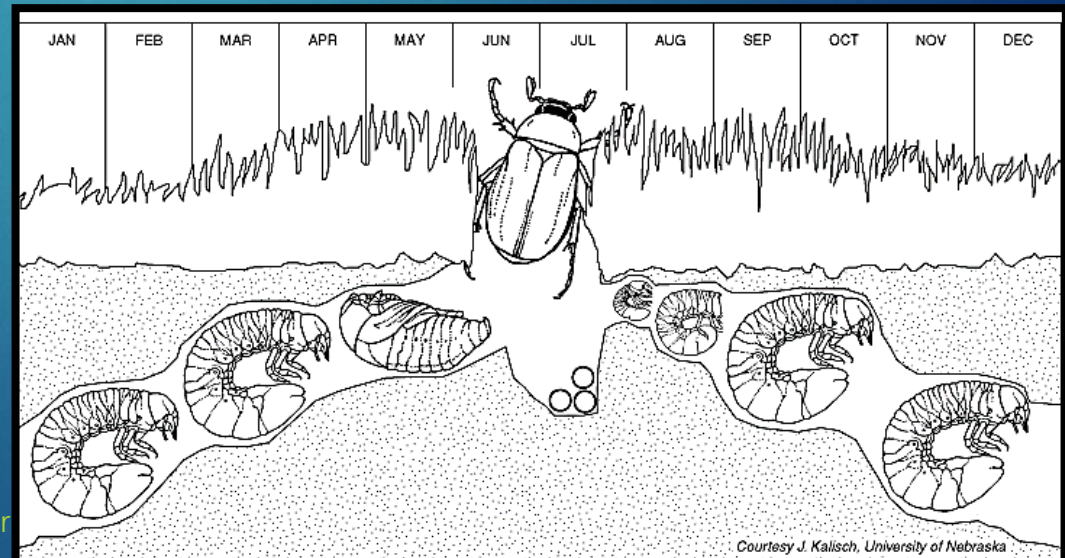
	Insects per ft <sup>2</sup>		When to scout	Scouting method
	Unirrigated turf	Irrigated turf		
<b>Japanese beetle grub</b>	5 to 10	10 to 20	Sept. and Oct.	Shovel
<b>European chafer</b>	6 to 10	10 to 20	Sept. and Oct.	Shovel
<b>May/June beetle grub</b>	3 to 5	5 to 10	Sept. and Oct.	Shovel
<b>Crane fly</b>	15 to 25	25 to 50	Dec. and Jan.	Shovel
<b>Billbugs</b>	5 to 10	10 to 20	April and May	Irritant soak
<b>Chinch bugs</b>	20 to 30	30 to 50	June and July	Irritant soak
<b>Cutworm</b>	----- 1 to 2 -----	-----	July and Aug	Irritant soak
<b>Fall armyworm</b>	-----1 to 2 -----	-----	July and Aug	Irritant soak
<b>Mole crickets</b>	----- 2 to 4 -----	-----	April and May	Irritant soak

# Insect Management

- ▶ Insecticides
  - ▶ Preventative grubs – early instar
    - ▶ imidacloprid (Merit)
    - ▶ thiamethoxam (Meridian)
    - ▶ chlorantraniliprole (Acelepryn)
  - ▶ Curative grubs - late instar
    - ▶ trichlorfon (Dylox)
    - ▶ carbaryl (Sevin)



White grub:  
Japanese beetle





# Insect Management

- ▶ Insecticides

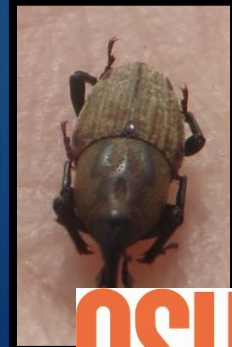
- ▶ Combination products for foliar and root feeding insects

- ▶ Allectus

- ▶ imidacloprid and bifenthrin

- ▶ Aloft

- ▶ Clothianidin and bifenthrin



# Best Management Practices for Turfgrass



Alec Kowalewski, PhD  
Turfgrass Specialist  
Oregon State University

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# Turf Review Questions

99

- 
- A photograph of a baseball glove, a baseball, and a baseball bat lying on a grassy field. The glove is brown and black, the baseball is white with red stitching, and the bat is wooden. The background is a blurred green field.
- ▶ What grass species do you maintain?
  - ▶ Resistant varieties?
  - ▶ Are soils tested regularly?
  - ▶ Mowing height, blade sharpness?
  - ▶ Irrigation, Standing water?
  - ▶ Fertilization and aeration?
  - ▶ What are your pest problems?
  - ▶ Weed tolerance threshold?
  - ▶ How often are fields used?
  - ▶ Are fields rotated?
  - ▶ Outside influences?
  - ▶ Disease issues?

# Upcoming School IPM Webinars

- Apr.19      Vertebrate Turf Pests
- May 10      Stop School Pests and iPestManager  
Tools
- May 17      Ants, The #1 Pest in Schools
- Jun. 7       Termite Mitigation in Schools





# Certificates of Attendance

## CERTIFICATE *Of* PARTICIPATION

This is to certify the above participant attended the 90-minute webinar entitled  
**IPM FOR TURF ON SCHOOL GROUNDS**



PRESENTED BY: EPA's Center of Expertise for School IPM

ON THIS DAY: March 15, 2016

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# Questions?

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