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Training, including information on active ingredients, weeds and products

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Know your Target Weeds including life cycles

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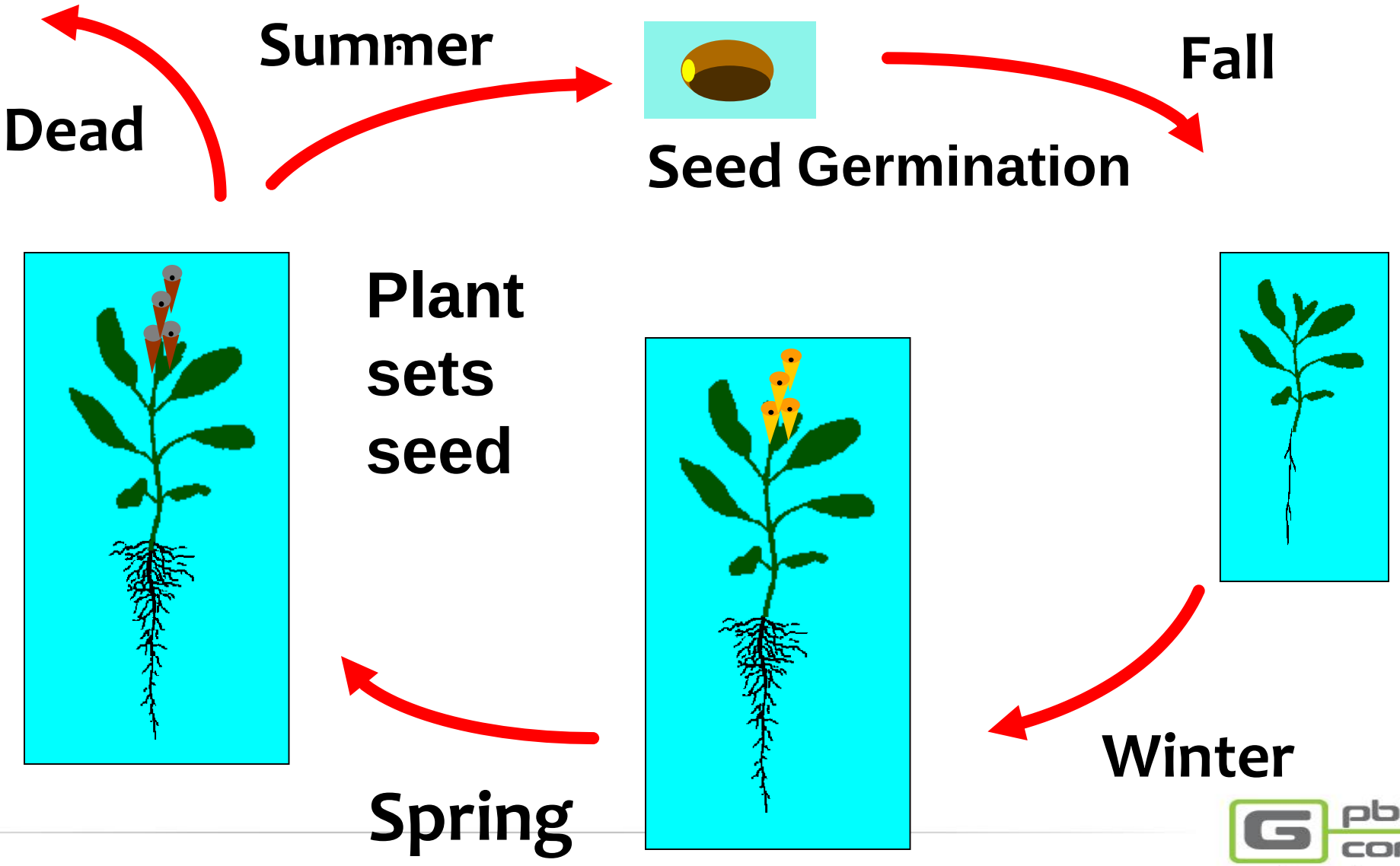
Life cycle of a winter annual weed



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Winter Annuals

The winter annuals are those that germinate in the late summer to early fall, over winters and then flowers and produce seed in mid to late spring after which the plant dies.

*** Winter annuals pose a huge problem in sports turf because they generally germinate after the soil has been disturbed. <u>Not good for us.</u>**

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Winter Annuals

- Common chickweed
- Henbit
- Common mallow
- Corn speedwell…

- Best time for control
  - Fall

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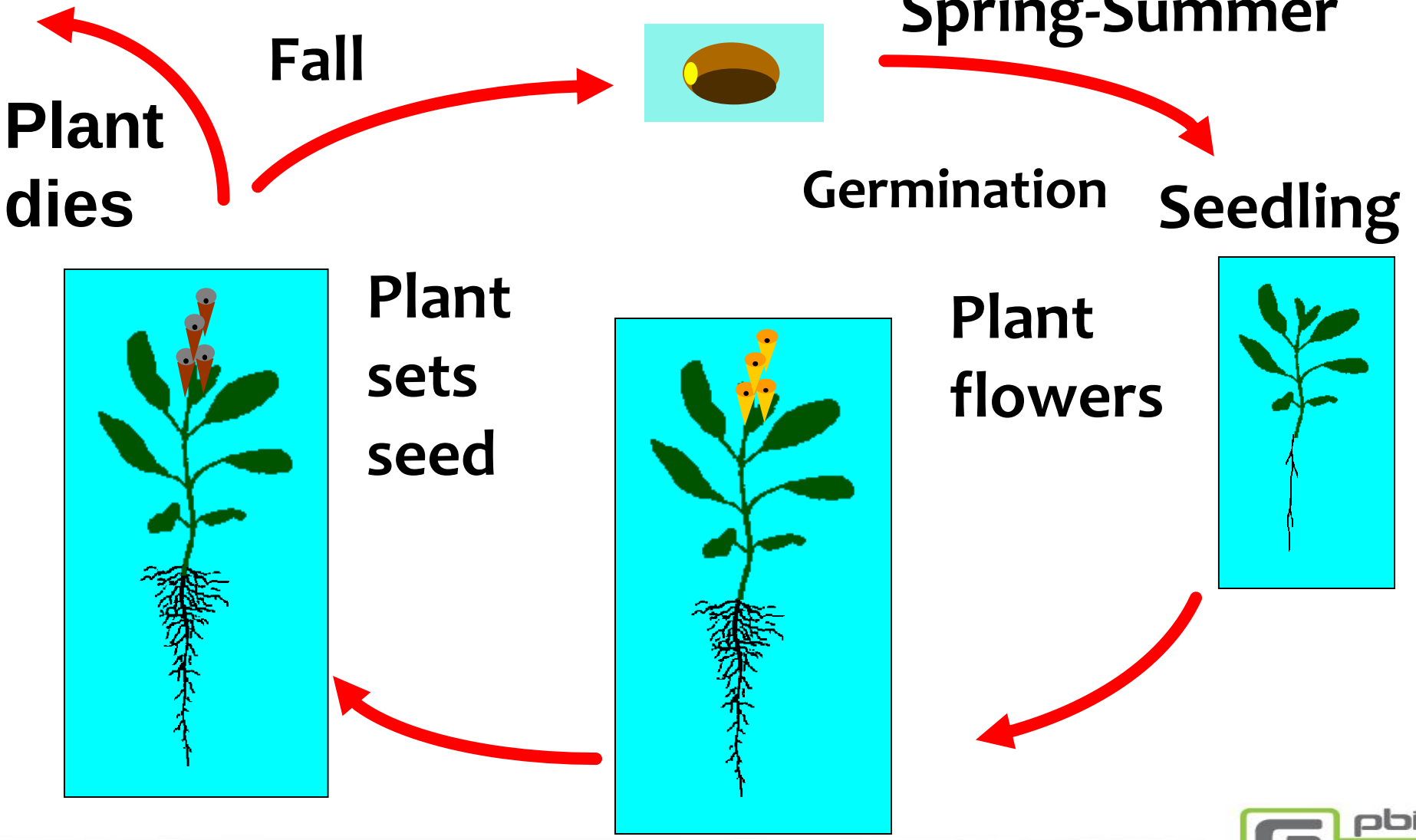
Life cycle of a summer annual weed



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Summer Annuals

- Germinate in the Spring or Summer, set seed, and then die in the fall.
- Summer annuals are hard to control for several reasons. These weeds germinate at different times of the year during the summer and mature in a short period of time so one application will not get them all.
- Summer annuals also have a waxy cuticle layer to prevent water loss which also inhibits herbicide penetration and uptake.

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Summer Annuals

- Prostrate knotweed
- Prostrate spurge
- Oxalis
- Common purslane
- Black medic

- Best time for control
  - Spring/Early

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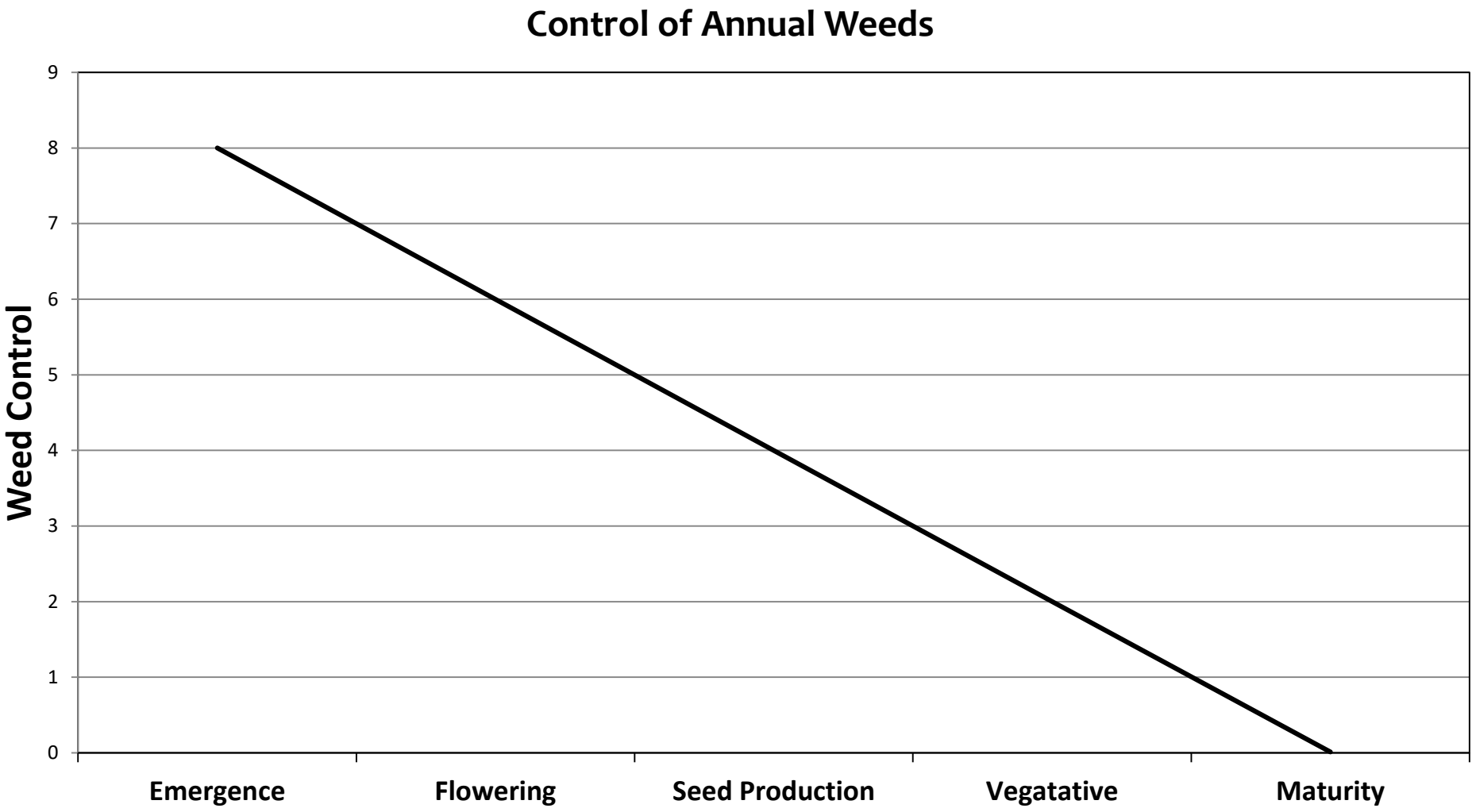

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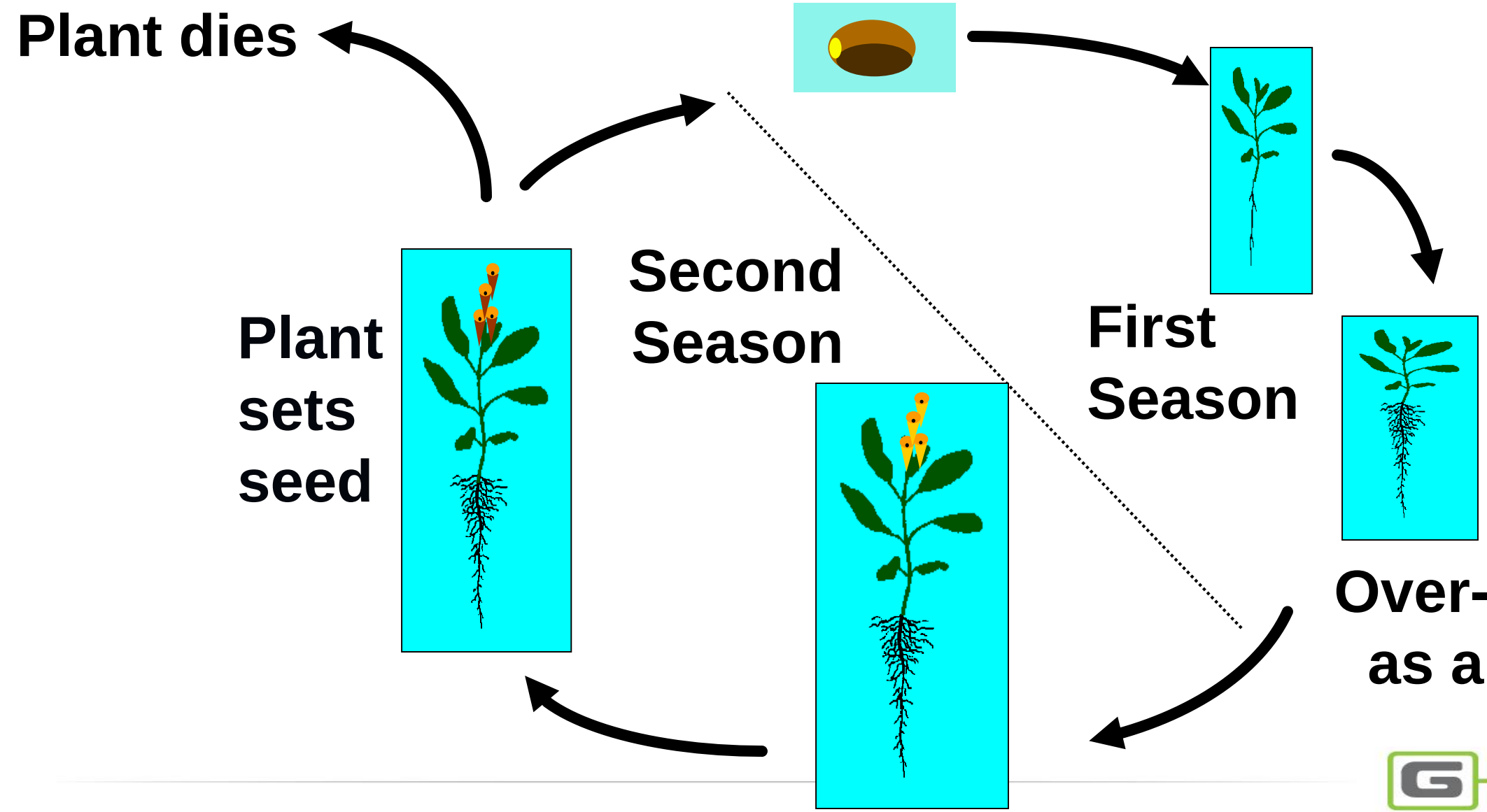
Life cycle of a biennial weed



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Common Biennials

- Bull Thistle
- Queens Ann's Lace
- Mullein

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Common Mullein

Bull Thistle

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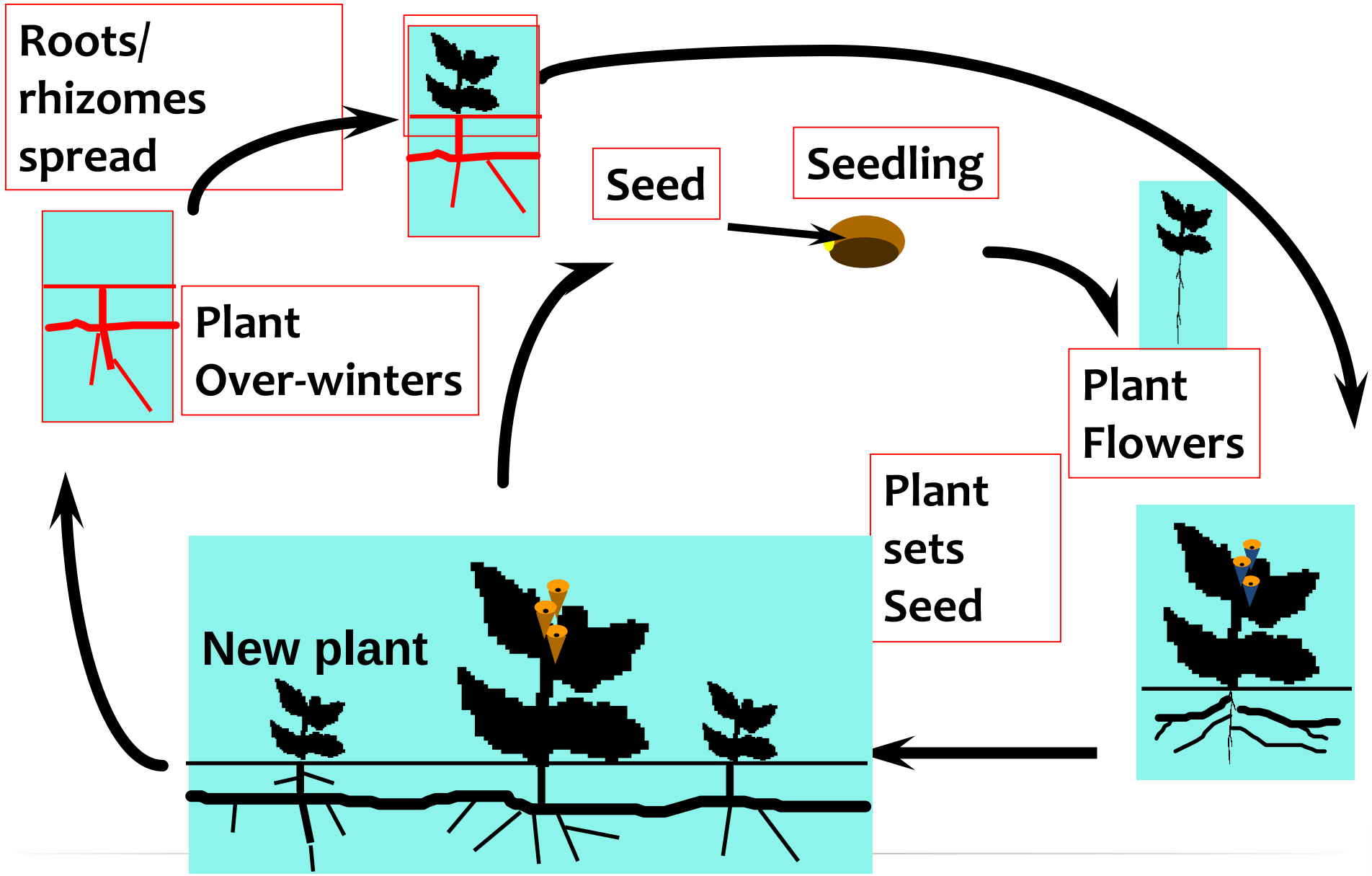
Life cycle of a perennial weed



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Perennial Weeds

- Dandelion
- White clover
- Broadleaf plantain
- Creeping Charlie (Ground Ivy)
- Wild violet

- Best time for
  - Fall

- For perennial weeds the fall is the absolute best time for control (applications during the other times of the season can have success)
- Appropriate air temperatures, still warm soil temperatures and adequate fall moisture allows for better herbicide uptake by the plants.
- It's also the time when these perennial weeds are moving nutrients down to the roots for winter storage which also pulls herbicide down with it resulting in better kill.
- Spring applications coincide with nutrients moving back up into the leaf tissue resulting in less product being moved down into the root system.
- Herbicides made late in the year will likely not show symptoms until next spring.

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Control of Perennial Weeds

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Examples from the field

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Black Medic

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Black Medic

Background Information

- Summer annual
- Trifoliate leaves, the central leaf has a longer stalk than the other leaves
- Small cluster of yellow flowers
- When flowers mature, they turn into a black fruit cluster

Habitat

- Tolerates a range of conditions, including drought. Does well in low fertility

Control

- Three-way mixtures of 2,4-D, dicamba, MCPP, or MCPA. Other options for control may include triclopyr or quinclorac

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Prostrate Spurge

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Prostrate Spurge

Background Information

- Summer annual broadleaf
- Opposite green leaves, often with a maroon blotch
- Hairy, pinkish stems exude a milky sap when broken
- Small white flowers with pink, three-lobed seed capsules

Habitat

- Turf thinned by summer stress, landscape beds and cracks in sidewalks

Control

- Three-way herbicides, enhanced with the addition of Carfentrazone or Sulfentrazone. Triclopyr also works well in controlling.

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Prostrate Knotweed

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Prostrate Knotweed

Background Information

- Is a summer annual (one of the 1st broadleaf weeds that appears in the spring)
- Low growing
- Prostrate growth habitat with branched stems (stretched out along the surface)
- Leaves are alternately arranged
- Small white flowers are barely visible

Habitat

- Found in compacted soils, next to streets, curbs and sidewalks

Control

- 2,4-D is fair but when in combination with dicamba and or triclopyr work well

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Dandelion

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Dandelion

Background Information

- Perennial broadleaf
- Leaves have a distinct wavy margin that form into irregular “toothed” appearance that makes the plant easy to identify
- Bright yellow flowers transform into a globe-like white cottony seedhead
- Dandelion is the weed that homeowners complain about the most

Habitat

- Establishes in a wide range of conditions

Control

- Three way combinations with 2,4-D or MCPA, products with Carfentrazone or Sulfentrazone enhance activity

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Amine (Water based)
Trimec 6 days after app
Sprayed in the Spring
Soil Temp: 40°F Air Temp: 37°F

Ester (Oil based)
SpeedZone 6 days of app
Sprayed in the spring (same day)
Soil Temp: 40°F Air Temp: 37°F

Broadleaf Plantain

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Broadleaf Plantain

Background Information

- Perennial Broadleaf
- Rosette growth habit with elliptic to oval shaped leaves
- Leaf blades are usually smooth with light green or reddish green petioles
- Leaf surface appears waxy
- Seeds will fill up most of the flower stalk

Habitat

- Often found in rich, moist soils

Control

- 2,4-D provides very good control but combination products provide excellent control

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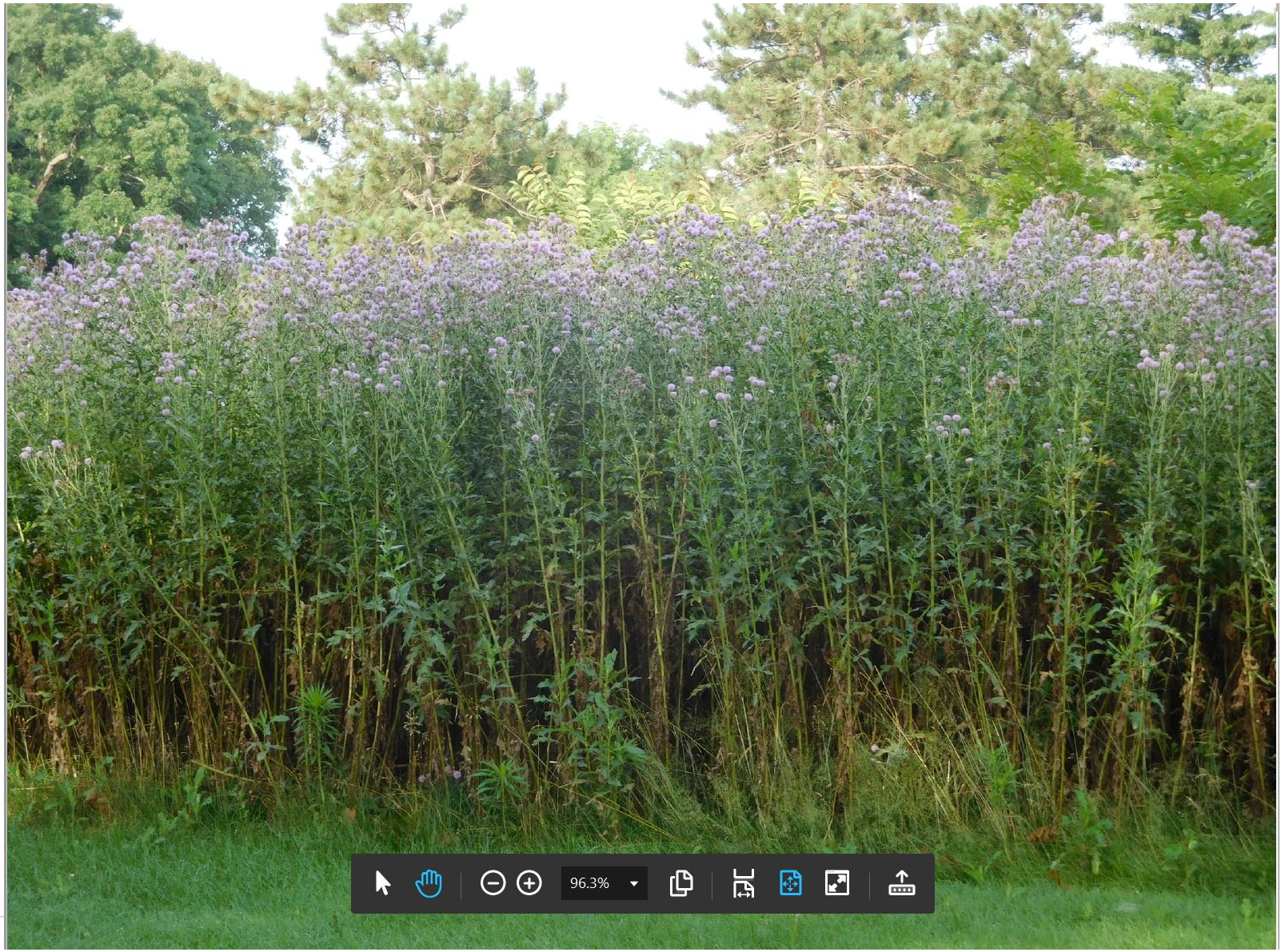
Canada Thistle



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Problems with Canada Thistle

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Canada Thistle

Background Information

- Perennial Broadleaf
- Leaves with smooth surfaces have spiny margins & flowers are pink to purple
- They aggressively spread from rhizomes, which results in large colonies
- Initially establish from wind-blown seed

Habitat

- Thin turf, location need a seed source

Control

- Triclopyr or clopyralid alone or in combination products

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Ground Ivy “Creeping Charlie”

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Ground Ivy

Background Information

- Perennial broadleaf
- Kidney shaped leaves with rounded teeth on edges
- Belongs to the mint family, has square stems
- Has a very strong mint-like odor when crushed by stepping on or mowed
- Spreads by stolon's (thick stands will choke out turf), contains tube shaped purple flowers

Habitat

- Shaded, moist areas but will tolerate full sun

Control

- Products containing triclopyr work well

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Common Mallow
Winter Annual

Ground Ivy
Perennial

White Clover

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White Clover

Background Information

- Perennial Broadleaf
- Trifoliate leaves with or without a wedge-shaped mark. Each trifoliate leaf has a short petiole
- Flowers are white and turn pink as they age

Habitat

- Areas with low fertility, will tolerate low mowing heights

Control

- Triclopyr, clopyralid along or combination products containing dicamba, MCPP, Fluroxypry and quinclorac

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Wild Violet

pbi / gordon corporation
Employee-Owned

Wild Violet

Background Information

- Perennial Broadleaf
- Low-growing plant with heart shaped shiny leaves
- Plants spread by rhizomes and seed
- Flowers are deep purple or bluish purple

Habitat

- Thin, shaded turf and roadsides

Control

- Triclopyr is very effective

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Birdsfoot Trefoil

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Employee-Owned

Birdsfoot Trefoil

Background Information

- Perennial Broadleaf
- Oblanceolate shaped leaves (trifoliate)
- Spreads by rhizomes and stolons
- Large yellow pea like flowers
- Produces a fruit pods in the shape of a birds foot

Habitat

- Can adapt to a wide range of conditions, drought and low fertility

Control

- Products containing Triclopyr work well or blends containing multiple active ingredients.

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Active Ingredients

- 2,4-D
- MCPP
- Dicamba
- MCPA
- Triclopyr
- Quinclorac
- Carfentrazone & Sulfentrazone

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2,4-D

- **Family: Phenoxyacetic acid**
- **Foliar & root absorbed**
- **Systemic (downward & upward)**
- **Ester**

-2,4-D has superior control on dandelions and plantain.

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MCPP (Mecoprop)

- **Family: Phenoxyacetic acid**
- **Foliar absorbed**
- **Systemic (downward)**
- **Amine & Ester form** (ester not seen much)

-MCPP has good control on white clover & Shepard's Purse.

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Dicamba

- **Family: Benzoic acid**
- **Foliar & root absorbed**
- **Systemic (downward & upward)**
- **Amine form**
  - **Dicamba has excellent control on knotweed & henbit**

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MCPA

- Family: Phenoxyacetic acid
- Foliar & root absorbed
- Systemic (downward & upward)
- Ester & amine forms
- Good replacement where 2,4-D is restricted
  - Good control on dandelion, plantain, thistle

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MCPA

- **Slightly more selective than 2,4-D but has activity on many weeds that 2,4-D also covers, dandelion, Plantain, & purslane.**

Triclopyr

- **Great for tough to kill weeds**
  - **Wild violet, ground ivy (creeping Charlie)**

- Foliar & root absorbed
- Ester & Amine forms

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Quinclorac

- **Broadleaf & grassy weed control**
  - **Used primarily on annual grassy weeds**
    - **Crabgrass, annual foxtail species and barnyard grass**
  - **Works well on certain broadleaf species**
    - **White Clover, black medic, speedwell and bindweed to name a few**

Crabgrass

Black medic

- **Foliar & root absorbed**

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Carfentrazone & Sulfentrazone

- **Carfentrazone & Sulfentrazone are "Protox Inhibitors"**
- **Inhibiting a key enzyme in chlorophyll production.**
- **Without this enzyme, the weed builds up peroxide-like chemical.**
- **The cells explode!**
- **Delivered *SPEED* to broadleaf weed control! *Weed death in 7 - 14 days!***

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- Pyraflufen-ethyl (PE) is another compound that falls into this group of contact herbicides.

- To date PBI-Gordon is not comfortable putting it out at various intervals because of phytotoxicity. You will see some other manufactures use PE

- There was also an issue on spotting fescue at elevated levels.

- With the safety and success with Carfentrazone & Sulfentrazone is the reason why we have stuck with these two compounds

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Effects of Carfentrazone & Sulfentrazone on a leaf surface

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Strength in numbers

Different herbicides work well on specific weeds

2,4-D: 40 perennial weeds controlled

MCPP: 10 weeds controlled (the weak sister)

2,4-D + MCPP = 80 weeds controlled

2,4-D + MCPP + Dicamba = 120 weeds controlled

When reacted together under the proper conditions, these three herbicides become stronger and more effective on more weeds than if use separately *or* just mixed/blended together.

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Weed	Lifecycle	Aminocyclopyrachlor	Atrazine/Simazine	2,4-D	MCPP	Dicamba	2,4-D + MCPP	2,4-D +2,4-DP	2,4-D+MCPP+ dicamba	Carfentrazone	Carfentrazone + 2,4-D + MCPP + MCPA &/or dicamba	Chlorsulfuron	Clopyralid	Fluroxypyr	Fluroxypyr + 2,4-D + dicamba	Imazaquin	Iodosulfuron+dicamba + thiencarbazone	Mesotrione	Metsulfuron	Pyraflufen-ethyl	Quinclorac	Quinclorac + 2,4-D + sulfentrazone + dicamba	Triclopyr	2,4-D + triclopyr	Triclopyr + clopyralid	MCPA + triclopyr + clopyralid	Sulfentrazone + 2,4-D + MCPP + dicamba	Sulfentrazone	Triclopyr + dicamba + sulfentrazone + 2,4-D
Aster	P[1]	—	—	G	—	—	F	G	F	—	G	—	G	—	G	—	G	—	G	—	—	G	—	F	G	G	G	—	G
Bedstraw, smooth	P	—	—	P	P-F	G	F	F	G	—	G	G	—	E	G	—	—	—	P	G	—	G	F-G	G	G	G	G	—	G
Beggarticks	A	—	G	G	—	—	—	G	G	—	G	—	—	—	G	—	—	—	—	G	—	E	—	G	G	G	—	—	G
Betony, Florida	P	E	F-G[2]	F	F	F-G	F	F-G	F-G	—	G	—	—	—	G	—	—	G	G	—	—	G	—	G	G	—	G	—	G
Bittercress, hairy	WA	G	—	E	F	E	E	E	E	—	—	—	—	—	G	G	—	—	E	—	—	—	—	—	—	—	—	G	—
Bindweed, field	P	—	—	G	G	G	E-F	G	E	—	G	—	—	G	G	—	—	—	—	—	E	G	G	G	—	—	F-G	—	G
Burclover	A	—	—	F-P	E	E	E-F	E	E	—	G	F	G	—	G	–	—	—	G	—	—	—	G	—	—	—	F-G	—	—
Buttercups	WA,B&P	—	F	G	F	F-G	E	E	E	—	G	G	G	—	G	G	G	G	E	—	—	E	—	G	E	G	G	G	G
Buttonweed, Virginia	P	F	—	F	P-F	F	F	E-F	E-F	F	G	F	F	G	G	—	—	—	G	—	—	G	F	F-P	G	G	G	—	G
Carpetweed	SA	—	E	G	F	E	E	E	E	G	G	—	—	—	G	—	—	G	P	G	—	E	—	G	—	G	G	G	G
Carrot, wild	A,B	—	—	G	F	E	G	P-F	E	—	G	G	—	—	G	—	—	—	E	—	—	E	G	F	—	G	G	—	G
Chamberbitter	SA,P	G	G-E	P	—	—	—	—	—	—	—	—	—	—	—	P	—	—	E	—	—	—	—	E	—	—	—	—	—
Chickweed, common	WA	G	E	P	G	G	E	E	E	F	G	G	—	G	G	G	G	G	E	G	—	E	—	E	—	E	G	G	G
Chickweed, mouse-ear	WA,P	F-G	F-G	G	G	G	E	E	E	F	G	G	P	G	G	G	—	G	E	G	—	G	P-F	E-F	E	E	G	G	G
Chicory	P	—	—	G	E	G	E	E	E	—	G	—	—	—	G	—	—	—	E	—	—	G	G	G	—	G	G	—	G
Cinquefoil, common	P	E	—	E-F	E-F	E-F	E-F	E-F	E-F	—	G	F	—	—	G	—	—	—	—	—	—	G	—	—	—	—	G	G	G
Clover, crimson	SA	—	—	G	G	G	E	E	E	—	G	G	G	—	G	—	—	—	—	—	E	E	—	—	—	E	G	—	G
Clover, hop	WA	E	E	F-G	G	G	E	E	E	—	G	G	G	—	G	—	—	—	F	—	E	E	—	E	—	E	G	—	G
Clover, white	P	E	E	F-G	G	G	E	E	E	—	G	G	G	G	G	G	G	G	E	G	E	G	F-G	E-F	E	E	G	G	G
Cudweed	WA	E	G-E	G-E	—	E	G-E	G-E	E	—	—	—	–	–	G	G	G	—	E	—	—	E	—	G-E	G-E	G	G	G	G
Daisy, English	P	—	—	P	F	G	G	F	E	—	G	—	F	—	G	—		—	—	—	F	F-G	—	—	G	G	F-G	—	G
Daisy, oxeye	P,B	—	—	F	F	F	F	F	E-F	—	—	—	—	—	G	F	G	—	—	—	—	G	—	—	—	—	G	—	G
Dandelion	P	G	E-F	G	G	G	E	E	E	—	G	G	F-G	F-G	G	P-F	G	G	E	G	F-G	G	G	F-E	G	G	G	G	G
Dandelion, Catsear	P	G	—	E-F	F	E	E	E	E	—	—	—	—	—	G	—	G	—	—	—	—	G	—	G	E	E	—	—	G
Dayflower, Spreading	SA	—	G-E	F	F	F	F-G	F-G	F-G	—	G	—	—	—	–	G	—	—	G	—	P	E	—	F-G	—	—	G	—	G
Deadnettle, purple	WA	—	G-E	G	F	G	F	—	F-G	—	G	—	—	E	G	—	—	—	P	—	G	E	—	—	F	—	G	—	G
Dichondra	P	G	E-F	E	F	E-F	E	E	E	—	—	—	—	—	—	—	G	—	P	—	E	—	—	—	E	—	—	—	—
Dock, broadleaf & curly	P	E	F	G	F-G	F-G	G	F-G	E-F	—	G	G	G	—	G	—	—	G	G-E	G	—	G	F-G	G	E	—	G	G	G
Dogfennel	P	G	—	G	—	G	—	—	E	—	G	—	—	—	G	—	G	—	G	—	–	E	—	E	E	—	G	—	G
Doveweed	SA	—	G-E	F	F	F	F-G	F-G	F-G	—	—	—	—	—	—	—	G	—	P-F	—	—	—	—	F-G	—	G	—	—	—
Eveningprimrose, Cutleaf	WA	—	E	–	–	G	G	F	G	—	—	—	—	—	G	G	—	—	—	G	—	—	G	G	G	G	—	G	—
Falsedandelion, Carolina	WA,B	—	P	G	G	G	—	G	—	—	—	—	G	—	G	—	—	—	G-E	—	—	E	P	—	G	—	—	—	—
Filaree, redstem	WA	—	—	P-F	—	G	—	—	—	—	G	G	—	—	G	—	—	—	—	—	—	E	—	—	—	—	G	G	G
Garlic, wild	P	—	P	G	P	—	E-F	E-F	E-F	—	G	F	—	—	G	G	—	—	G-E	—	P	G	—	G	—	—	G	G	G
Geranium, Carolina	WA	E	E	E	E-F	E	E	E	E	—	G	F	—	—	G	G	—	—	P-F	—	—	E	—	--	—	G	G	G	G
Groundsel	WA	—	—	G	G	—	G	G	G	—	G	G	G	—	—	–	—	—	E	—	—	E	—	G	—	—	G	—	—
Hawkweed	P	—	—	G	P	G	E-F	E-F	E-F	—	G	—	—	—	G	—	—	—	—	—	—	G	—	—	G	G	G	—	G
Healall	P	G	—	G	P	E-F	E	E	E	—	G	—	P	—	G	—	—	—	G	—	—	G	P	—	E	E	G	—	G
Henbit	WA	G	E	F-G	F	G-E	F	E-F	E	F	G	G	—	F-G	G	G	G	G	E-F	G	—	E	—	E	G	G	G	G	G

Active Ingredient Strengths

The previous slide shows the active ingredients listed at the top and weed species listed on the left side. Letters in the middle including E,F and G are used.

- E for excellent control
- F for fair control
- G for good control

This shows how much more effective the products are when they are formulated together and used with more than one active ingredient

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Employee-Owned

How the active ingredients work

- 2,4-D mimics the naturally occurring plant growth hormone IAA causing uncontrolled growth
- Dicamba is similar to the herbicide 2,4-D. Both act like natural plant hormones known as auxins. These hormones help to control plant growth. When plants are treated with dicamba, they grow in abnormal and uncontrollable ways, and often, the plants die.
- Triclopyr is an auxin mimic or synthetic auxin. This type of herbicide kills the target weed by mimicking the plant growth hormone auxin (indole acetic acid), and when administered at effective doses, causes uncontrolled and disorganized plant growth that leads to plant death

PBI-Gordon Difference

<u>Before</u> Trimec®

Popular Herbicide Combination

Common 3-way <u>blend</u> of agriculture products

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PBI-Gordon Formulations

PBI Gordon herbicides are a <u>homogeneous</u> formulation made from technical active ingredients

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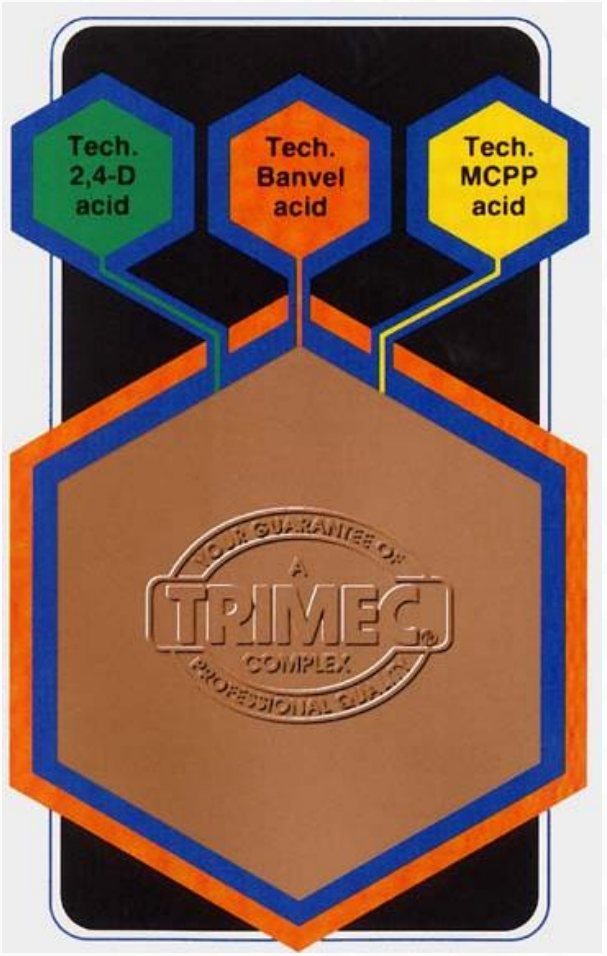
What is PBI-Gordon Unique

- **The active ingredients (2,4-D + MCPP + dicamba) are plant growth regulators reacted in a patented process.**

- **<u>Synergistic combination</u> of ingredients. In the process the herbicides are bonded together to work better than if the three herbicide were applied separately.**
  - **Considered to be "homogenous"**

What do PBI Products Deliver

- **Improved weed control over a 3-way blend**
- **Lower active ingredient required per acre without the loss of efficacy. (1+1+1 = 5 or 6)**



Esters & Amines

-]The most popular salt formulation is the amine salt. The amine salt is soluble in water and suitable for spray applications. Amine formulations are nonvolatile, but they can react with calcium and magnesium ions
- Esters are insoluble in water but soluble in organic solvents and oils; hence, they are formulated as emulsifiable concentrates. When added to water, ester formulations form emulsions and do not react with calcium and magnesium ions. Esters provide better penetration of the thick waxy coating on leaves of some weeds when compared with salts.

Amines vs. Esters

Primarily these are mostly foliar absorbed products. If the plant is not actively growing the products will not work as well. You will see some control, but it may not be what you are looking for. Now there are things that you can do to increase efficacy such as using the correct formulation (Amine vs. Ester) for the season and using surfactants.

Esters – less than 65^{o}F or when desirable plants are close to apps

Amines - 65^{o}F or greater, more safety around desirable plants

Amine (Water based)
Trimec 6 days after app
Sprayed in the Spring
Soil Temp: 40°F Air Temp: 37°F

Ester (Oil based)
SpeedZone 6 days of app
Sprayed on the same day
Soil Temp: 40°F Air Temp: 37°F

Amines vs Esters

- Esters are more active on plants, more soluble on the plants cuticle (more readily absorbed than amines).
- Amine formulations are more water soluble and are less efficient at moving from the leaf surface, across the cuticle and into the leaf
- The cuticle is a layer of waxes & lipids that helps protect the plant (desiccation & invading pathogens)
- Esters are lipid soluble, they move through the cuticle more efficiently
- Once in the plant, esters and amines are converted by the plant into an active acid that interferes with growth and kills the susceptible plant

Ester Formulations

- Faster
- Better suited for cool weather applications

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SpeedZone®

BROADLEAF HERBICIDE FOR TURF

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SpeedZone™

Formulated 4-way product

ACTIVE INGREDIENTS:

Carfentrazone-ethyl . . . . . .

2,4-D, 2-ethylhexyl ester . . . . . .

Mecoprop-p acid . . . . . .

Dicamba acid . . . . . .

INERT INGREDIENTS: . . . . . .

SpeedZone™

- Cool-weather response--as low as 45°F
- Great cool weather product
- Rainfast in 3-4 hours
- Reseed in 1 week
- Low-Odor
- Low volatile ester formulation
- Caution signal word
- Labeled for application up to 90°F
- Apply much earlier in the spring and up to a "killing frost" in the fall.

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12 Hours after application

Amine (Water based)
Trimec 6 days after app
Sprayed in the Spring
Soil Temp: 40°F Air Temp: 37°F

Ester (Oil based)
SpeedZone 6 days of app
Sprayed on the same day
Soil Temp: 40°F Air Temp: 37°F

Goosegrass Control

SpeedZone®
BROADLEAF HERBICIDE FOR TURF

Untreated Plot

Exceptional Control!!

1.5 fl. oz./1,000 - 2 apps – 1 month apart

First application June 23

100% goosegrass plot , no turfgrass

Goosegrass Control – SpeedZone works best when applied while the goosegrass is small and actively growing, but control can be obtained at all growth stages.

PowerZone®

BROADLEAF HERBICIDE FOR TURF

Fast-acting 2,4-D alternative

MCPA formulation

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Employee-Owned

PowerZone®

Contains:

Carfentrazone + MCPA + MCPP + Dicamba

ACTIVE INGREDIENTS:
Carfentrazone-ethyl . . . . . .
MCPA, 2-ethylhexyl ester. . . . . .
Mecoprop-p acid . . . . . .
Dicamba acid. . . . . .
INERT INGREDIENTS: . . . . . .

- **An alternative where 2,4-D formulations are not an option.**
- **Use where more than 2 broadcast applications are necessary.**

PowerZone® Advantages

- Non 2,4-D product, ideal for areas that 2,4-D cannot be used or when caps of 2,4-D have been reached
- Cool-weather response – Fast
- Rainfast in 3 hours
- Low-Odor
- Labeled for application up to 90^{o}F
- 2 week re-seed interval
- Caution signal word

T-ZONE™ SE

“SE” – Suspo-Emulsion

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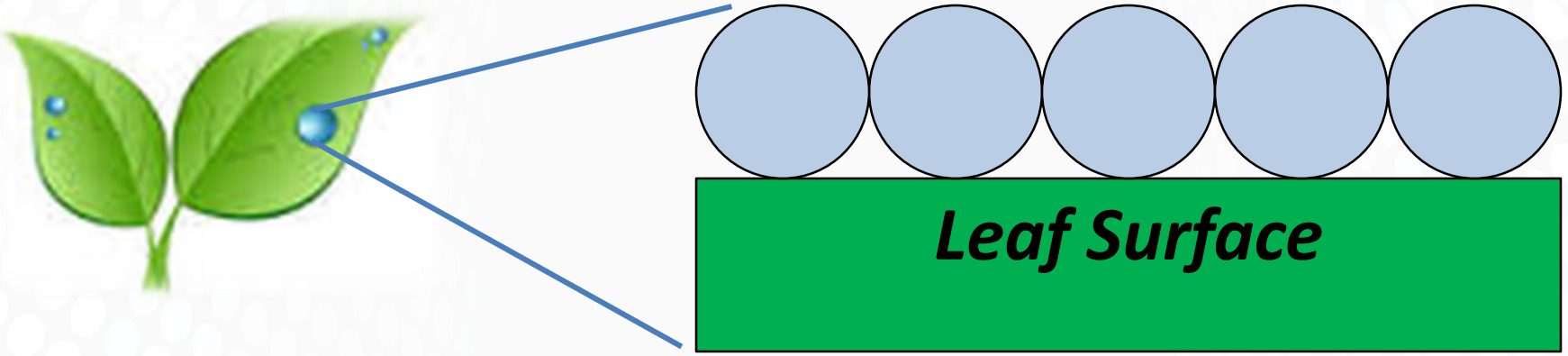
SE - Suspo-emulsion

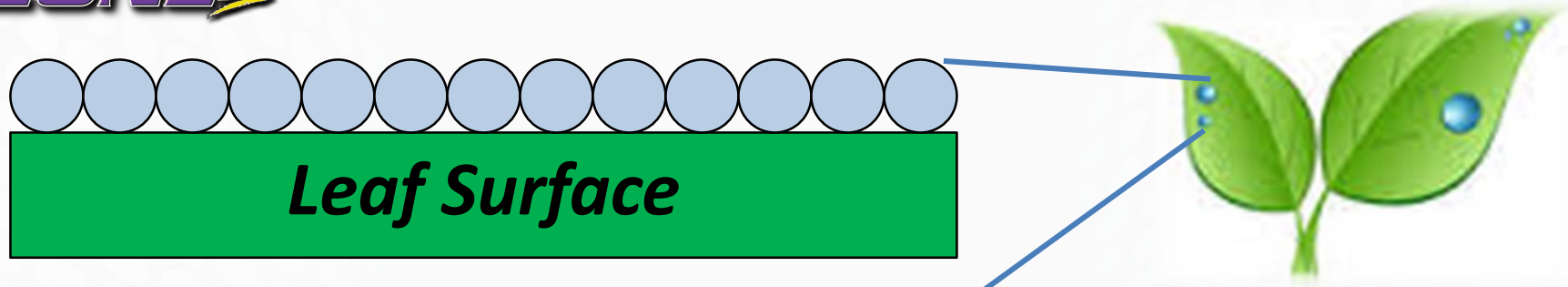
- **New SE Formulation**
  - **Suspo-emulsion (SE) is a formulation containing both solids and liquid**

Oil Droplet Packing Efficiency

Traditional “EC” formulation - larger oil droplets



“SE” formulations allows for more oil droplets on the leaf and increased herbicide contact on the leaf surface.



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The Difference

- **Oil Droplet Packing Efficiency**
  - **Microscopic oil droplets contain the active ingredients**
  - **The smaller the oil droplet means more oil droplets on the leave surface**
  - **More oil droplets on the leaf surface means increased herbicide contact**

Active Ingredients

TZONE™ SE

BROADLEAF HERBICIDE FOR TOUGH WEEDS

ACTIVE INGREDIENTS:

Triclopyr BEE, butoxyethyl ester	7.72%
Sulfentrazone	0.66%
2,4-D, 2-ethylhexyl ester	29.32%
Dicamba acid	2.22%
OTHER INGREDIENTS:	60.08%
	TOTAL 100.00%

THIS PRODUCT CONTAINS:

0.50 lb 3,5, 6-trichloro-2-pyridinyloxyacetic acid per gallon or 5.55%.
0.06 lb N-[2,4-dichloro-5-[4-(difluoromethyl)-4,5-dihydro-3-methyl-5-oxo-1H-1,2,4-triazol-1-yl]phenyl] methanesulfonamide per gallon or 0.66%.
1.75 lbs 2,4-dichlorophenoxyacetic acid equivalent per gallon or 19.44%.
0.20 lb 3,6-dichloro-o-anisic acid equivalent per gallon or 2.22%.
Isomer specific by AOAC Methods.

KEEP OUT OF REACH OF CHILDREN

CAUTION

Rates

Table 1. Use Rates For Ornamental Turfgrass, Sod Farms, and Non-Cropland		
Species	**Rate**	**Spray Volume**
Cool-season Turf		
Kentucky bluegrass, annual bluegrass, annual ryegrass perennial ryegrass, tall fescue, red or fine leaf fescues	3.25 to 4 Pints/Acre (1.2 to 1.5 fl.oz./ 1,000 sq.ft.)	10 to 220 Gallons/Acre (0.25 to 5.0 Gallons/ 1,000 sq.ft.)
Warm-season Turf (Dormant Turf)		
Hybrid Bermudagrass, common Bermudagrass, zoysiagrass, and bahiagrass	2 to 2.25 Pints/Acre (0.75 to 0.83 fl.oz./ 1,000 sq.ft.)	10 to 220 Gallons/Acre (0.25 to 5.0 Gallons/ 1,000 sq.ft.)

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2X the Triclopyr per Acre
Effective control of tough weeds

Triclopyr active ingredient
(applied)

Company	Product	Rates	Triclopyr a.i./acre	Comparison
PBI-Gordon	T-ZONE SE	**3.25 to 4.0 pts/acre**	**0.20 to 0.25**	**Nearly 2X more pounds on the ground**
NuFarm	4-Speed XT	3.0 to 4.0 pts/acre	0.11 to 0.143	- -
NuFarm	Cool Power	2.5 to 3.5 pts/acre	0.09 to 0.131	- -
NuFarm	Horse Power	2.0 to 3.0 pts/acre	0.10 to 0.143	- -
Helena	Battleship III	3.0 to 4.0 pts/acre	0.10 to 0.135	- -
JDL/LESCO	Momentum FX2	3.0 to 4.0 pts/acre	0.10 to 0.135	- -

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TW TOUGH WEEDS

Wild Violets & Ground Ivy

Applied early November – 50-55 degree temps
Heavy weed pressure with no turf

Wild Violets & Ground Ivy

Spring results!!
Heavy weed pressure with no grass present.

TZone SE on Birdsfoot Trefoil – before

After

Day of Application

Day 23

Initial Application

Picture 2

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7 day after

14 days after

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Employee-Owned

Amine Formulations

- Slower activity compared to esters
- Less volatile compared to ester formulations
- Better suited for warm weather applications, can be used until temperatures cool off in the fall
- PBI-Gordon amine formulations contain a sequestering agent

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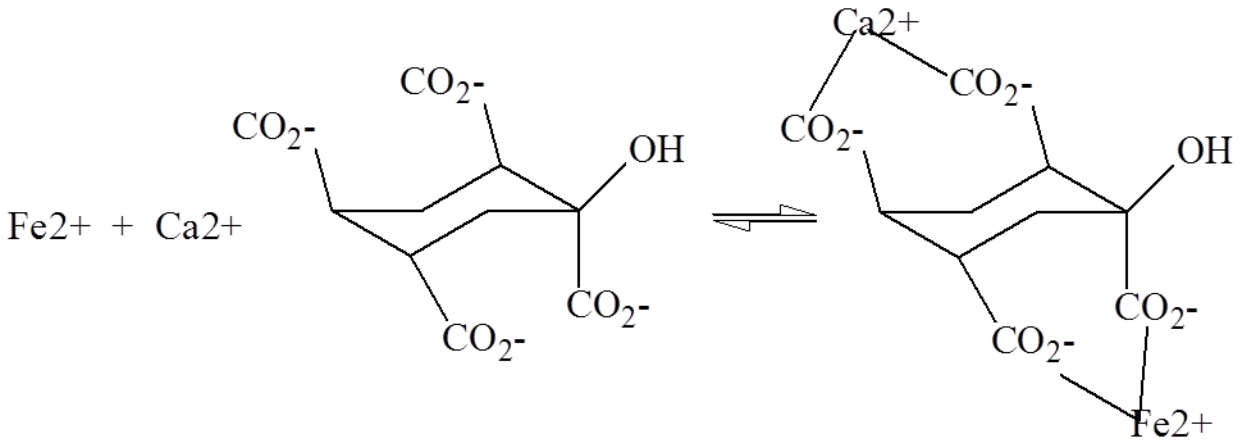
Sequestering agents



All of the aqueous based Trimec & ProForm products have a sequestering agent added for hard water robustness.

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Water Hardness

Example Trimec 992 –

Contains a sequestering agent to chelate minerals up to 1500 PPM water hardness. Prevents 2,4-D from precipitating in spray tank.

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Sequestering agents

- 2,4-D can precipitate without a sequestering agent present.
- The dark color in all of the water based PBI-Gordon formulations (Surge, Q4, Q3, Trimec Classic, Trimec 992) all contain a sequestering agent.
- In our new Trimec 1000, a newer generation of sequestering agent has been added that is colorless
- The sequestering agent ties up the Ca and Mg but still remains water soluble. This prevents the interaction between the 2,4-D/MCPP, etc. and the Ca/Mg.

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Trimec 992

- Extra 2,4-D
- Quick, visual response dandelion curl (from the 2,4-D)
- Quality inert ingredients
- Surfactant needed (none added to this formulation)
- Rates – 1.1 to 1.5 oz. per 1,000 sq. ft.

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Trimec Encore

- 3 – Way formulation without 2,4-D
- Contains that active ingredients MCPA (similar to 2,4-D), MCPP and Dicamba
- Ideal for use where max applications of 2,4-D have been reached or 2,4-D sensitive sites
    - (2) broadcast and (2) spot treatments per season
- Quality inert ingredients
- Surfactant needed (none added to this formulation)
- Rates – 1.1 to 1.5 oz. per 1,000 sq.. ft.

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Trimec 1000

The Trimec Family newest member

pbi/gordon corporation
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Trimec 1000

- Ingredients (4)
  - 2,4-D DEA (diethanolamine)
  - 2,4-D DMA (dimethylamine)
  - MCPP
  - Dicamba
- Low odor formulation
  - Odor is noticeable concern for applicators
- Premium inert ingredients
  - Increase control of deep rooted perennials
  - Resist crystallization so AI stays wet on the leaf longer.

GORDON'S PROFESSIONAL
TURF & ORNAMENTAL PRODUCTS

TRIMEC 1000

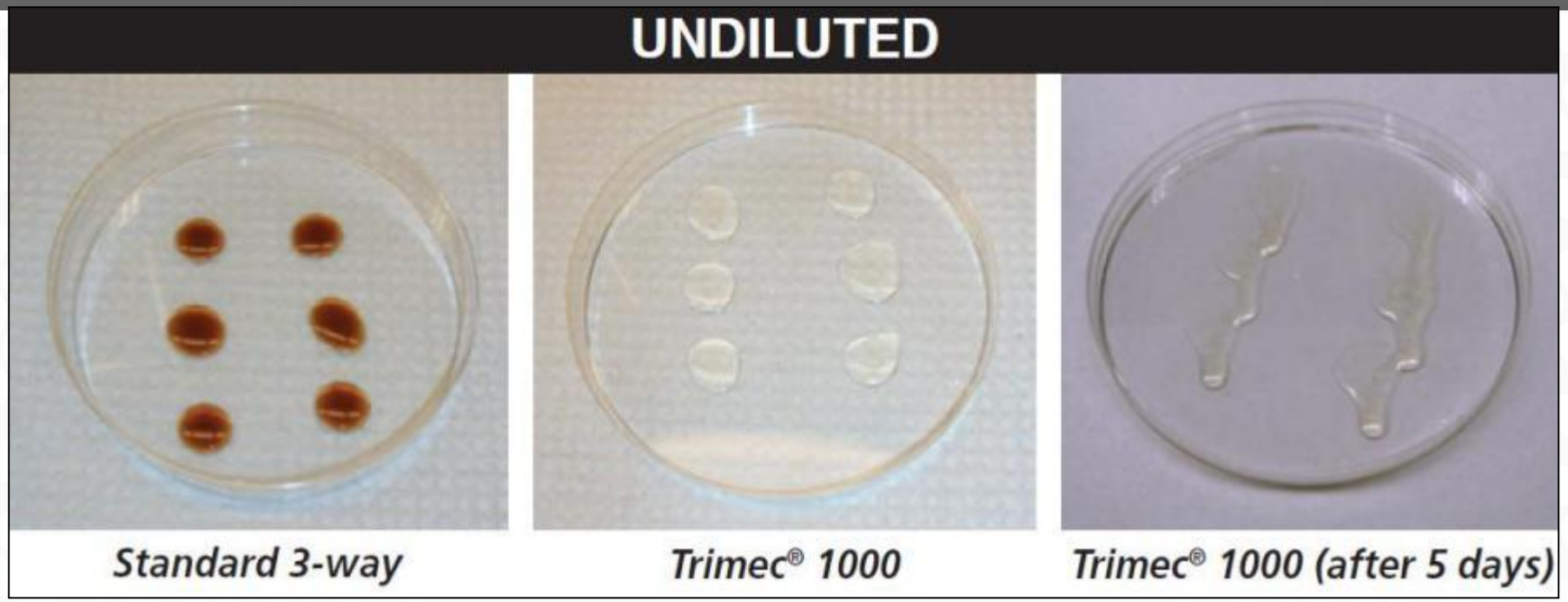
LOW ODOR

BROADLEAF HERBICIDE

ACTIVE INGREDIENT:	
2,4-D, diethanolamine salt (DEA)	34.59%
2,4-D, dimethylamine salt (DMA)	1.22%
MCPP-p, dimethylamine salt (DMA)	8.17%
Dicamba, dimethylamine salt (DMA)	2.68%
INERT INGREDIENTS:	53.34%
TOTAL	100.00%

- DEA is extremely low odor
- DEA is known to be good for deep rooted perennials

See the difference



Resists drying and crystallization

+ Stays wet longer on the weed

= More absorption

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GORDON'S PROFESSIONAL TURF & ORNAMENTAL PRODUCTS

TRIMEC® 1000 LOW ODOR BROADLEAF HERBICIDE

- Very low odor
- Premium inert ingredients
- Visual activity includes stem curling and yellowing
- Can be applied in temperatures up to 90°F
- Best suited for warm temperature applications
- Controls most weeds in 14 to 21 days
- Rain-fast in 8 hours
- Reseed in 3 weeks

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Surge®

Formulated 4-way product

ACTIVE INGREDIENTS:

Sulfentrazone	
2,4-D, dimethylamine salt	
Mecoprop-p, dimethylamine salt	
Dicamba, dimethylamine salt	

Surge®

- Warm weather weed control- Fast
- Rainfast in 6 hours
- Yellow nutsedge suppression
- Low-Odor
- Up to 2x faster than other amine products
- Labeled for application up to 90^{o}F
- Better performance in cool-weather compared to other Amine Herbicides

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WATER BASED

STOP
STOP

pbi/gordon corporation
Employee-Owned

Q4® Plus

Formulated 4-way product

Q4® Plus Only

Contains:

Quinclorac ***(¾ lb ai quinclorac per acre)***

+ 2,4-D + Dicamba + Sulfentrazone

pbi/gordon corporation
Employee-Owned

Q4® Plus

- Grassy & broadleaf weed control
  - All-in-one product
- Warm weather weed control- Fast
- Rainfast in 6 hours
- 1 week reseed interval
- Yellow nutsedge control
- Caution signal word
- Labeled for application up to 90°F

WATER BASED

Methylated Seed Oil (MSO)

Application Information

Apply **Drive XLR8** to actively growing weeds as post-emergence broadcast or spot sprays using the turfgrass species, rate, and growth stages indicated in **Table 1**, **Table 2**, and **Table 3**. **DO NOT** exceed the labeled application rate or fail to comply with use restrictions listed in **Restrictions and Limitations**.

For best results, weeds should not be under stress from lack of water, excessive water, low fertility, mowing shock, excessive hot or cold temperatures, or injury from other herbicide applications.

To achieve consistent weed control, use methylated seed oil (MSO). Refer to **Table 2** and **Table 3** for rates.

- **Methylated Seed Oil (MSO) adjuvant is <u>NOT</u> needed when using Q4™ Plus**

Quinclorac

TABLE 1. Leaf stages of grassy weeds and yellow nutsedge for optimum control.

Weed species	1 to 3 leaf	4 to 5 leaf (1 tiller)	6 leaf (2 tillers)	7 leaf (3 tillers)	8 leaf (4 tillers)	Mature (late season)
Crabgrass, (large and smooth), Barnyardgrass, Foxtail, (green, yellow and giant), Signalgrass, (broadleaf)	X	X	X	Footnote 1	Footnote 1 (reduced control)	X

[1]Second or follow-up applications on ornamental turfgrass may be required. Early summer treatments are generally more effective. Applications in the summer (approximately July 15 to August 15) to older, drought stressed grassy weeds are less effective. Late summer applications (after August 15) to mature crabgrass can be very effective.

Crabgrass

Treated area was:

- 10% bluegrass
- 60% crabgrass
- 30% broadleaf weeds

Yellow Nutsedge