IPM for Turf on School Grounds

Center of Expertise for School IPM

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Pesticide Safety, Integrated Pest Management and Your School

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Protecting the health of children is a top priority

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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

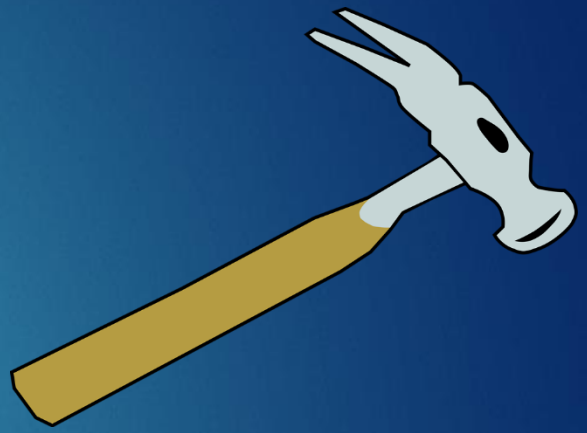
Integrated Pest Management

- 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

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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


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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.
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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

Routine Soil Test

					SOIL TEST RESULTS				RECOMMENDATIONS			
L A B No.	Sample Designation	Crop	S o i l Group*	pH**	Phosphorus P***	Potassium K***	Magnesium Mg***	Calcium Ca***	LIME-STONE	N	P_2O_5	K_2O
					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.

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

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

* 1. Sandy soil (CEC < 4.6 $cmol_c kg^{-1}$)

* 2. Loams and Light clays (CEC = 4.6-9.0 $cmol_c kg^{-1}$)

* 3. Clays and soils high in organic matter (CEC > 9.0 $cmol_c kg^{-1}$)

* 4. Clays of the Blackbelt (CEC > 9.0 $cmol_c kg^{-1}$)

** 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.

Approved by: Joseph Harbuck

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)

  ??? essential ???

  Chlorine (Cl)

  Nickel (Ni)

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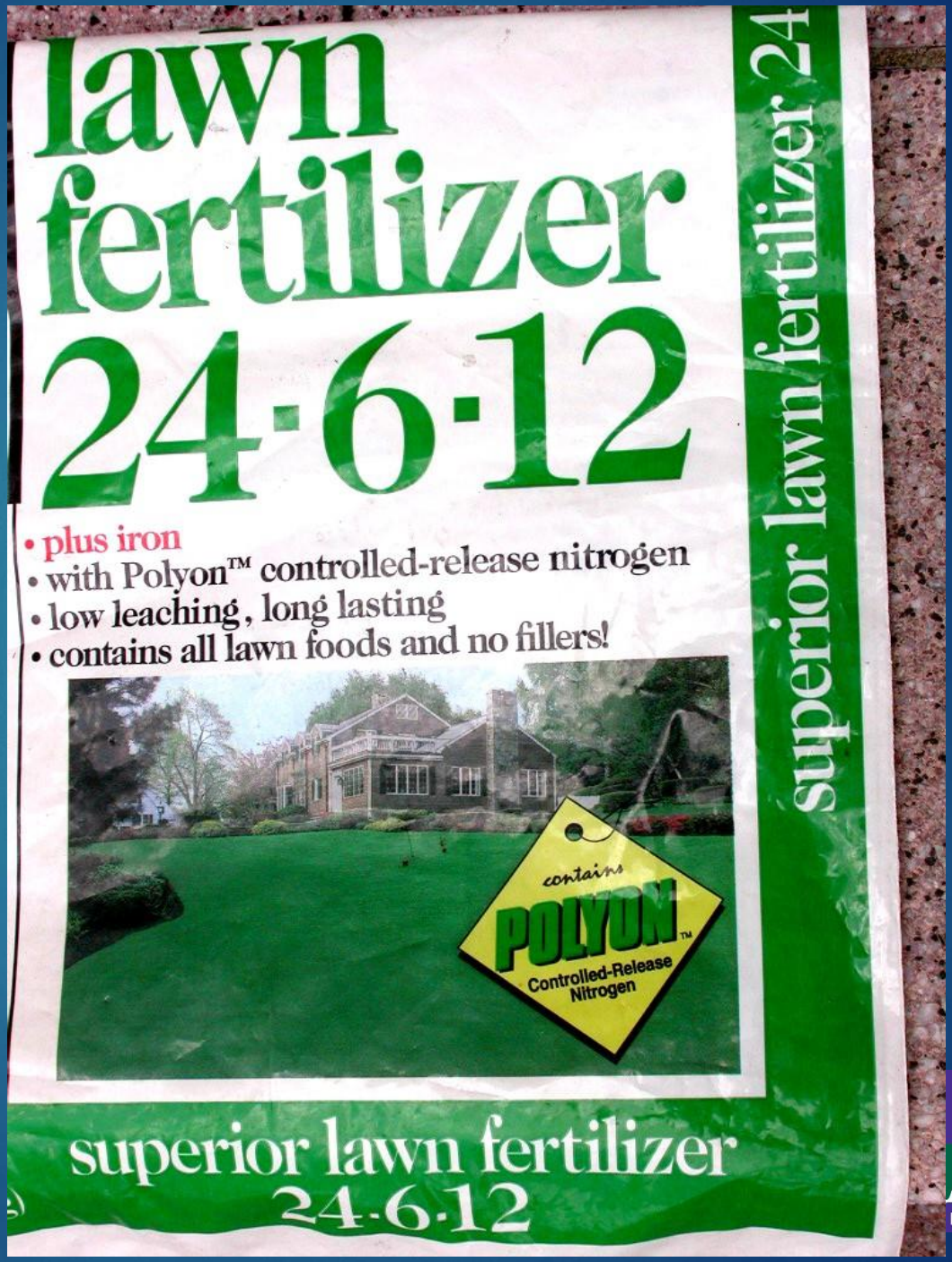
Example:
Analysis 24-6-12

Ratio 4-1-2



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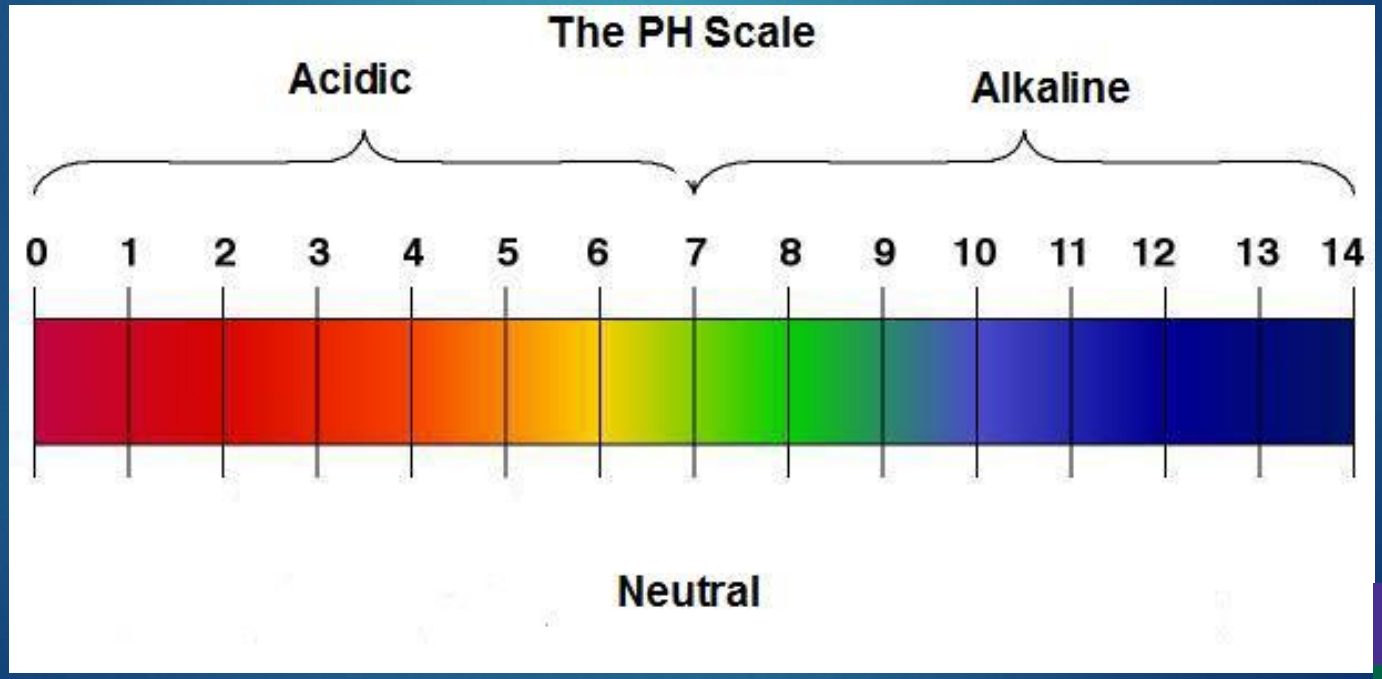
Micronutrients

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

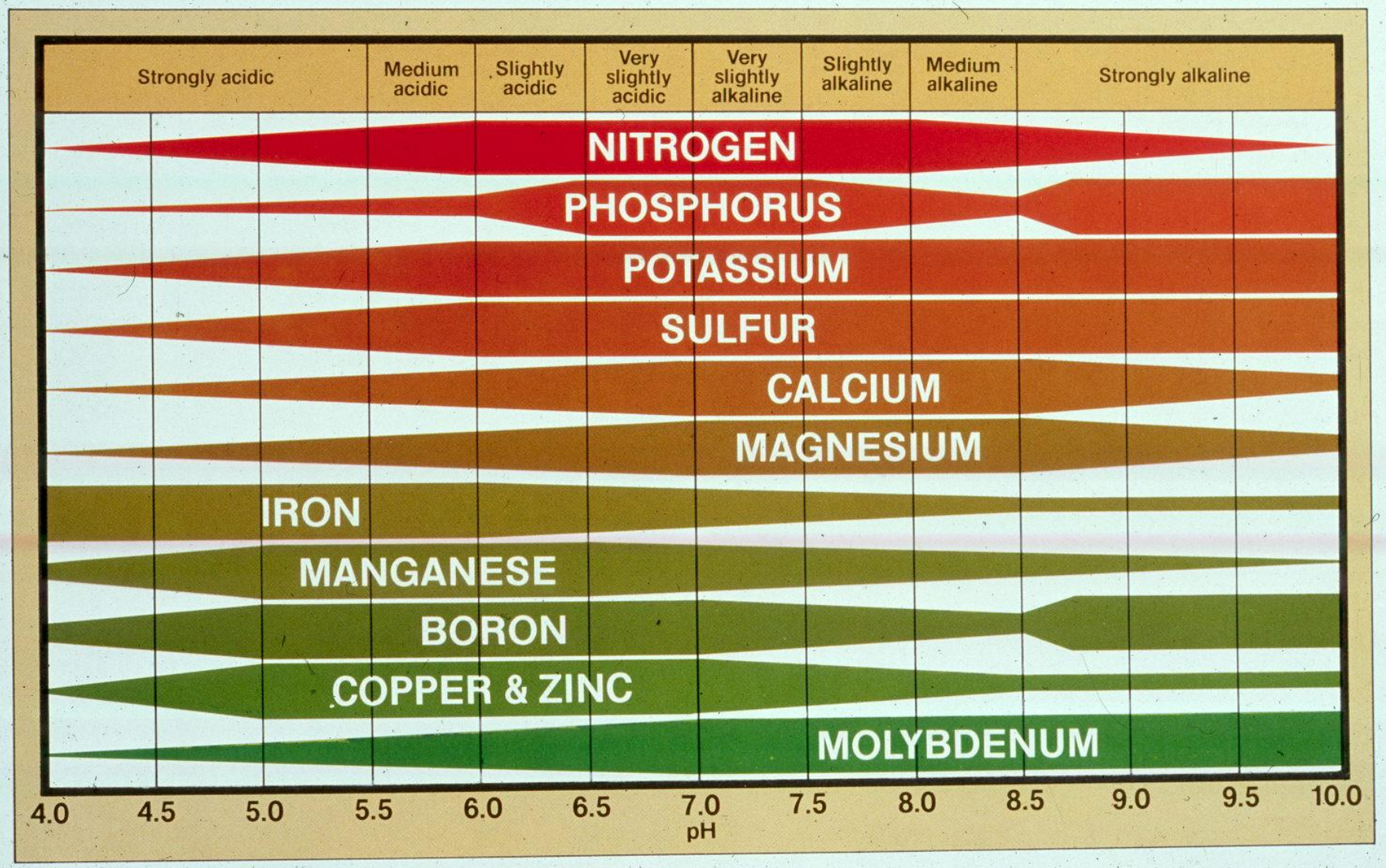


Photo: Dave Han,
Auburn University

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

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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

Photo: ME.DOA

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

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

Disease Monitoring

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

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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.

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Protect Beneficial Insects

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

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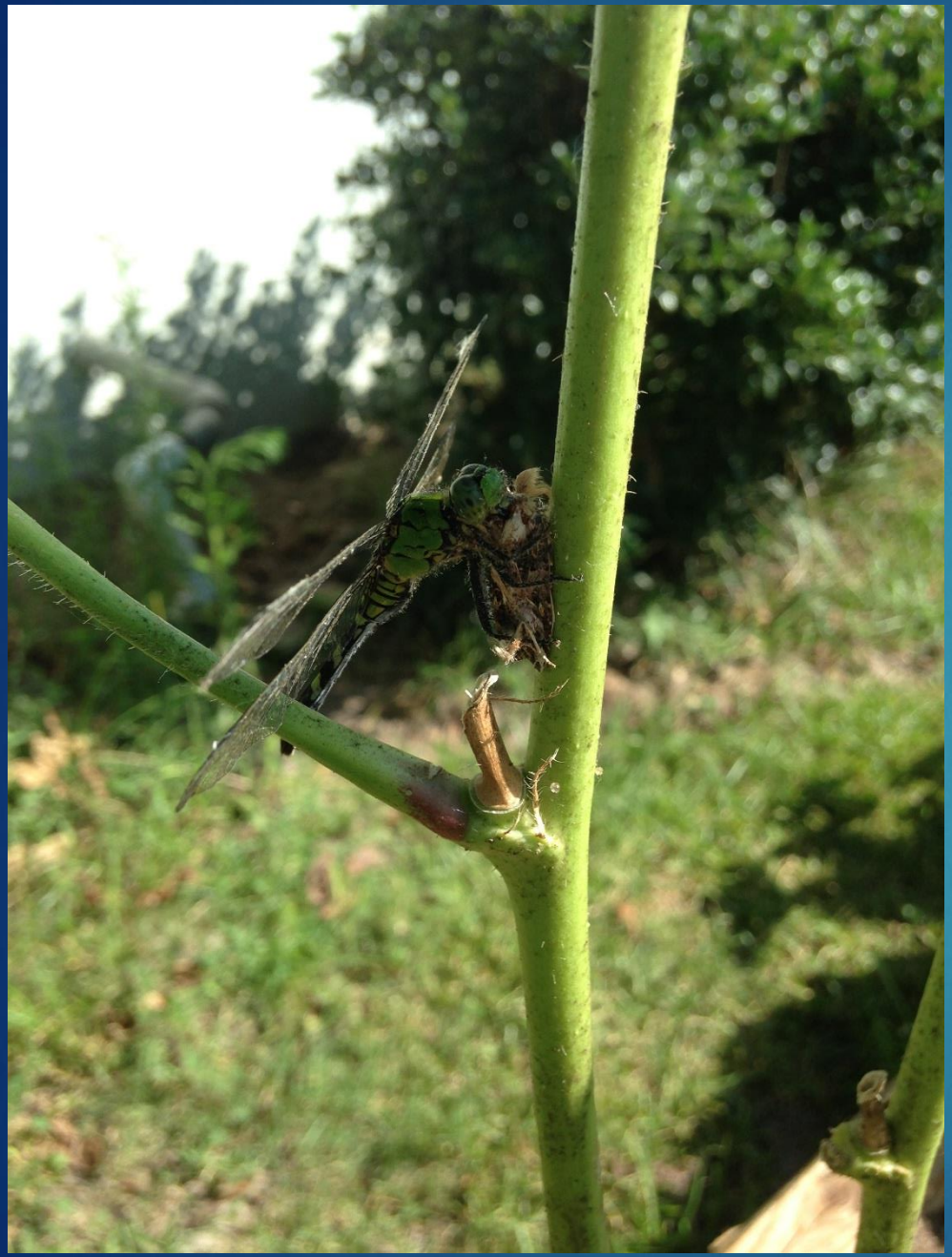

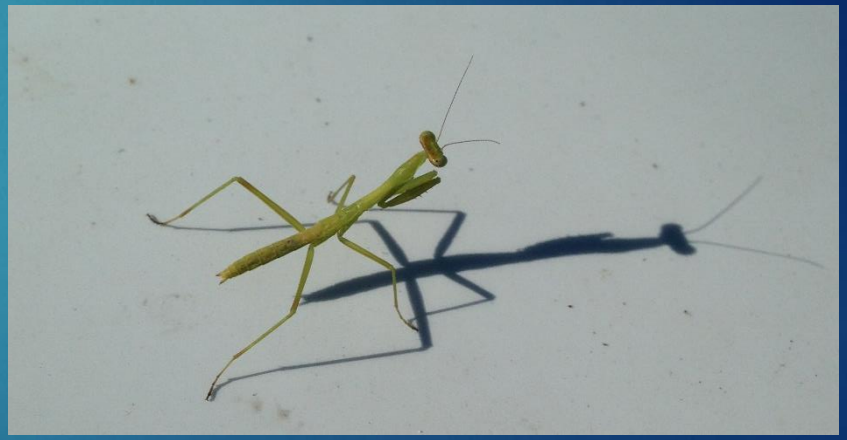

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Milky Spore

- **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

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Best Management Practices for Turfgrass

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Turfgrass Specialist
Oregon State University
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Best Management Practices for Turfgrass

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

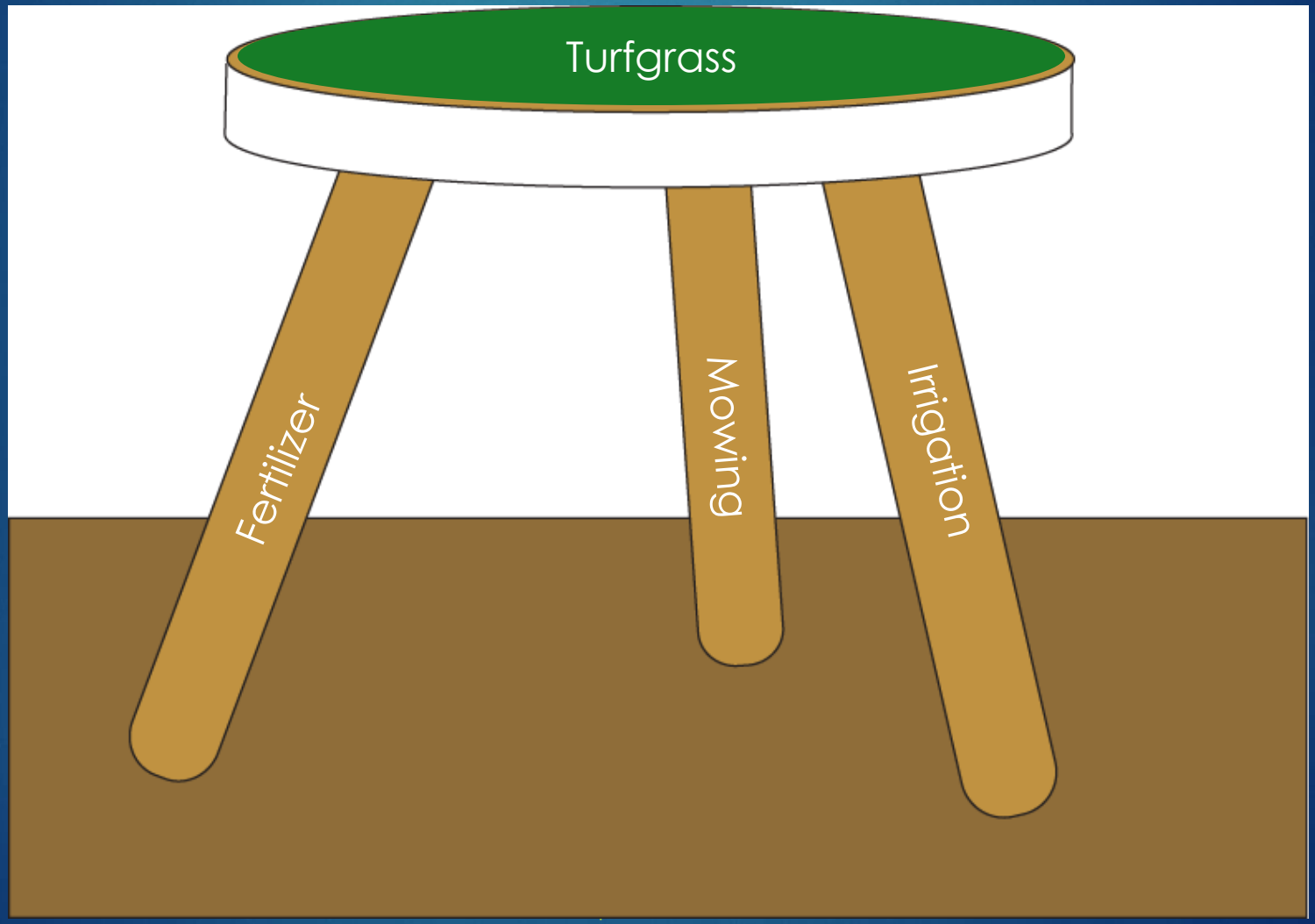
Best Management Practices for Turfgrass

- **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



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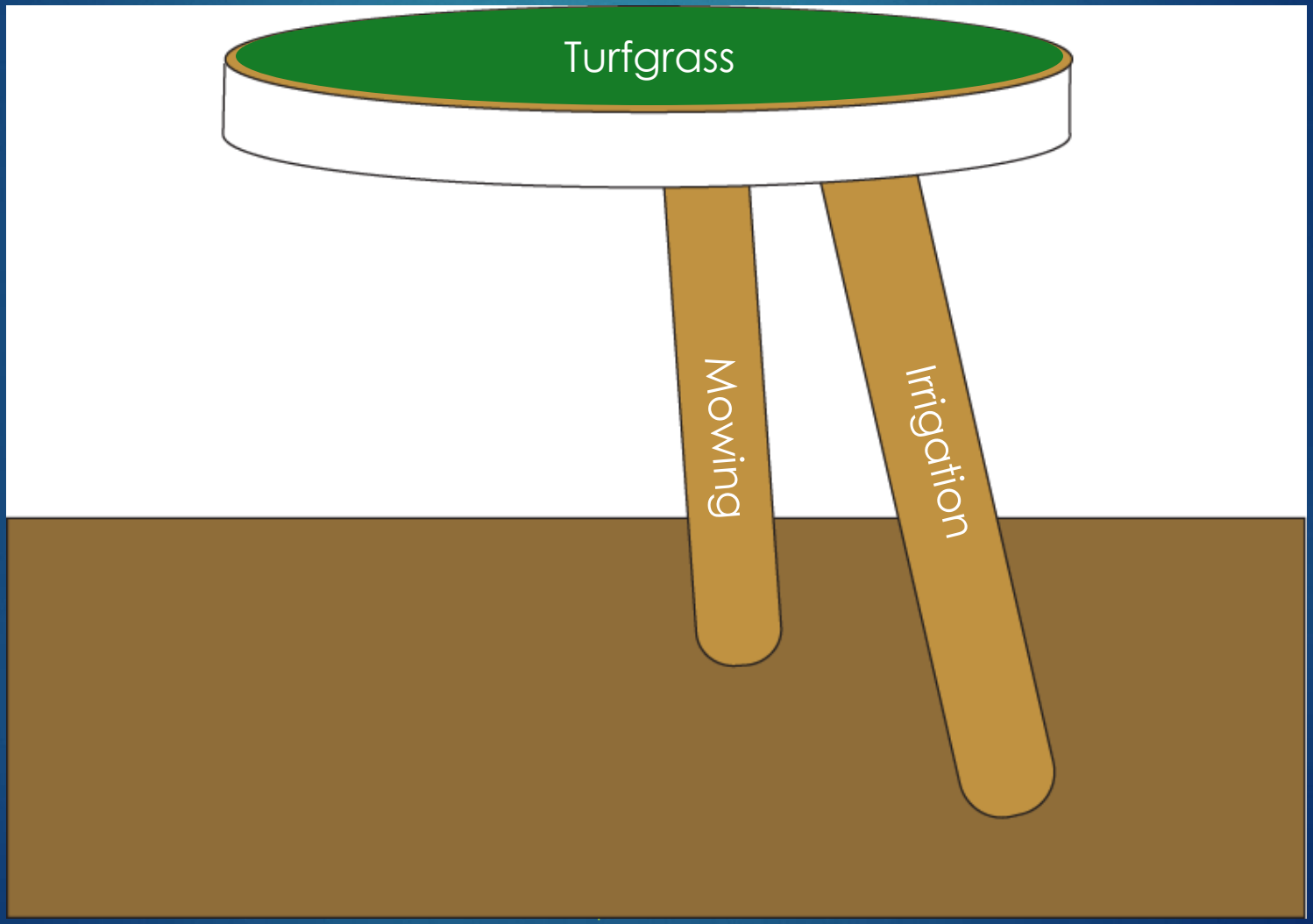
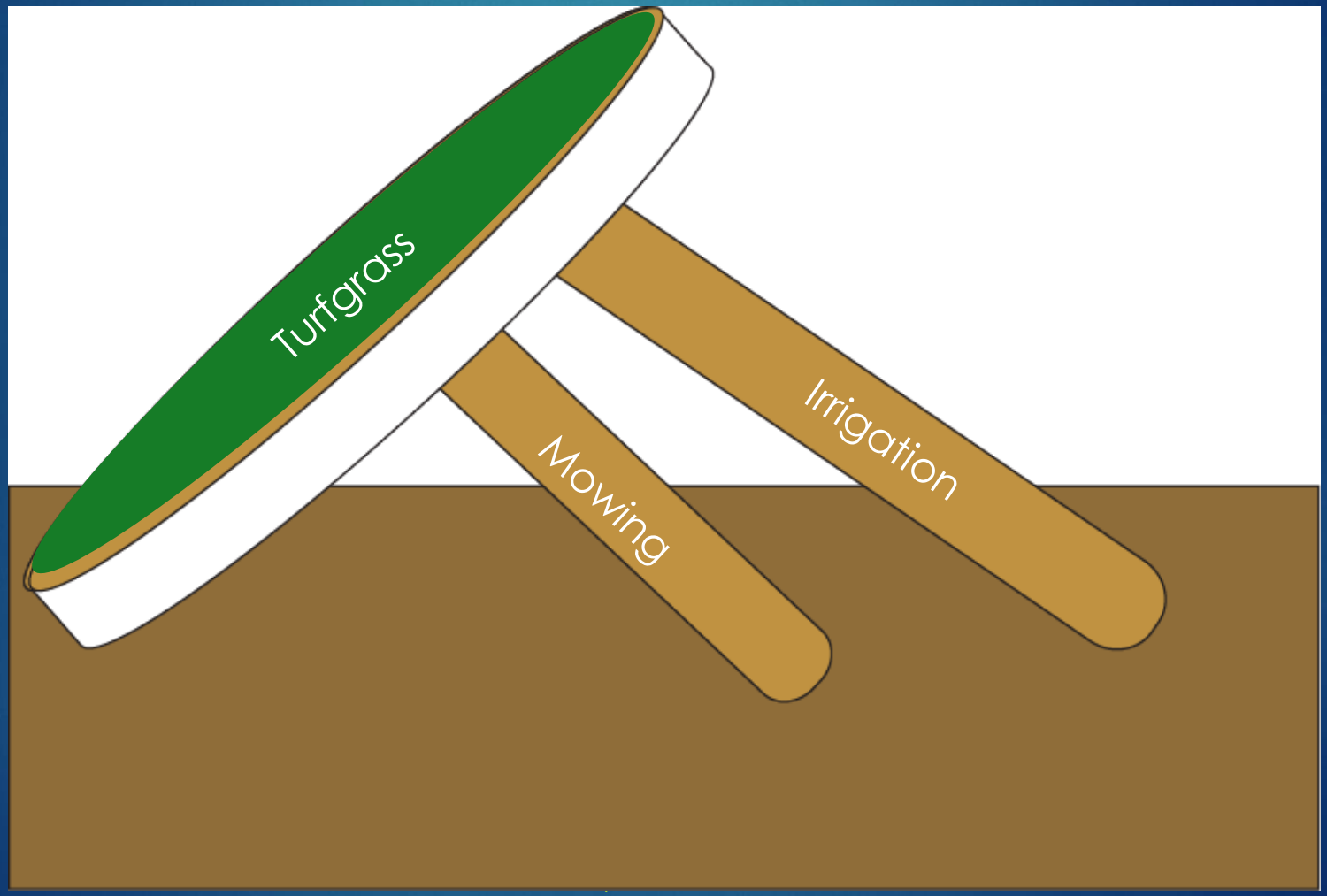
Primary Cultural Practices

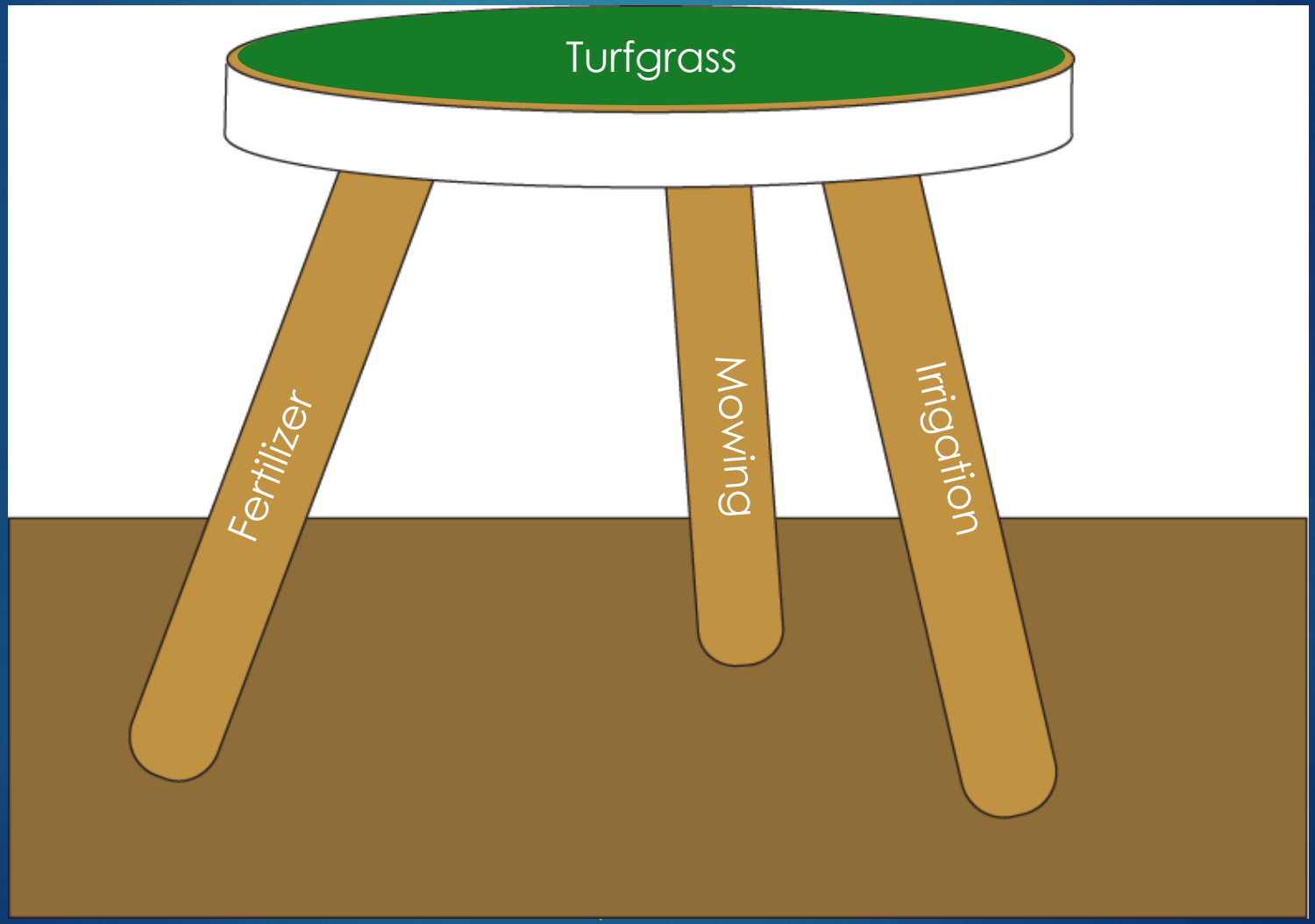


Primary Cultural Practices




BARNSBURY RD
WESTMINSTER WAY

Primary Cultural Practices



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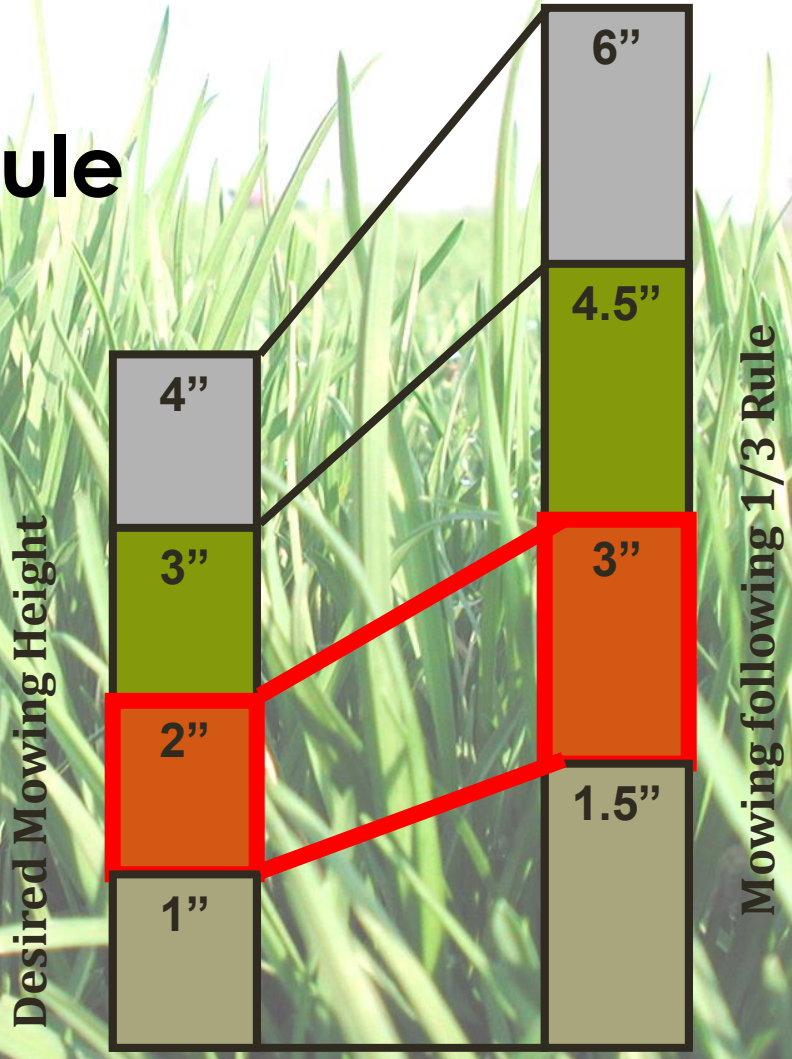
Mowing

Mowing

- **The one-third rule**



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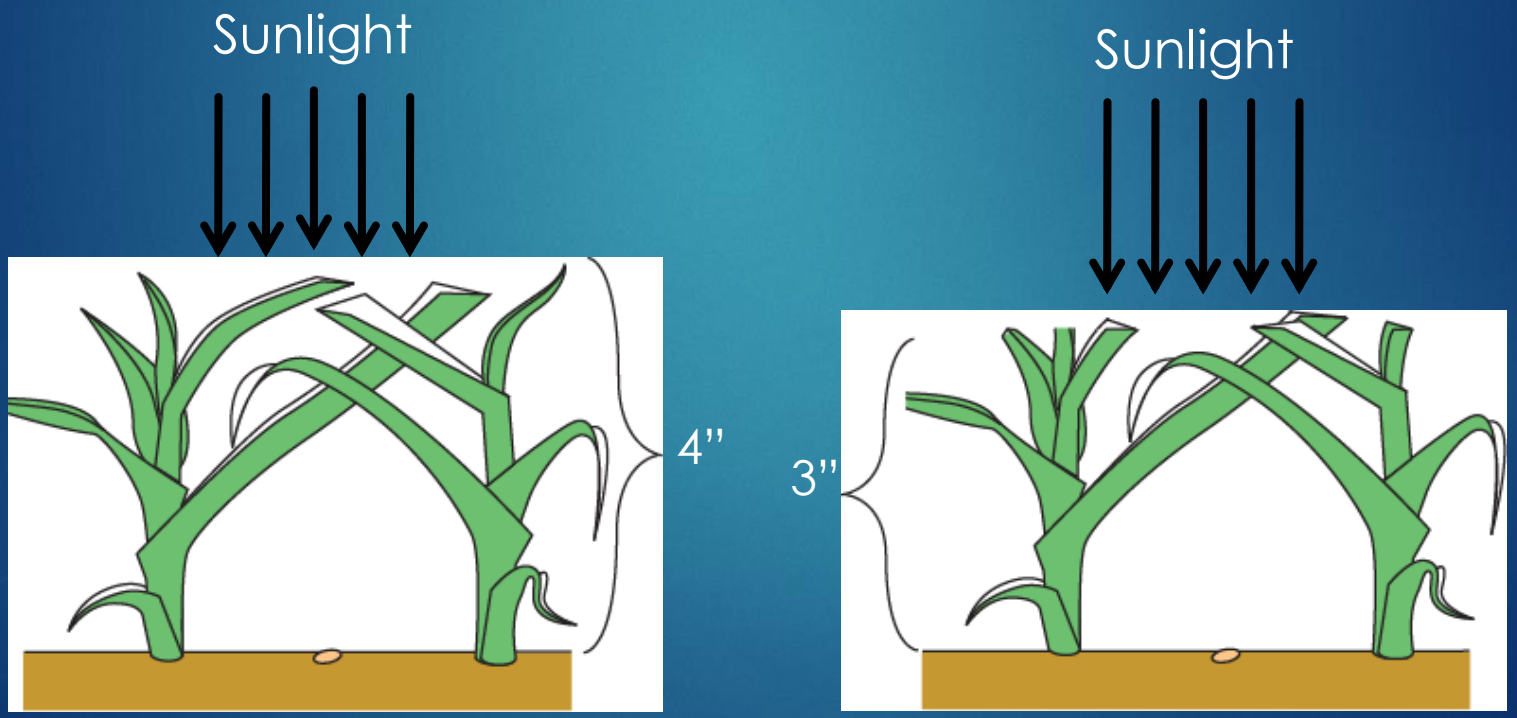
Mowing

- The one-third rule
  - Prevent weed seed germination



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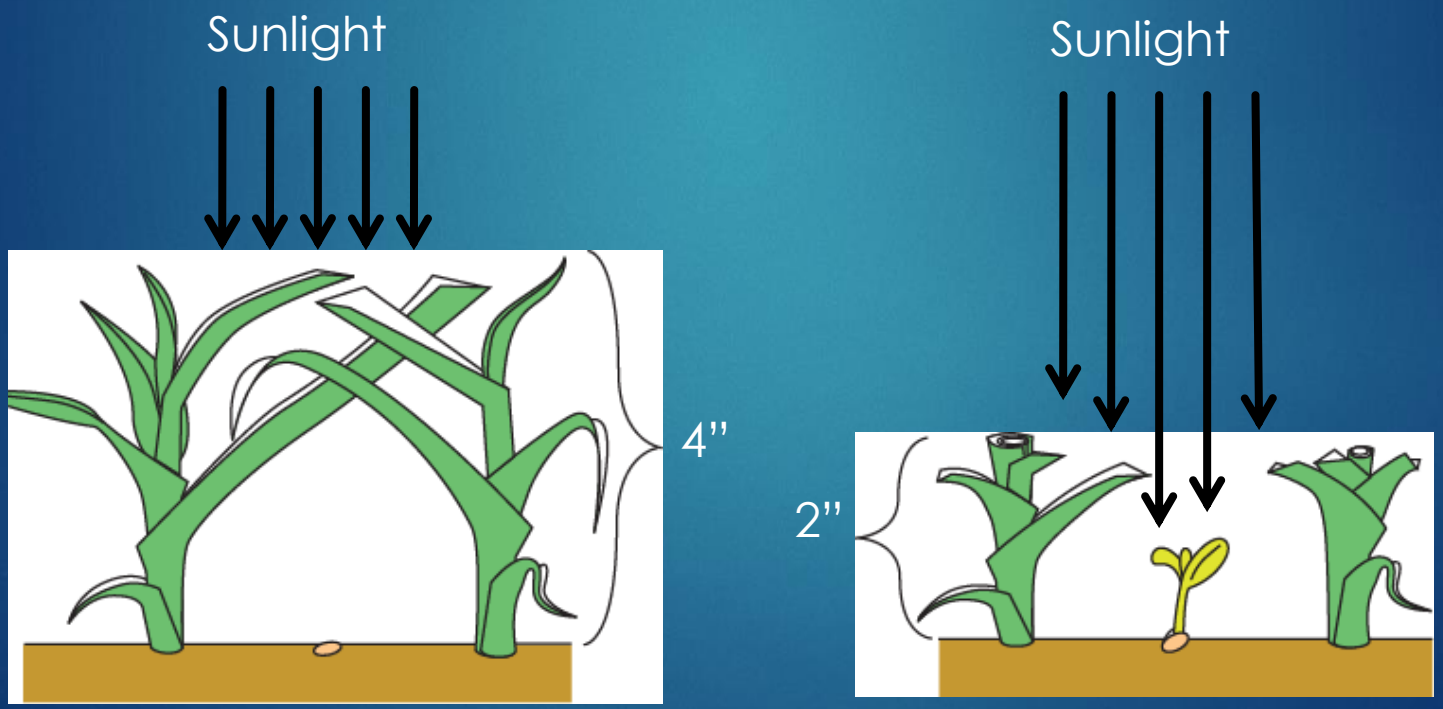
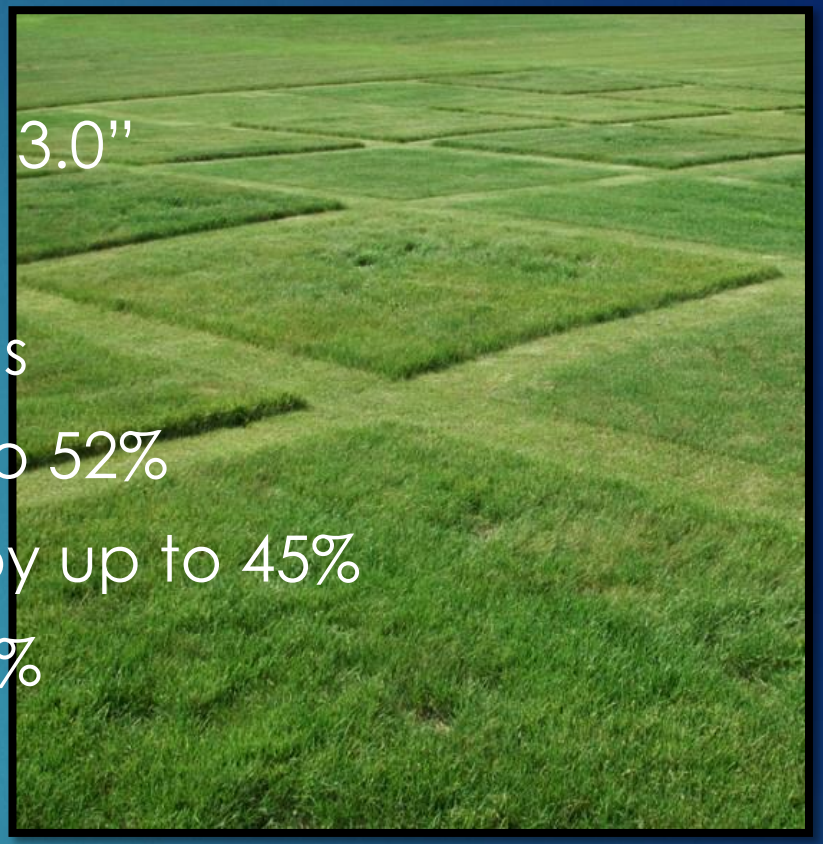


Mowing

- 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

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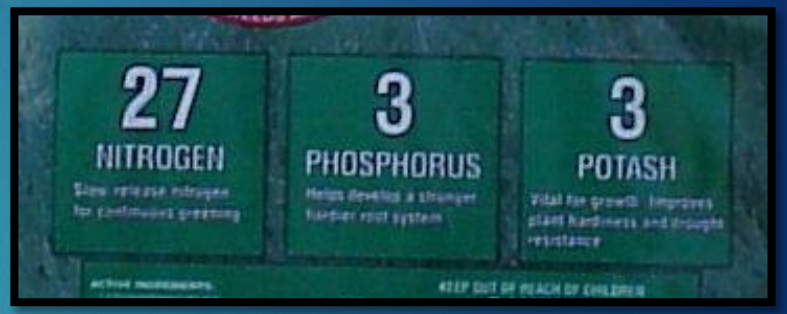
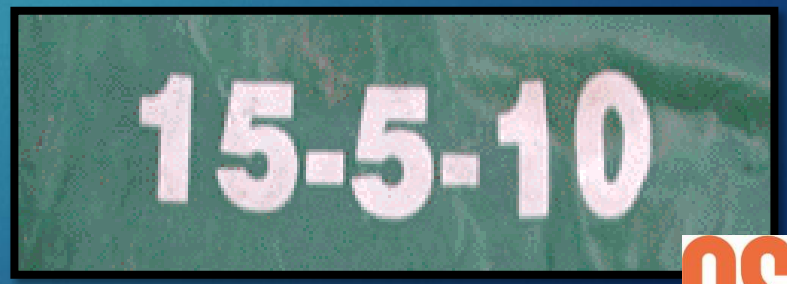
Fertilization

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





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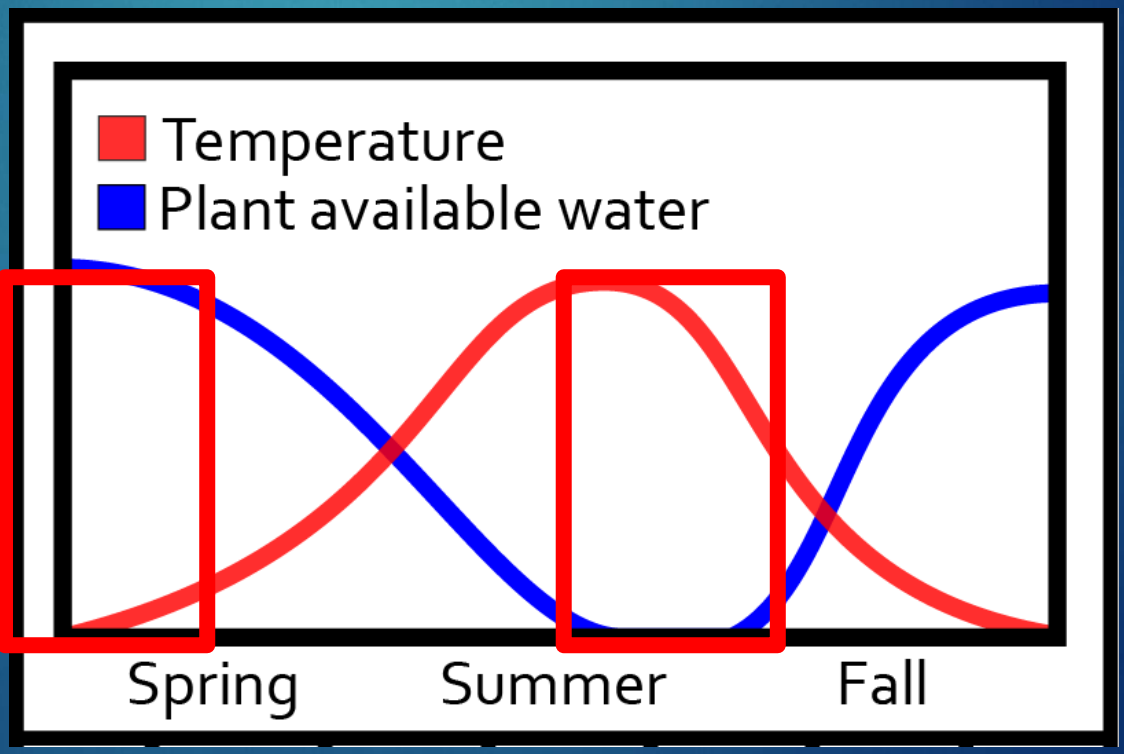
Fertilization

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



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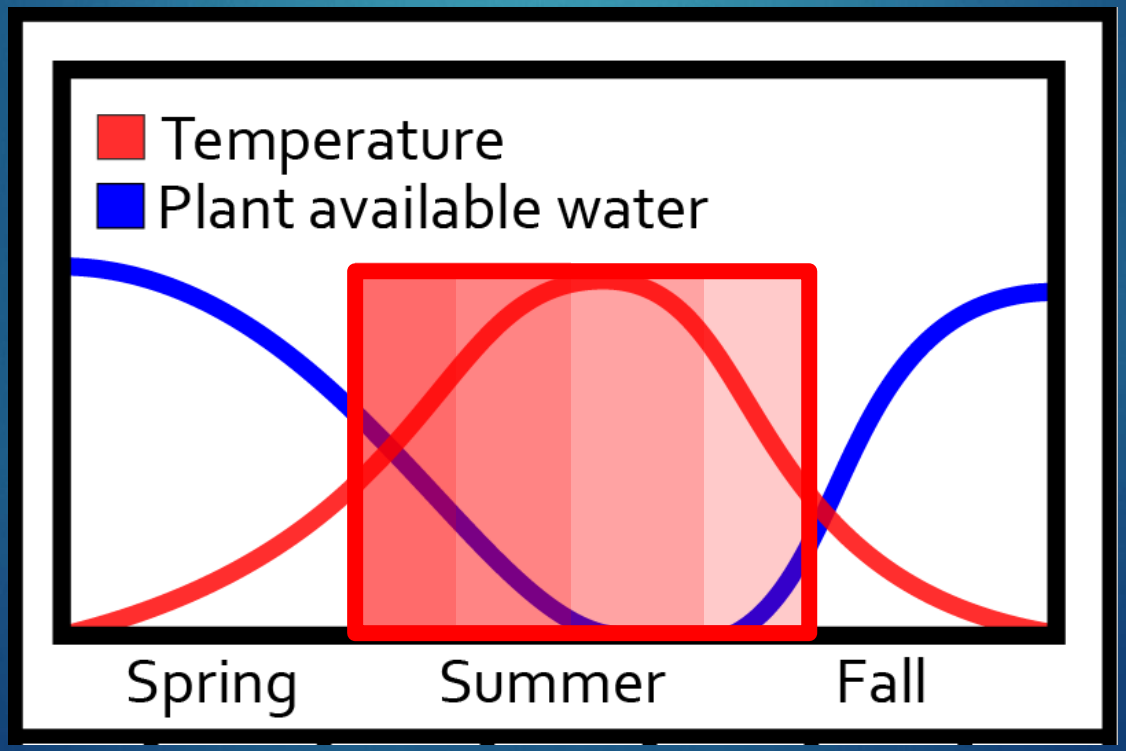
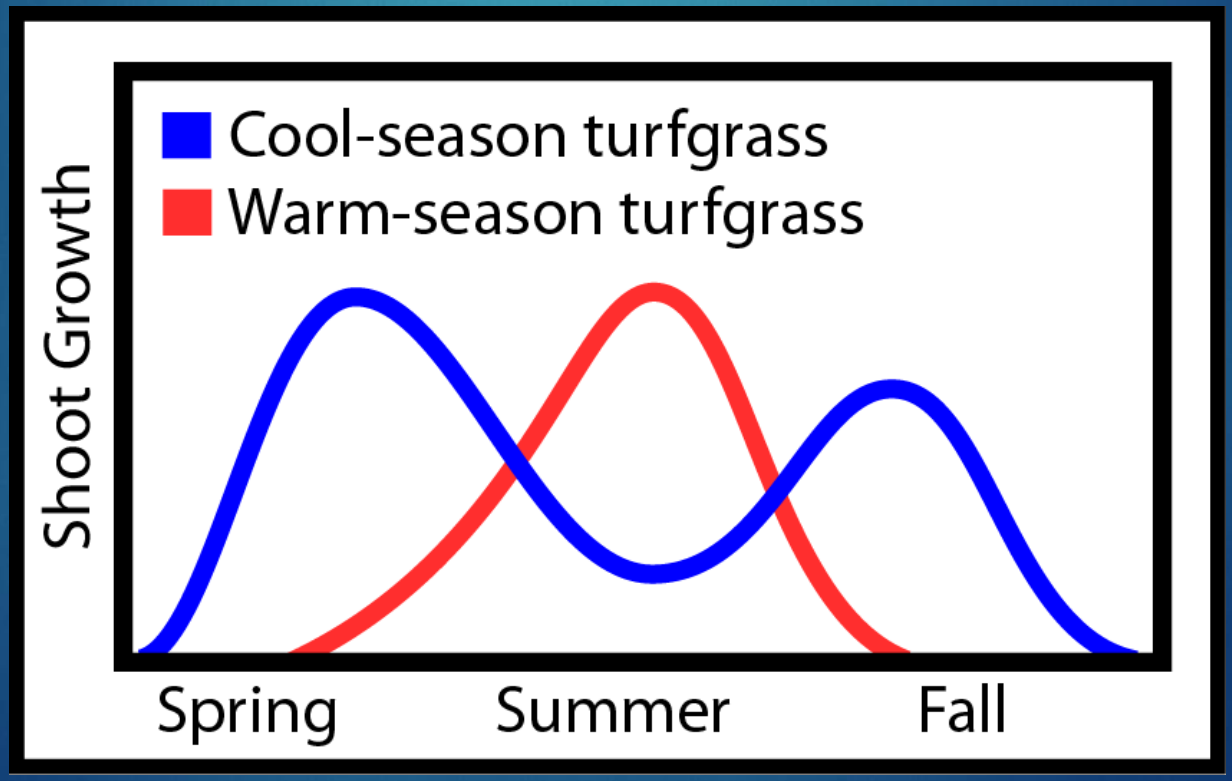
Fertilization

- 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

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Irrigation

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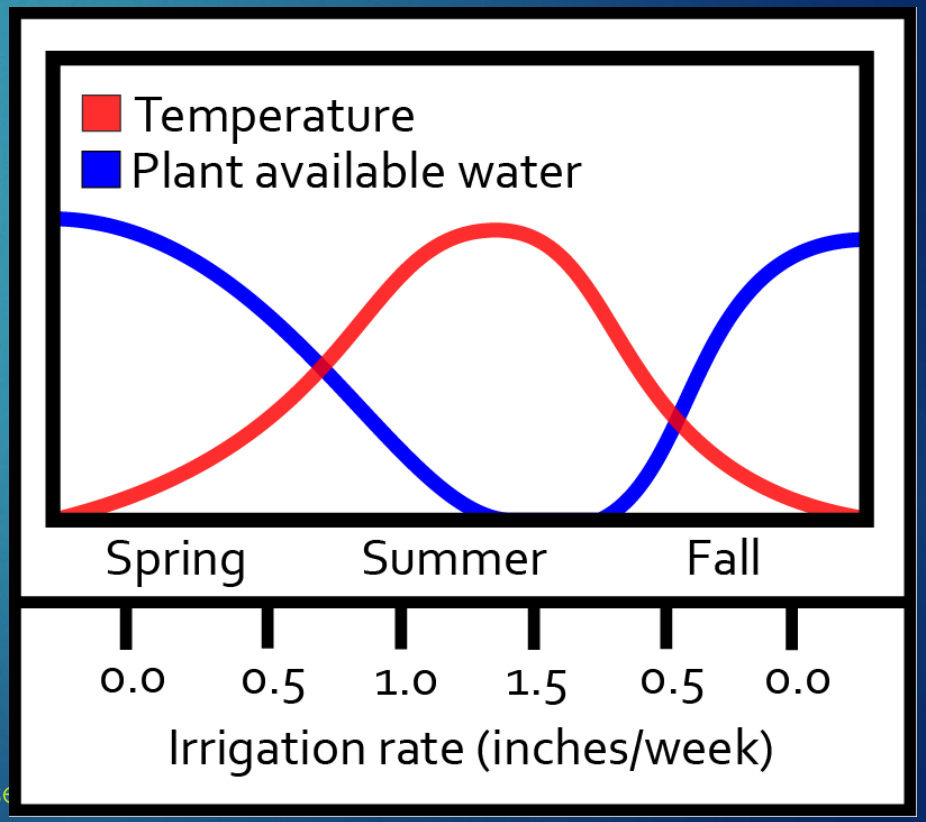
Irrigation

- 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

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Irrigation

- Twice as much is not twice as good
  - Moss

Irrigation

- Weeds associated with over irrigation…
  - Annual bluegrass
  - Rough bluegrass

Annual bluegrass

Rough bluegrass

Irrigation

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

Crabgrass

Knotweed

woodsorrel

Irrigation

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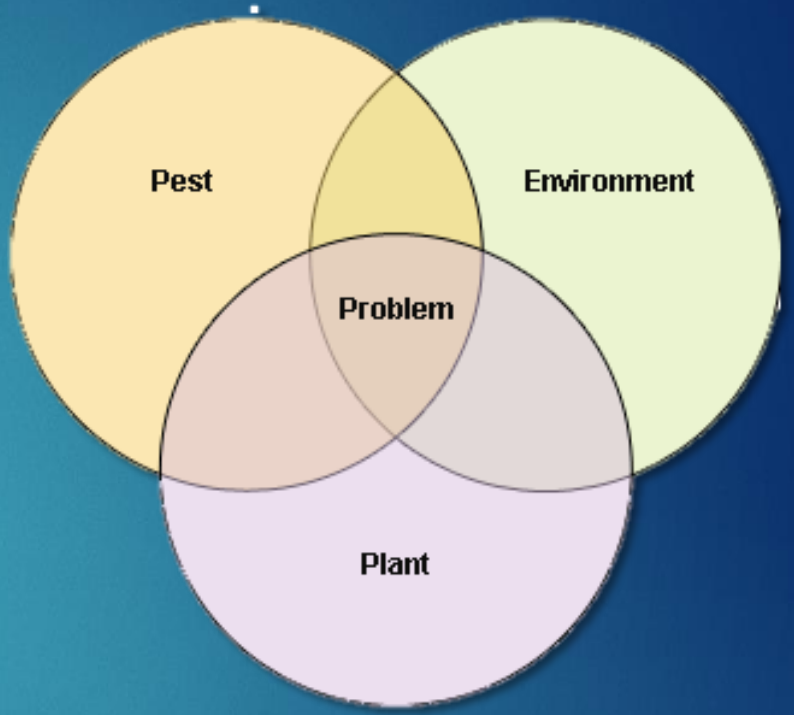
Weed Management

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

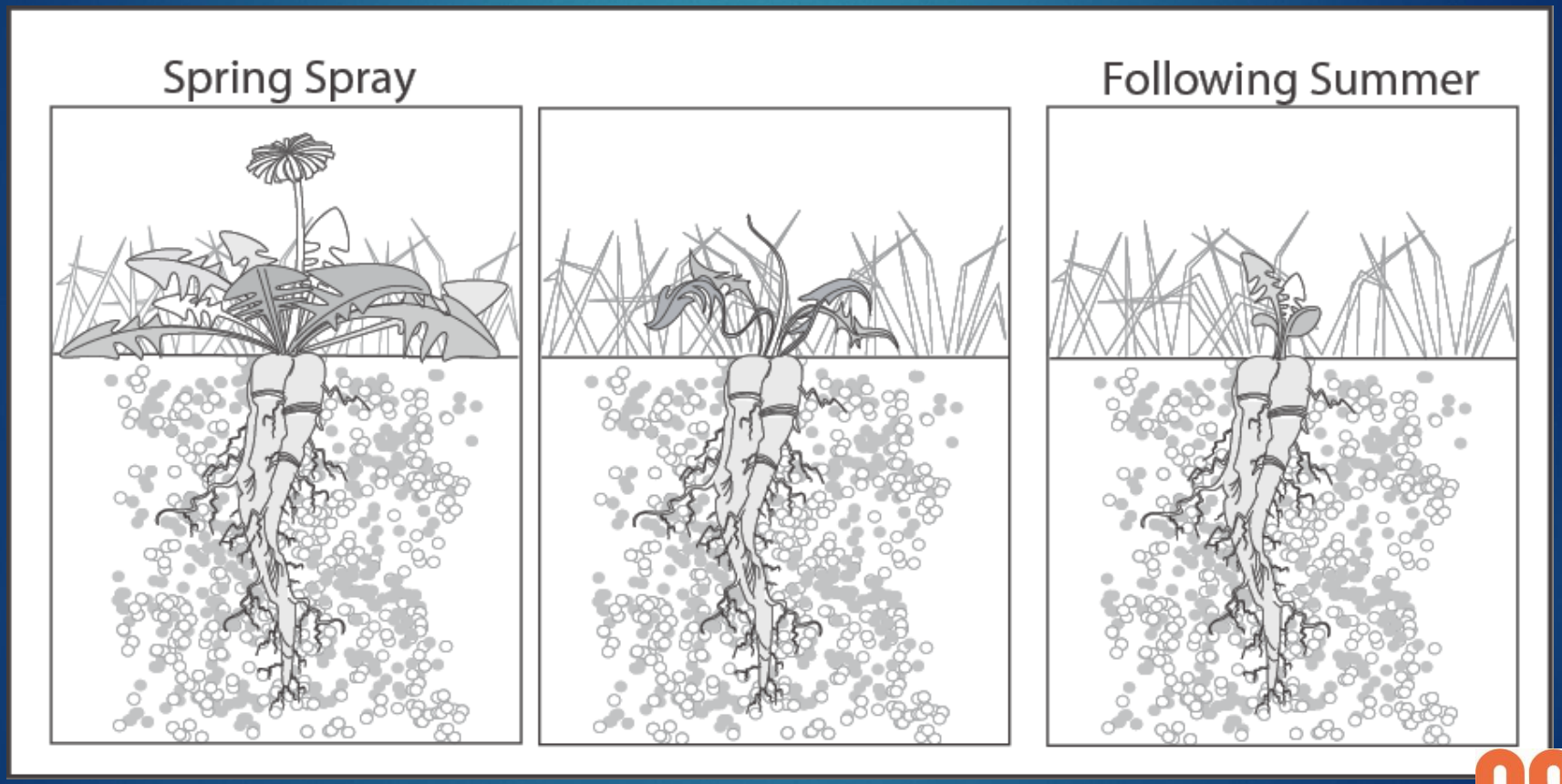
False dandelion

Broadleaf plantain

Sow thistle

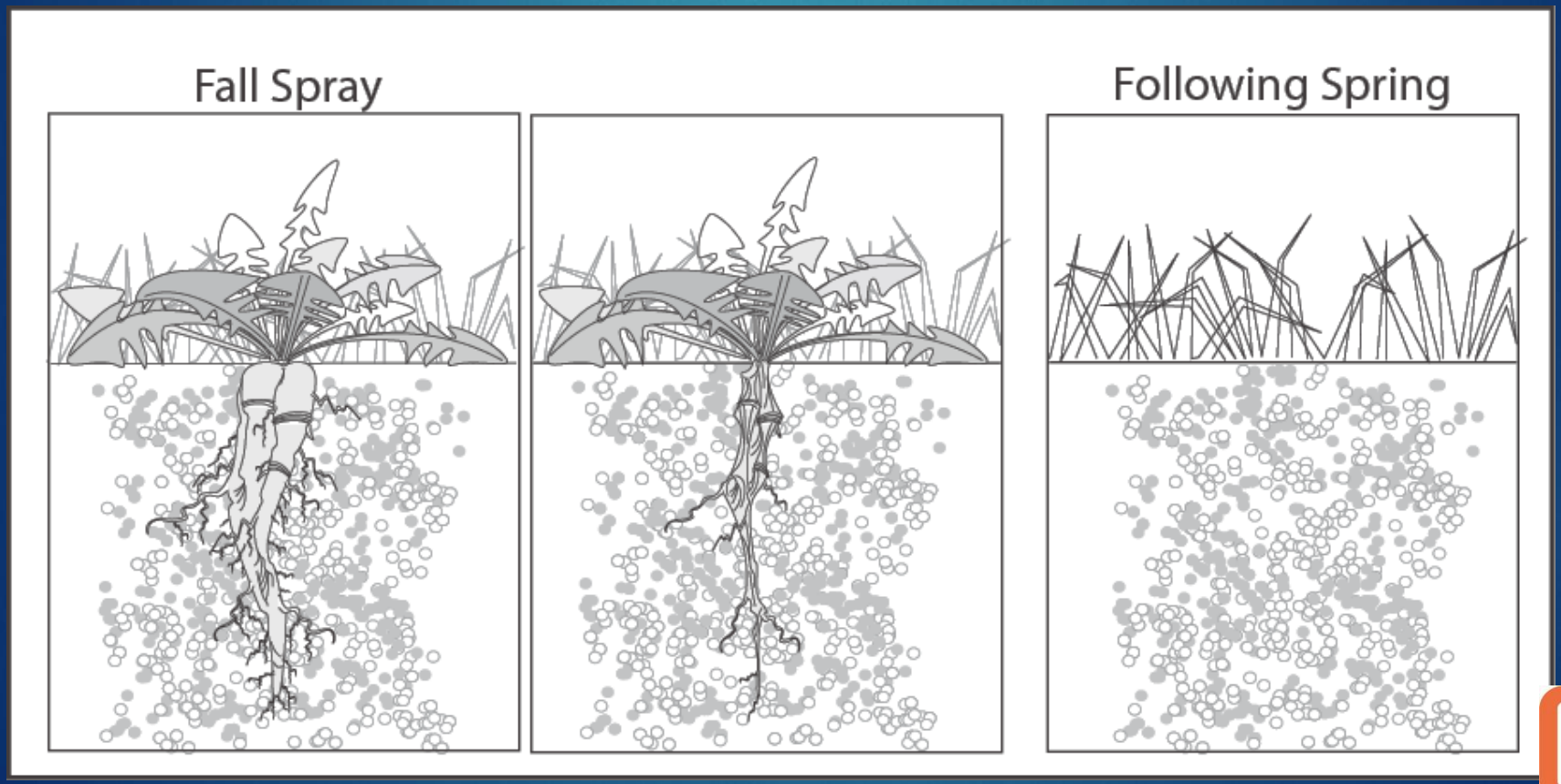
Dandelion

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



Dandelion

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

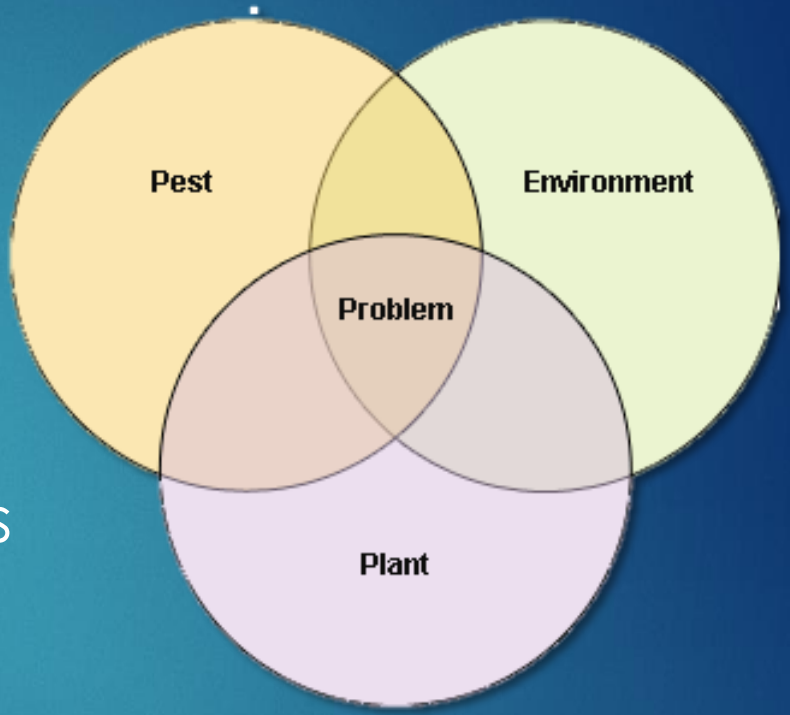


Weed Management

- Broadleaf weeds
  - Dandelion
  - **Clover**

Weed Management

- Pest Triangle
  - Pest
    - White clover
  - Plant
    - Kentucky bluegrass
  - Environment
    - Low fertility (N)
    - Low mowing height



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Clover

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

White clover

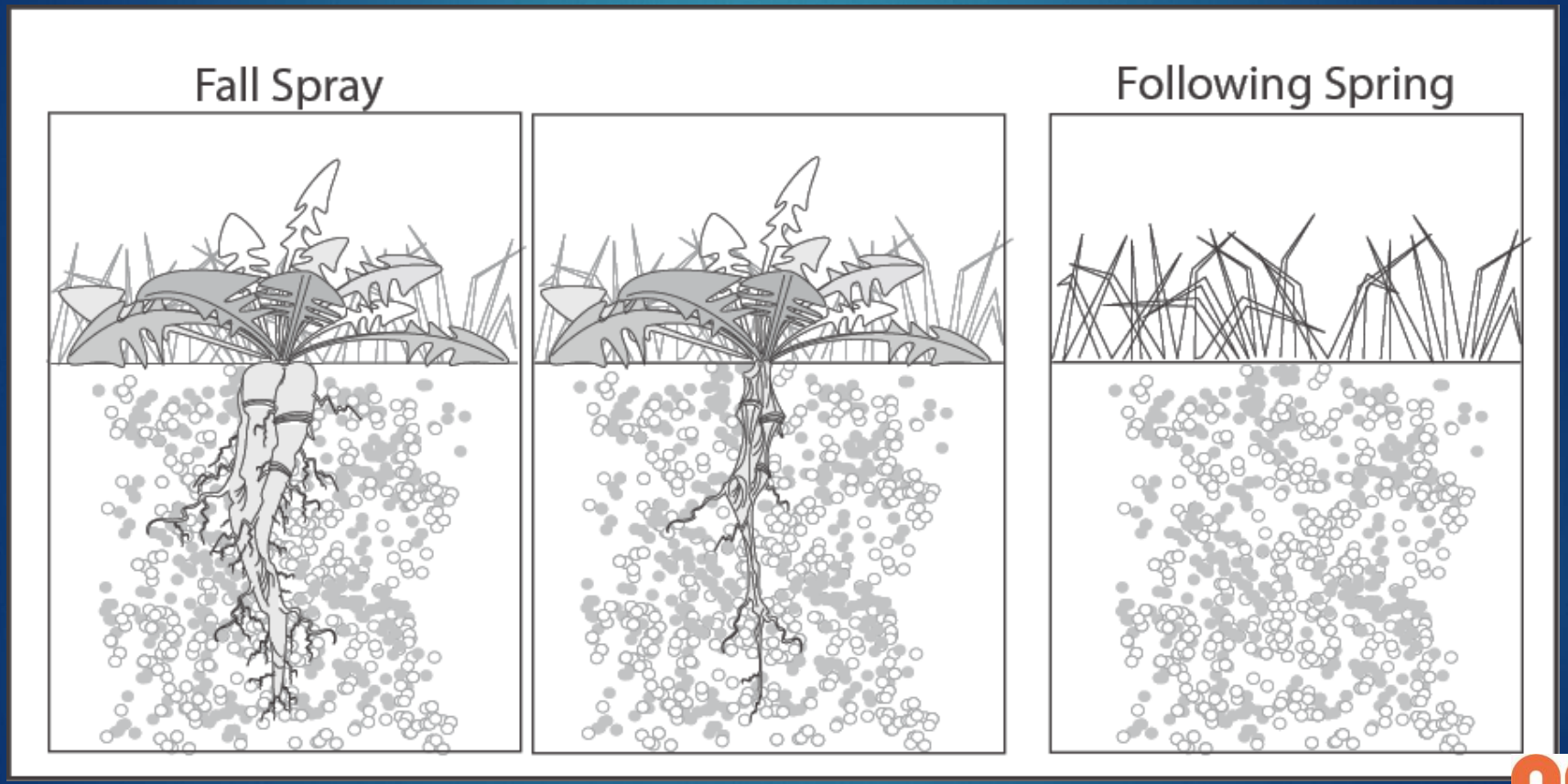
Chickweed

English daisy

Wild violet

Clover

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



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Weed Management

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Insect Management

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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

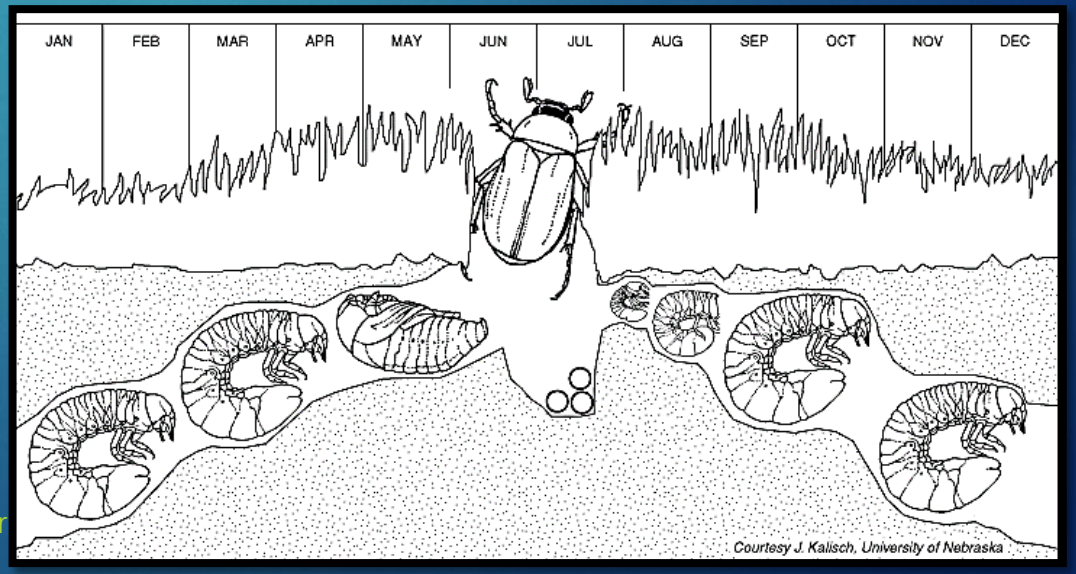
- Economic action thresholds

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



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Insect Management

- Insecticides
  - Combination products for foliar and root feeding insects
    - Allectus
      - imidacloprid and bifenthrin
    - Aloft
      - Clothianidin and bifenthrin

Best Management Practices for Turfgrass

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Turf Review Questions

- 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

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