

# **Herbicides for the Nursery and Landscape Industry**

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# My History

- **Native of Pennsylvania**
- **University of Delaware (B.S.), Virginia Tech (M.S.), Cornell (Ph.D)**
- **Worked for 3 years between those degrees**
- **Associate Professor and Extension Specialist at the University of Georgia, Griffin**
- **75% Extension, 25% Research**
- **All aspects of weed control in ornamentals, small fruits, Christmas trees, and flower culture**



**Herbicide info!**

# Difficult Weeds



These two weeds are very different, and require different control strategies

**Yellow nutsedge**  
(*Cyperus esculentus*)

**Chamberbitter**  
(*Phyllanthus* spp.)

# Weed Life Cycles

**Annual:** Completes growth cycle in a single growing season (Crabgrass).

**Perennial:** A plant that persists and produces reproductive structures year after year (Bermudagrass).

**Biennial:** A plant that normally requires two growing seasons to complete its life cycle, flowering and fruiting in its second year (Wild Carrot).

# Herbicides

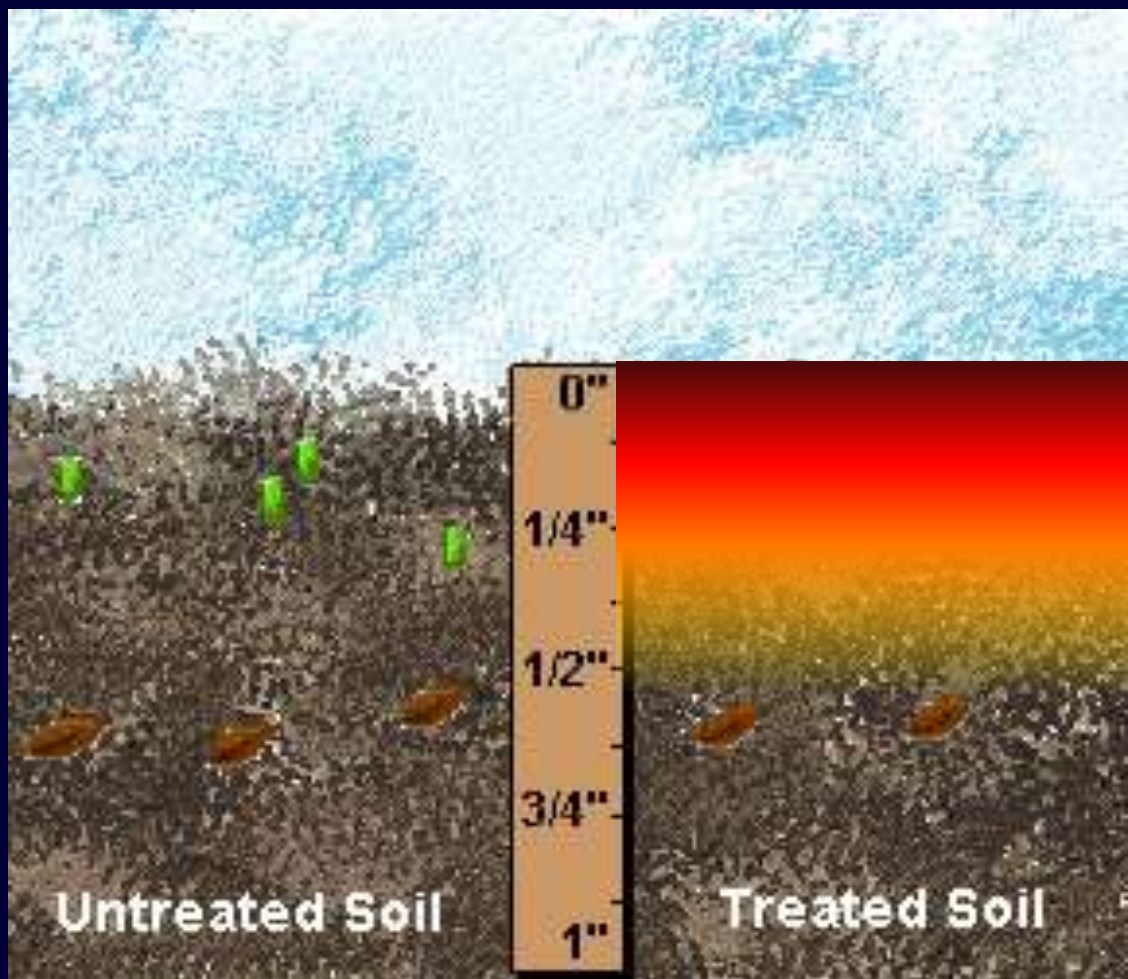
## Preemergent

- Apply to bare soil or mulch before germination of seeds
- Need water to move (activate) herbicide into seed germination zone

## Postemergent

- Apply any time after seed has germinated
- Need a certain period of dryness after application

# Pre Herbicides



Activation or leaching (Via water) is required to get herbicide in weed seed germination

# Herbicides

- **Selective herbicides** control a certain group of plants, but safe on others (**Lontrel**)
- **Non-selective** herbicides control all plants that they come in contact with (**Roundup**)

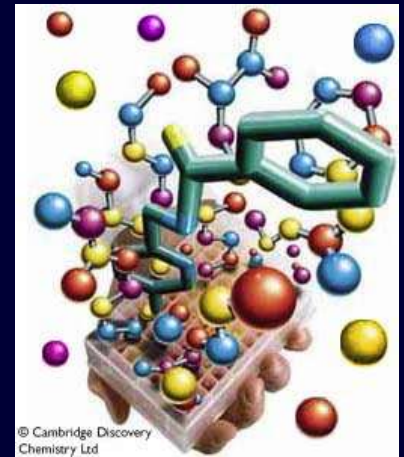


# Herbicides

**Foliar applied or soil applied:**

- **Preemergent (Preen)**
- **Postemergent (Roundup)**
- **Pre / Post (SureGuard)**

# Herbicides



- **Formulations are created to be applied dry (granular) or as a liquid (sprayable)**
- **Sprayables are made with concentrates (liquid or dry)**

# Herbicides

**Trade names and confusion!**

**Trade name: Roundup**

**Active ingredient (Common chemical name): glyphosate**

**Full chemical name: *N*-(phosphonomethyl)glycine**

# Mode-of-action

- All herbicides have a mode-of-action or a chemical means by which they control a plant (some have multiple).

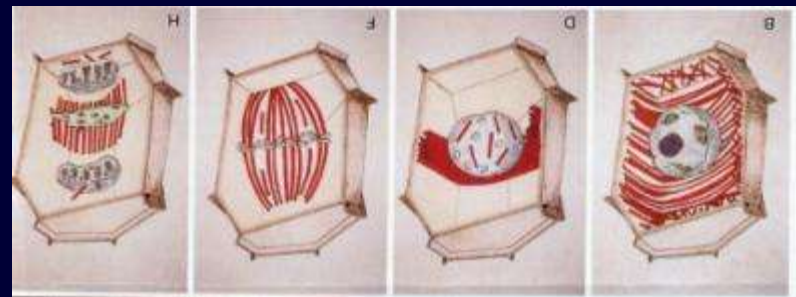
**Glyphosate (i.e. Roundup) inhibits the EPSP synthase pathway and the production of tryptophane, tryrosine, and phenyalanine**

- Some plants have mechanisms by which they detoxify herbicides (most have multiple).

**Most grass plants have the ability to detoxify phenoxy (2,4-D) herbicides by performing a biochemical process called NIH shift**

# Mode-of-Action Dinitroanilines

- **Include the herbicides: Trifluralin (Treflan), Pendimethalin (Pendulum), Oryzalin (Surflan), Benefin (Balan), Prodiamine (Barricade)**
- **The colored herbicides**
- **Only used as preemergence herbicides**
- **Backbone of the ornamental industry**
- **Causes microtubule disruption in plants**
- **Used to change ploidy number in tissue culture**



# Herbicide Philosophy

- **Good weed control does not happen by accident, will not last, and takes time**
- **You never will get 100% weed control with just a single pre or post herbicide application**
- **Complete weed control (visually), requires a well thought weed control plan that usually requires several weed control techniques**



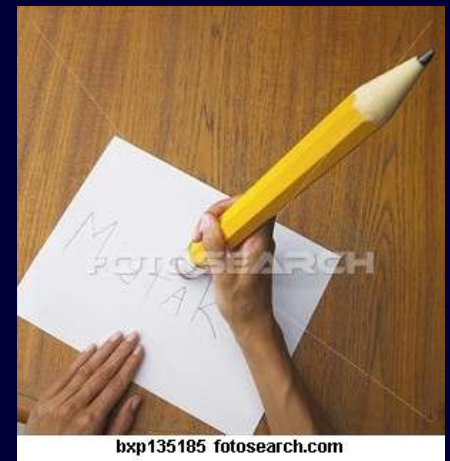
# Herbicide Philosophy

- We would like to have a selective post herbicide for every weed (see it treat it!)
- Currently our best way to control annual weeds is to use pre herbicides
- Granulars provide poorer control than sprays, but safety is much better
- Sprays are much cheaper than granulars herbicides (~1/3 less)



# Herbicide Errors

- **No rain after a pre herbicide application**
- **Rain after a post herbicide application**
- **Poorly calibrated equipment**
- **Poor choice of a herbicide**
- **Using a pre herbicide after most weed seed have germinated**





# Pre Herbicides for the Nursery Industry

Trade Name	Active	Containers (C) / Field (F)	Landscape Use
<b>Tower*</b>	(dimethenamid)	F	Y
<b>Casoron</b>	(dichlobenil)	F	Y
<b>Dimension*</b>	(dithiopyr)	F, C	Y
<b>Broadstar / SureGuard*</b>	(flumioxazin)	F, C	N
<b>Gallery*</b>	(isoxaben)	F, C	Y
<b>Pennant*</b>	(metolachlor)	F, C	Y
<b>Devrinol</b>	(napropamide)	F, C	Y
<b>Surflan*</b>	(oryzalin)	F, C	Y
<b>Ronstar*</b>	(oxadiazon)	F, C	Y
<b>Pendulum*</b>	(pendimethalin)	F, C	Y
<b>Barricade*</b>	(prodiamine)	F, C	Y
<b>Kerb</b>	(pronamide)	F	N
<b>Princep</b>	(simazine)	F	Y
<b>Treflan</b>	(trifluralin)	F, C	Y

# Post Herbicides for the Nursery Industry

## Non-Selective Herbicides

Trade Name	Active
<b>Reward</b>	(diquat)
<b>Finale</b>	(glufosinate)
<b>Roundup</b>	(glyphosate)
<b>Goal</b>	(oxyfluorfen)
<b>Scythe</b>	(pelargonic acid)

## Grass Herbicides

Trade Name	Active
<b>Envoy Max</b>	(clethodim)
<b>Acclaim Extra</b>	(fenoxaprop)
<b>Fusilade II</b>	(fluazifop-p-buytl)
<b>Segment(aka: Vantage)</b>	(sethoxydim)

## Selective Broadleaf Herbicides

Trade Name	Active
<b>Basagran</b>	(bentazon)
<b>Lontrel</b>	(clopyralid)
<b>Sedgehammer (aka: Manage)</b>	(halosulfuron)
<b>Image</b>	(imazaquin)
<b>Garlon (aka: Brush-B-Gon)</b>	(triclopyr)

# Combo Herbicides

- **Dry formulation**
- **Usually contain a burndown herbicide (oxyfluorfen) and a preemergent herbicide (pendimethalin)**
- **Easy to apply and forgiving**

# Combination Herbicide for the Ornamental Industry

Trade Name	Formulation	Active	Containers (C) / Field (F) / Landscape (L)
<b>OH2</b>	3 GR	oxyfluorfen / pendimenthalin	F, C, L
<b>Rout</b>	3 GR	oxyfluorfen / oryzalin	F, C, L
<b>Kansel+</b>	3.25 GR	oxadiazon / pendimethalin	F, C, L
<b>Snapshot</b>	2.5 GR	isoxaben / trifluralin	F, C, L
<b>Showcase</b>	2.5 GR	isoxaben / trifluralin / oxyfluorfen	F, C, L
<b>XL (Amaze)</b>	2 GR	benefin / oryzalin	F, C, L
<b>Regal O-O</b>	3 GR	oxyfluorfen / oxadiazon	F, C, L
<b>RegalStar</b>	1.2 GR	oxadiazon / prodiamine	F, C, L
<b>Freehand</b>	1.75 GR	Dimetnenamid / pendimethalin	F, C, L

# Herbicides for Herbeaceous Annuals and Perennials

Trade Name	Formulation	Active	Containers (C) / Field (F) / Landscape (L)
<b>Kansel+</b>	3.25 GR	oxadiazon / pendimethalin	F, C, L
<b>Snapshot</b>	2.5 GR	isoxaben / trifluralin	F, C, L
<b>XL (Amaze)</b>	2 GR	benefin / oryzalin	F, C, L
<b>Freehand</b>	1.75 GR	Dimetnenamid / pendimethalin	F, C, L
<b>Treflan</b>	(trifluralin)	F, C	F, C, L

# Pre Herbicide Tips

## **New Preherbicides:**

- **Freehand and Tower**

## **Excellent Pre granulars:**

- **Broadstar , Freehand, Showcase**

## **Safe Pre granulars:**

- **Snapshot, Tower, XL**

# Pre Herbicide Tips

## Excellent Pre sprays:

- **Gallery with Surflan, Barricade, or Pendulum**
- **Sureguard**
- **In ground: Simazine with Surflan, Barricade, or Pendulum**

# Pre Herbicide Tips

- **If field grown make 2 to 4 applications a year**
- **If containers, make 4 to 6 applications a year (every 60 days)**
- **With pre herbicides, try to use at least 2 different products with 2 different modes-of-action**
- **Landscape situation 2 to 4 application / Year (for several years)**

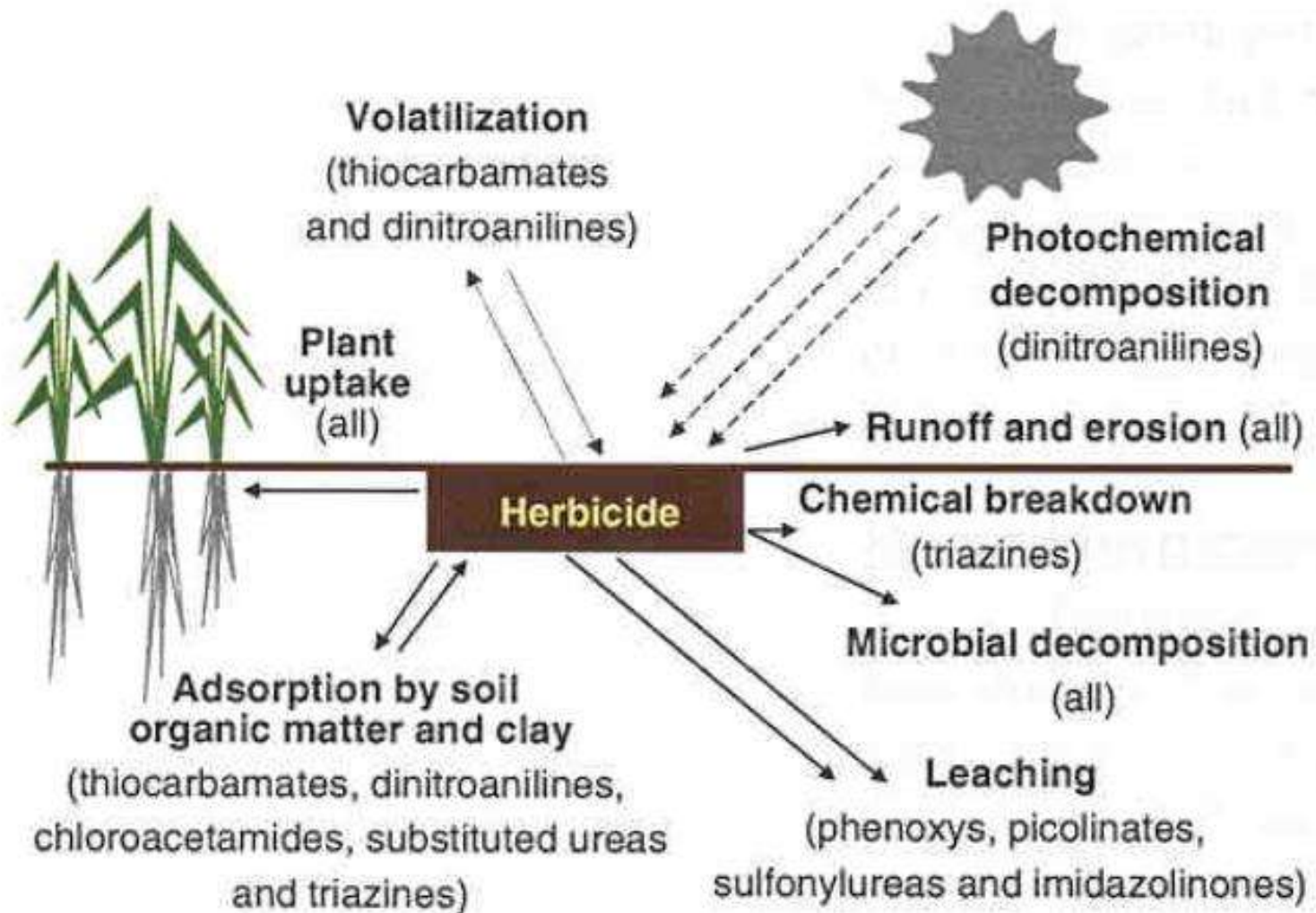




Control

Herbicide Treatments

# Herbicide Fate



# Organic

- **Organic production - Several products on the market that contain burndown type chemicals:**
  - **Acetic Acid**
  - **Malic Acid**
  - **Strong Soap**
  - **Clove oil**
- **Also one preemergent product Corn Gluten**
- **NaCl can be used as a pre / post herbicides**

# Roundup

- **Glyphosate inhibits the EPSP synthase pathway (tryptophane, tryrosine, and phenyalanine). This pathway is not present in animals**
- **Lots of new formulations, Glyphosate is off patent**
- **0.25 to 10% Concentration – using 41% active (25 to 50% if wicking, 50 to 100% if treating stumps)**

# Roundup



**Glyphosate damage in ornamentals (sub lethal doses)**

**Questions?**