

# Weed Management in Lawns

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Oregon State University

Non-Crop Vegetation Management Course

January 31, 2020



Oregon State  
University

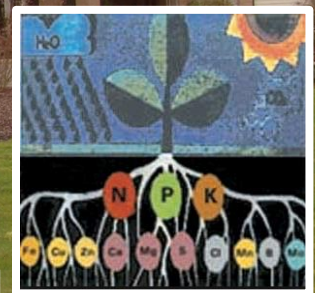
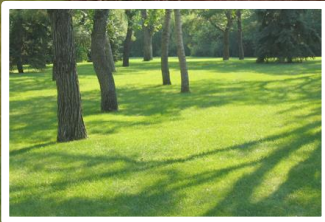
## What makes a weed?

- Able to germinate and seed in almost any environment
- Seed longevity in the soil
- Very fast growing
- Usually self-compatible
- Produces lots of seeds
- Adapted dispersal methods
- Perennials have rapid vegetative growth and regenerate from propagules
- Very competitive



# Why do weeds occur?

Competition for limited resources...



# Making a Weed Management Plan

1. ID the weed, and understand biology
2. ID control methods
3. Research laws and regulations
4. Environmental impact
5. Cost-benefit of control methods
6. Best management practices
7. Scouting and monitoring
8. Record keeping

**Step One:  
Weed  
Identification**

# Weed ID

- Habitat it grows in
- ★ ○ Life cycle
- ★ ○ Type of plant
- Leaf characteristics
- Blade characteristics
- Pubescence
- Flower characteristics
- Plant size

## Grassy weeds

- Monocots
- Parallel venation
- Fibrous root system





# Sedges

- Monocots
- Grows in wet areas
- Triangular, hollow stems



# Broadleaf weeds

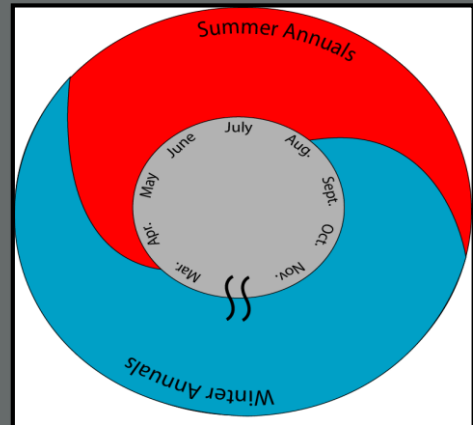
- Dicots
- Netted leaf venation
- Root system vast and deep



# Annual Weeds

One growing season

- Summer annuals
  - Germinate in the spring
  - Seed and die in the fall
- Winter annuals
  - Germinate in the fall
  - Seed and die in the spring



# Annual Weeds

- Fibrous/ branching roots
  - Maximize surface area
  - Constant nutrient uptake

# Biennial Weeds

- Two growing seasons
- Rosettes are most likely biennials
- Common mullein



1<sup>st</sup> growing season



2<sup>nd</sup> growing season

# Perennial Weeds

- More than two growing seasons
  - Any bulb
  - Dandelions
  - Some grasses
- Great carbohydrate storage





# Perennial Weeds

- Taproot
- Nutrient storage



# Weed Ecology and Biology

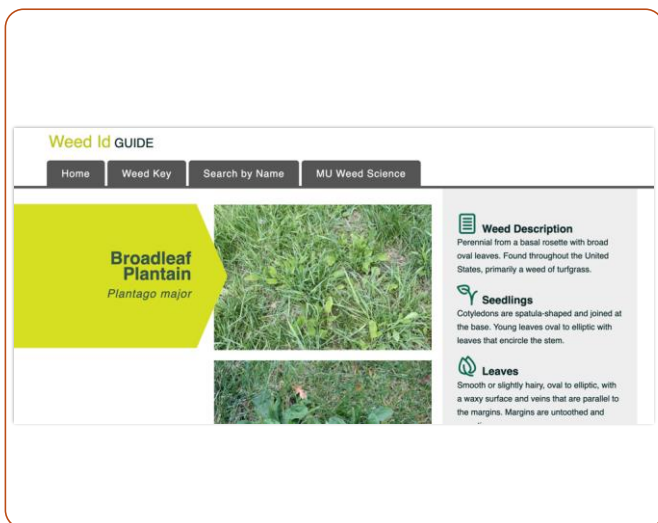
Some sources to help with weed ID:

○ University of Missouri Weed ID Guide:  
<https://weedid.missouri.edu/>

○ PNW Weed Management Handbook  
<https://pnwhandbooks.org/>

○ Apps:

- ID Weeds – University of Missouri
- PI@ntNet





## Step Two: Control Methods

### Control Methods

Mechanical

Biological

Physical

Chemical

Cultural

# Control Methods

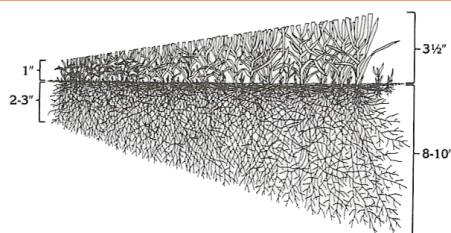
Mechanical

Biological

Physical

Chemical

Cultural



Higher mowing heights favor root and rhizome growth.

Logan Extermination

## Mechanical Control

- Mowing
  - Don't go too low!
  - ~3-4 inches is optimal
- Hand pulling
  - Expensive and time consuming
  - Best used in combination with other practices

# Control Methods

Mechanical

Biological

Physical

Chemical

Cultural



## Biological Control (nothing for weeds, but...)

- Nematodes
  - For grubs and soil-dwellers
- Beneficial Endophytes
  - For webworms, chinch bugs, and adult bill bugs

# Control Methods

Mechanical

Biological

Physical

Chemical

Cultural

## Physical Control

- Solarization
  - Heating the soil and blocking sunlight
  - Good for gardens or just to clear areas
- Biosolarization
  - Add compost!





# Control Methods



Mechanical      Biological      Physical      Chemical      Cultural

# Chemical Control

Used to suppress, interrupt growth, or kill

## Advantages

- Less labor needed
- Selectivity
  - PREs
  - POSTs
  - Selective/ Nonselective

## Disadvantages

- Health and environmental risks
- Desired plant injury
- Soil longevity
- Potential resistance



# Chemical Control

- Type of Weed
  - Grasses
  - Broadleaf
  - Annual
  - Biennial
  - Perennial
- Herbicides
  - Pre-emergent
  - Post-emergent
  - Selective
  - Non-selective
- Active Ingredients
  - Glyphosate
  - Pendimethalin
  - 2,4-D

## Pre-Emergent Herbicides (PREs)

- Prevents weed seeds from germinating
- Does not control pre-existing weeds
- Timing is critical
  - Apply spring and fall
- Do not inter-seed right away
- Water it in!



## Pre-Emergent Herbicides (PREs)

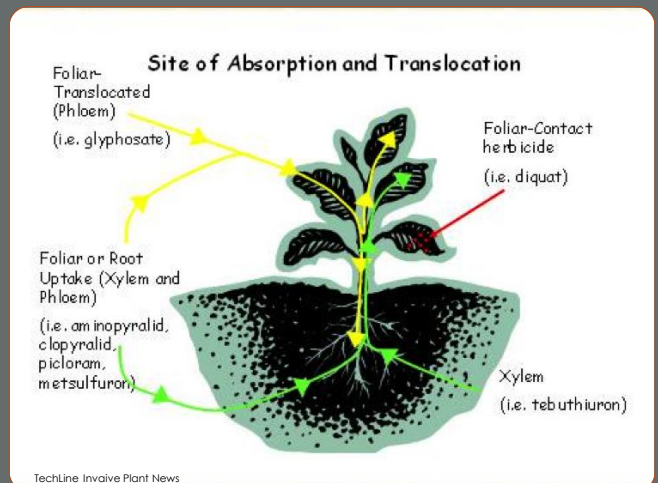
- |                         |                            |
|-------------------------|----------------------------|
| ○ Isoxaben (Gallery)    | ○ Pendimethalin (Pendulum) |
| ○ Broadleaves           | ○ Annual grasses           |
| ○ Mesotrione (Tenacity) | ○ Some broadleaves         |
| ○ Annual grasses        | ○ Dithiopyr (Dimension)    |
| ○ Annual bluegrass      | ○ Summer annuals           |
| ○ Some broadleaves      | ○ Crabgrass                |

# Herbicides: Pendimethalin/ Trifluralin

- **Selective AND Pre-emergent**
- Halts/slows cell division- Microtubule assembly inhibitor
- Spray prior to germination for annuals
  - Summer annual= Crabgrass
  - Winter annual= Annual bluegrass
- Use on landscaped beds, bare soil, can be used on turfgrass
- Do not:
  - Apply herbicide THEN seed
  - Apply near water or areas prone to run-off

# Post-Emergent Herbicides (POSTs)

- Mostly non-selective
- Systemic
  - EPSPS inhibitors
  - Glyphosate
- Contact
  - Photosystem I electron diversion
  - Diquat





# Herbicides: Glyphosate

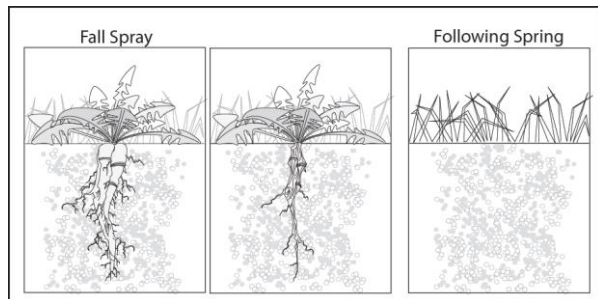
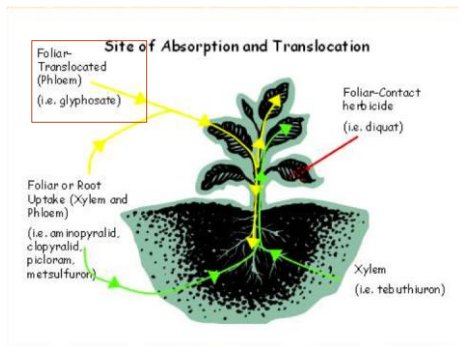
- Nonselective AND Post-emergent
- Systemic herbicide
  - But no soil movement
- Inhibits aromatic amino acid production
  - Chlorosis and death of plant tissues
- LD50
  - Glyphosate:
    - 5,600 mg/kg
  - Caffeine
    - 100-200 mg/kg



# Herbicides: Glyphosate

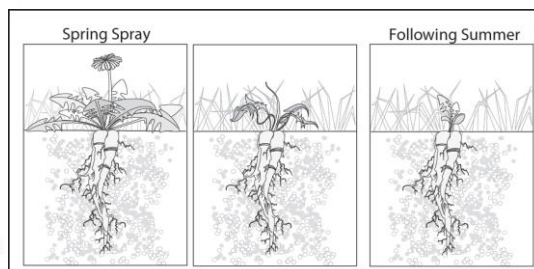
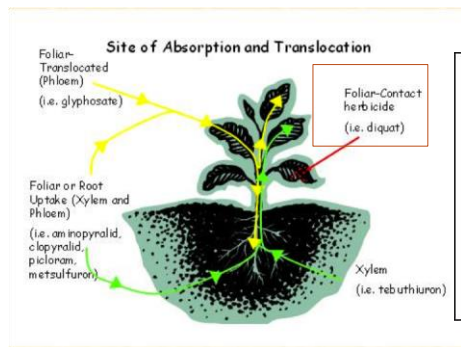
## Tips for use:

- After annuals and perennials have germinated
- Good for landscaped areas as a spot spray
- **DO NOT SPRAY ON THE GRASS OR AROUND ANIMALS!**



## POST Systemic Herbicides

Translocated throughout the plant



## POST Contact Herbicides

Death from the top down

## Selective POST Herbicides- Grasses

Good for getting grasses out  
of grass:

- ACCase inhibitor
  - Fluazifop
- HPPD inhibitor
  - Mesotrione
- Synthetic auxins
  - 2,4-D



## ACCase Inhibitors

- Successful for getting grassy weeds out of fescues
- Ex, Fluazifop
- Symptoms:
  - New growth is yellow
  - Red older tissues
  - Deadheart (corn)





# HPPD Inhibitors

- Carotenoid inhibitor
- Ex, Mesotrione
- Symptoms
  - Bleached foliage



# Synthetic Auxins

- Over-expression of auxin genes
- Ex, Quinclorac
- Symptoms
  - Epinasty
  - Leaf cupping and crinkling
  - Aerial roots





## How to manage broadleaves in grass?



Black Medic



White Clover



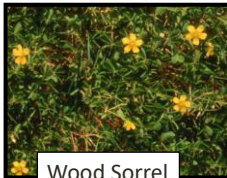
Broadleaf plantain



Spotted Spurge



Ground Ivy



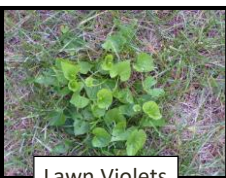
Wood Sorrel



Common dandelion



False dandelion



Lawn Violets



Yarrow



Mouse-ear Chickweed



Sow thistle

## Selective POST- Broadleaves

### ○ Synthetic auxins:

○ 2,4-D

○ Dicamba

○ MCPP

○ Triclopyr

○ Fluroxypyr

○ Clopyralid

○ Quinclorac



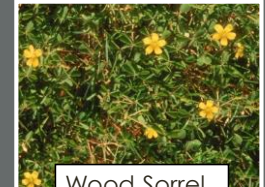
White Clover



Black Medic



Ground Ivy



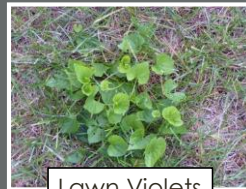
Wood Sorrel



Veronica



English Daisy



Lawn Violets



Yarrow

# Herbicides: 2,4-D

- Selective and Post-emergent
- Lowest LD50: 639 mg/kg
- Use on broadleaf plants
  - Common and False dandelions
  - Plantains
  - Thistle
  - Clover



## Selective POST- Broadleaves

- PPO Inhibitors:
  - Carfentrazone
  - Sulfentrazone



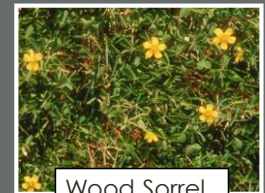
White Clover



Black Medic



Ground Ivy



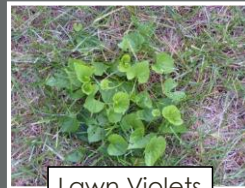
Wood Sorrel



Veronica



English Daisy



Lawn Violets

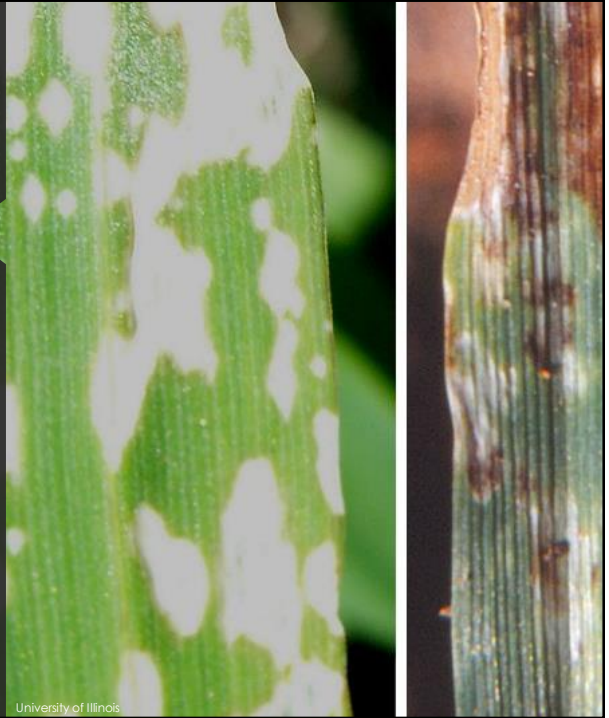


Yarrow

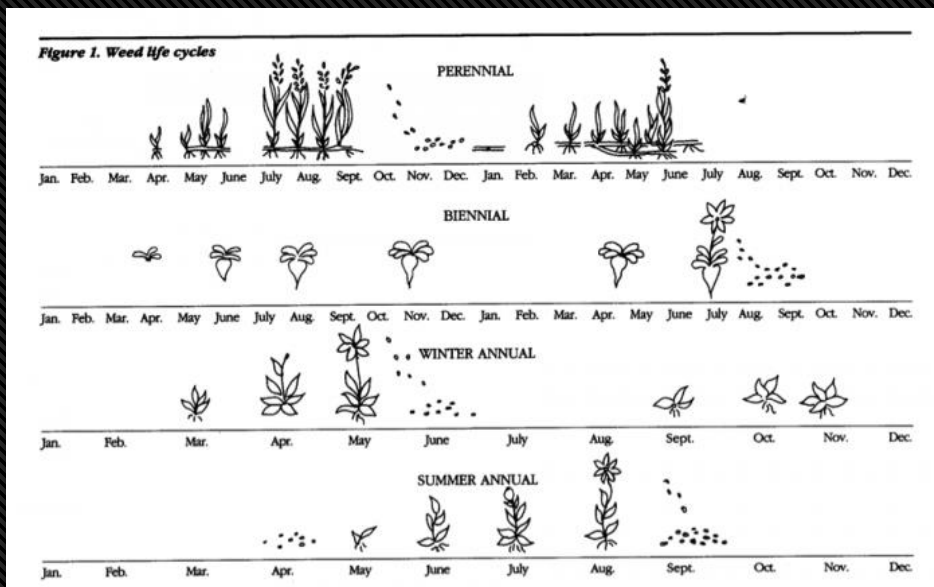


# PPO Inhibitors

- Disrupts membranes
- Works only on broadleaves
- Symptoms
  - Rapid wilting
  - Spray droplet damage on leaf
  - Rapid death



University of Illinois



Cornell Cooperative Extension Bulletin

## Herbicides: Herbicide Resistance

- The INHERITED ability to survive a lethal pesticide dosage that would affect wild type plant.
- How to avoid:
  - Mixtures/ Rotations
  - Apply chemical in a uniform fashion
  - Scout for survivors
  - Be proactive, not reactive!

Cambridge University

## Control Methods

Mechanical

Biological

Physical

Chemical

Cultural



# Cultural Control

- Inter-seeding
- Variety selection
- Irrigation
- Fertilization

American Irrigation

## Establishment Rate:

Perennial Ryegrass, Annual Ryegrass

Fast

Fine Fescues, Tall Fescue

Medium/Fast

Creeping Bentgrass

Medium

Kentucky Bluegrass, Rough Bluegrass

Slow

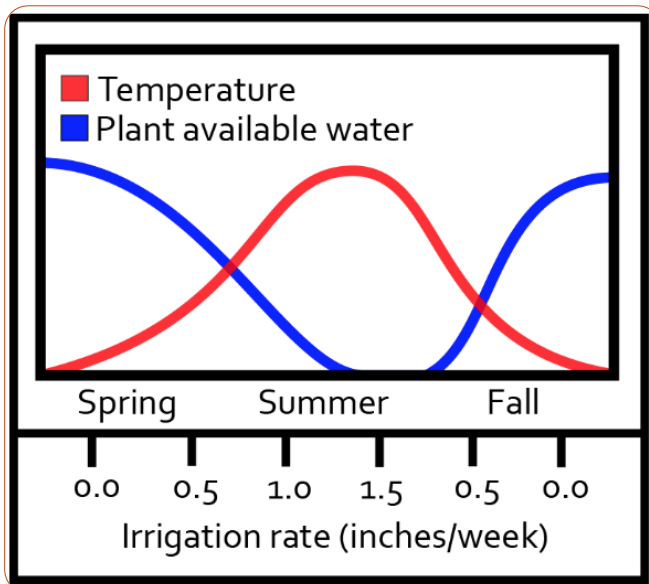
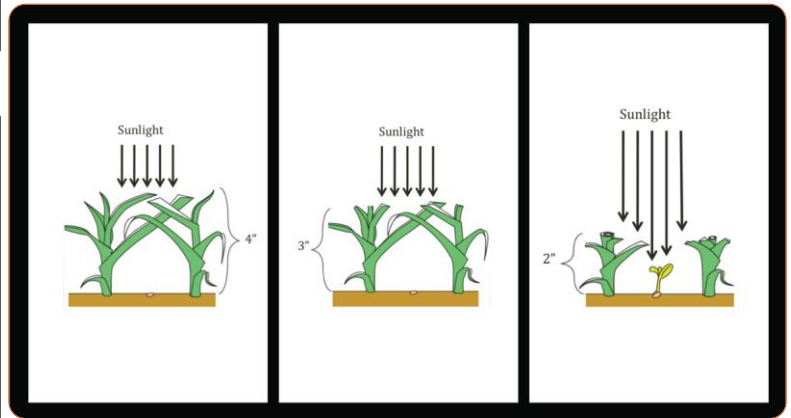
Umass Extension

## Inter-seeding

Use of a fast germinating plant to fill in already established turf

## Variety Selection

- Fast-establishing
  - Perennial ryegrass & tall fescue
- Decent soil coverage



## Irrigation

- Spring
  - 0.00-0.75 inches
- Summer
  - 0.75-1.50 inches
- Fall
  - 0.0-0.75 inches
- Winter
  - 0.0 inches
- Too much water = moss, annual bluegrass, chickweed
- Too little water = Spotted spurge, knotweed



Both Plots  
received 1" of  
water per  
week:

Which plot  
received:  
  
1" once a week?  
  
 $\frac{1}{4}$ " four times a  
week?



## Fertilization

- Split into four applications:
  - May, July, August, November
- Amount of fertilizer per year
  - 2-4 lbs N/1,000 sqft
  - 1 lb P/1,000 sqft
  - 1 lb K/ 1,000 sqft
  - 2-3 lbs S /1,000 sqft

# Cultural Control: Fertilization

- Calcium deficiency
  - Redroot Pigweed (*Amaranthus retroflexus*)
    - High potassium, low phosphorus, high iron, low manganese
  - Horsetail (*Equisetum arvense*)



# Cultural Control: Fertilization

- Too much potassium
  - Burdock (*Artium lappa*)
    - Low calcium
  - Lambsquarters (*Chenopodium album*)
    - Low phosphorus



Michigan State University



# Cultural Control: Fertilization

- Too much magnesium
  - Oxeye Daisy (*Chrysanthemum leucanthemum*)
    - Low phosphorus, high potassium
  - Curly Dock (*Rumex crispus*)
    - High phosphorus, high potassium



# Cultural Control: Fertilization

- Soil too acidic
  - Mosses
  - Red Sorrel (*Rumex acetosella*)





## Step Three: Laws and Regulations

# Research Laws and Regulations

- Have the proper applicator's license (ODA)
- Use proper handling of any (hazardous) materials
- Keep SDS nearby
- Check out Oregon Department of Agriculture for any pesticide updates

## Step Four: Environmental Impact

## Step 5: Environmental Impact

- Carbon footprint
  - Machinery
- Denitrification
  - Loss of soil N via microorganisms to the atmosphere
- Water run-off
  - From fertilizer or herbicide applications
- Eutrophication
  - Excess nutrient in a body of water

## Step Five: Cost- Benefit Analysis



## Step 6: Cost - Benefit

- Your objectives for the site
- Available resources and technology
- Weeds present
- Your own skills and equipment
- Topography and characteristics of site

Hand-weeding 10 acres is silly!

**Step Six:  
Apply your  
Technique!**

## Step Seven: Scouting and Monitoring

## Step 8: Scouting and Monitoring

- Be proactive, not reactive
- Take soil samples
- Walk the area- visual check
  - Over-seed bare areas
  - Hand weed occasionally
  - Spot spray

## Step Eight: Record Keeping

## Step 9: Record Keeping

- Write down everything you do in a small notebook
  - Who sprayed?
  - What did you spray and how much?
  - When did you apply it? When should you check it again?
  - Where did you put it?
  - Why did you use it?
  - Etc.

# Making a Weed Management Plan

1. ID the weed, and understand biology
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## OSU Microdochuim Field Day

Thursday, February 27<sup>th</sup>

Lewis Brown Horticulture  
Farm

Corvallis, Oregon

3- 5pm

**FREE!**







**Oregon State**

University

# Thank you!

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