ACLP II
ADVANCED
ARIZONA CERTIFIED
LANDSCAPE PROFESSIONAL

Plant Diseases, Disorders and Pests

- Watch for the ACLP II ADVANCED ARIZONA CERTIFIED LANDSCAPE PROFESSIONAL logo for terms important to know and understand
- To study more horticultural terms, go to

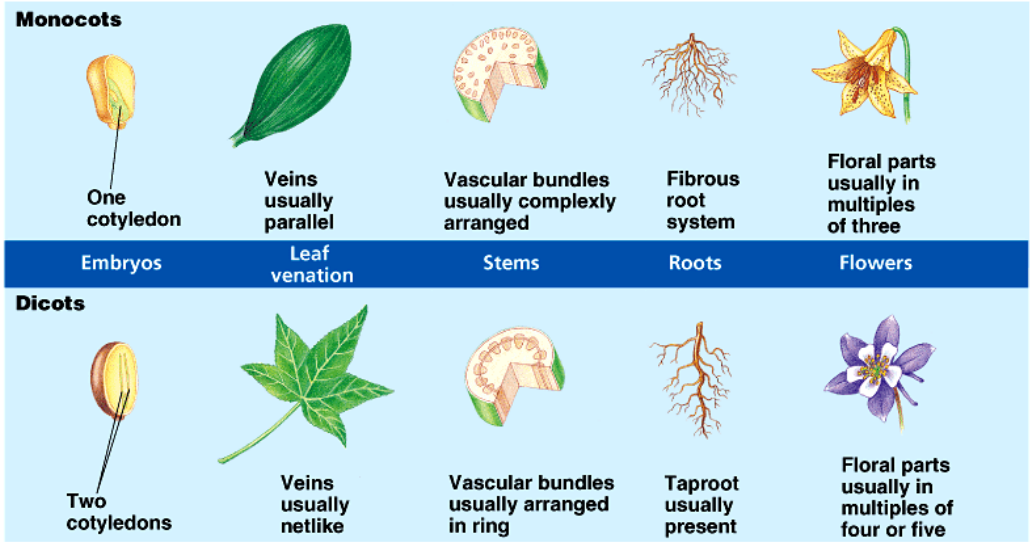
https://florabase.dpaw.wa.gov.au/help/glossary#C

Weeds and Weed Management

Two Basic Kinds of Weeds

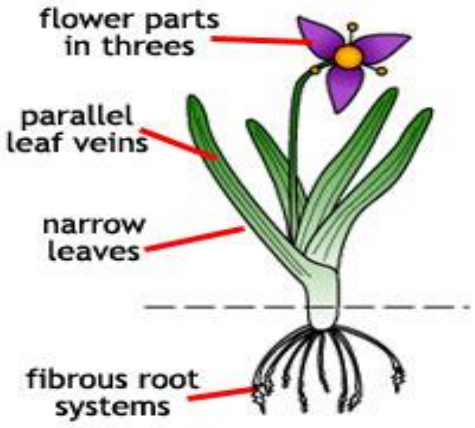
- **Monocotyledonous (Monocot)**
- One seed leaf
- Grass or sedge

- **Dicotyledonous (Dicot)**
- Two seed leaves
- Broadleaf



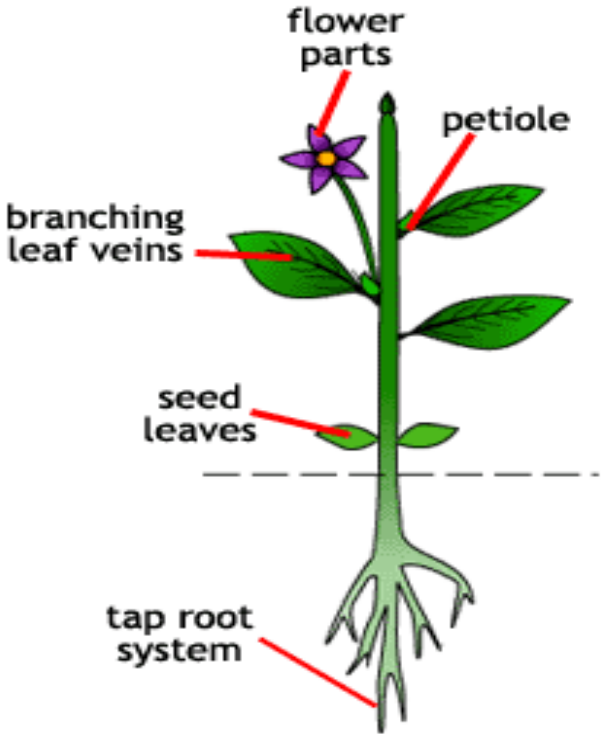
Monocotyledons

- **Monocots**
  - Long narrow blades
  - Parallel veins
  - Flowers in three parts
  - Fibrous root systems
- Grasses
  - Hollow, round, open sheath
- Sedges
  - Triangular, solid, closed sheath



Dicotyledons

- **Dicots**
  - Broadleaves
  - Net-like leaf veins, usually originating from one larger vein
  - Flowers in 4s or 5s
  - One central tap root with smaller lateral roots



Plant Life Cycles

Annual Weeds

- Complete life cycle in one year (seed -> adult -> seed)
- Seeds may remain dormant in soil for years (soil seed bank)
- Summer or winter annual

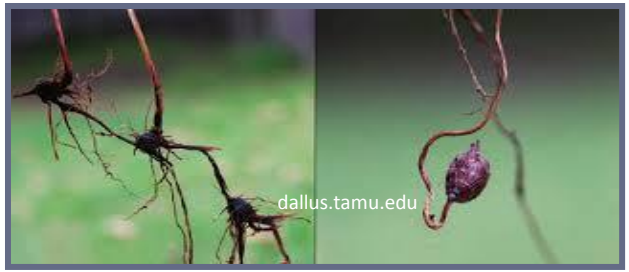
Perennial Weeds

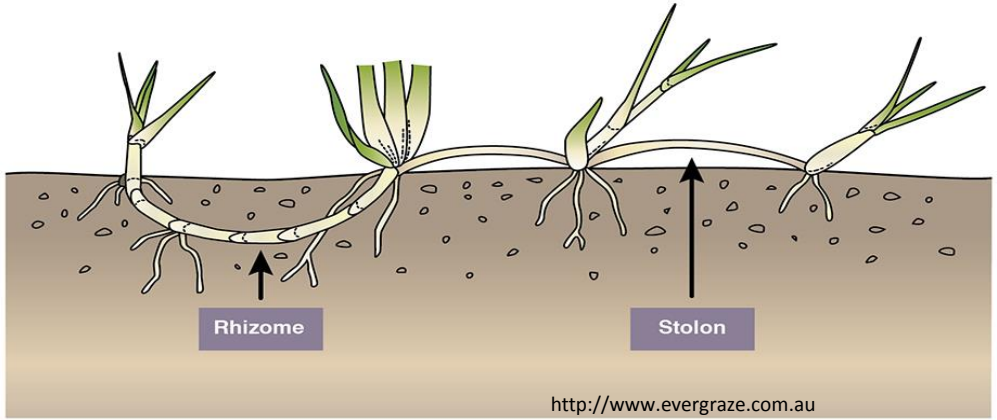
- Persist year after year
- May go dormant during drought or cold weather
- Can sprout back if roots or underground portions not removed or killed
- Summer or winter perennial

Biennials reproduce from seed and complete life cycle in 2 years

Root Structures

- Perennial weeds may have:
  - Rhizomes
  - Stolons
  - Tubers (nuts)





Ways to categorize weeds

- Annual vs. perennial vs. biennial
- Cool season vs. warm season
- Broadleaf (dicot) vs. grass and sedge (monocot)

Cynodon dactylon

bermudagrass

- Perennial
- Warm season
- Reproduces by seed and vegetatively (rhizomes and stolons)
- Loves sidewalk cracks, growing among broadleaf shrubs
- *Poa* family

Digitaria spp.

crabgrass

- Annual
- Warm season
- 6”-2’ tall, yet spreads wide from plant base (often shortened due to mowing)
- Flattened blade, ¼ - ½”wide, sheath has long stiff hairs
- *Poa* family

Poa annua

annual bluegrass

- Annual
- Cool season
- Common in turf areas
- Flattened stems spreading or erect
- Bright green with white seed heads
- Light green appearing patches seen in winter lawns
- *Poa* family

Sorghum halepense

johnsongrass

- Perennial
- Warm season
- Rhizome and seed spread
- 2-8’ tall
- Shiny red to purple inflorescent spikelets
- Plant forms hydrocyanic acid when frosts or under stress, making it toxic to livestock
- *Poa* family

Cyperus spp.

yellow and purple nutsedge

- Perennial
- Warm season
- Difficult to control
- Prefers high moisture soil
- Spreads via seed and underground ‘nut’, sending up new plants right and left
- Purple nutsedge tubers formed in chains, yellow nutsedge tubers are larger and formed at the end of numerous rhizomes
- Sedge family

Ambrosia artemisiifolia

common ragweed

- Annual
- Warm season
- 4’ in height
- Blue-green leaves covered with fine hairs
- Source of allergies for many
- Western ragweed also in area, which is a shorter perennial
- Sunflower family

Portulaca oleracea

common purslane

- Annual
- Warm season
- Prostrate growth
- Smooth, succulent-like foliage with red stems
- May be up to 12” dense mats in DG or in turf
- Can be used as an herb
- Portulaca family

Tribulus terrestris

puncturevine

- Annual
- Warm season
- Prostrate, mat forming
- ½”-5’ long
- Hairy, opposite leaves
- Yellow flowers
- Hairy, spiny burs find bicycle tires
- Caltrop family

Chamaesyce maculata

prostrate spurge, spotted spurge

- Annual
- Warm season
- Prolific seeds
- Often seen accompanied by ants
- Turns purple at first frost
- Other species also found in Western region
- Euphorbia family
  - milky substance

Sonchus oleraceus

annual sowthistle

- Annual
- Cool season
- Flower is dandelion-like, followed by white puff seed head
- Can reach 5 feet in height
- There are many other thistles, use guides to help identify
- Sunflower family

Sisymbrium irio

London rocket

- Annual
- Cool season
- Small yellow flower clusters on stem tips
- Leaves 1-4”, deeply divided
- Center bolts straight up when ready to flower
- Mustard family

Polygonum aviculare

prostrate knotweed

- Summer annual
- 1-3’ tall, prostrate
- Leaves hairless, alternate
- Small pink flowers, in late winter, early summer
- Papery sheaths at each stem node
- Wiry stems
- Buckwheat family

Amaranthus blitoides

prostrate pigweed

- Annual
- Summer
- Prostrate stems radiating in all directions from central taproot
- Stems fleshy, pliable, smooth, red- purple in color
- Leaves ½” wide in clusters
- Common garden weed
- Pigweed family

Amaranthrus palmeri

redroot pigweed

- Annual
- Warm season
- 2-6” tall, erect
- Lower stems red or red stripes
- Taproot
- Flower clusters are full of stiff, spine-like scales
- Pigweed family

Shorter than other pigweeds, in clusters and have stiff spine-like scales. This species will hybridize with Palmer Amaranth and become less distinguishable.

Setaria foxtail

yellow foxtail

- Winter annual grass
- 1-3” tall
- Erect stems, branch at base
- Hairs at base of leaf
- Common in row crops in spring
- Flowers/ seeds in spring
- *Poa* family

Catystegia sepium

field bindweed

- Perennial
- Extensive root system (20’ deep!)
- Climbing, forming dense mats
- Stems prostrate 1-4’ long
- Leaves alternate, arrow shaped
- Seeds viable for 50 years
- Flowers from late June to first frost
- Morningglory family

Malva neglecta

common mallow, cheeseweed

- Annual or biennial
- Cool season
- Low spreading or erect
- Long taproot
- Palmate venation
- aka “cheeseweed”
  - Seed looks like a wheel of cheese
- Mallow family

Erodium cicutarium

redstem filaree

- Annual or biennial
- Cool season
- 1”-2’ spreading or erect
- Rosette
- Hairy foliage, fern-like
- Purple flowers
- Geranium family

Chenopodium berlandieri

netseeded lambsquarters

- Annual
- Cool season
- 1-6’ tall
- Stems often with pink or purple stripes
- Small white to grey-mealy flowers
- Common in cultivated fields, gardens
- Fast grower, high water user
- Goosefoot family

Medicago hispida

California burclover

- Annual or short lived perennial
- Cool season
- Trails up to 2’ or erect
- Leaves have 3 round leaflets
- Yellow flowers
- Burs curved spines and hairless
- Pea family

Medicago lupilina

black medic

- Annual (or short lived perennial)
- Cool season
- Low trailing
- 3 oval-shaped leaflets on short stalk
- Small bright yellow flowers
- Hairy seed pots (not spined, which is a burclover)
- Pea family

Oxalis corniculata

creeping woodsorrel, oxalis

- Perennial
- Cool season
- Prostrate creeping with taproot
- Tri-foliate with heart-shaped leaflets
- Enjoys invading lawns and flowerbeds
- Woodsorrel family

Woodsorrel

Black Medic

Common Trifoliate Weeds of Lawns, Golf Courses, and Urban Meadows

Salsola iberica

Russian thistle, tumbleweed

- Annual
- Germinating much of year
- Round, bushy
- 1.5-3’ tall
- Massive seed producer
- Leaves are long string-like, then becoming stiff spines at tips
- Rapid germination
- Deep tap root
- Goosefoot family

Taraxacum officinale

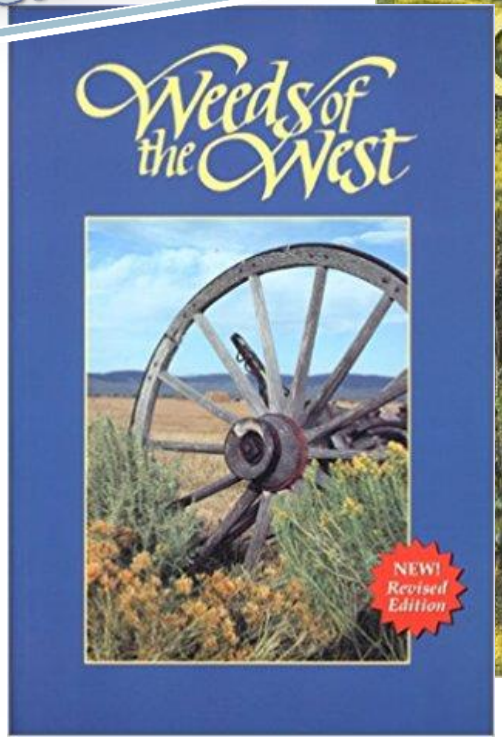
dandelion

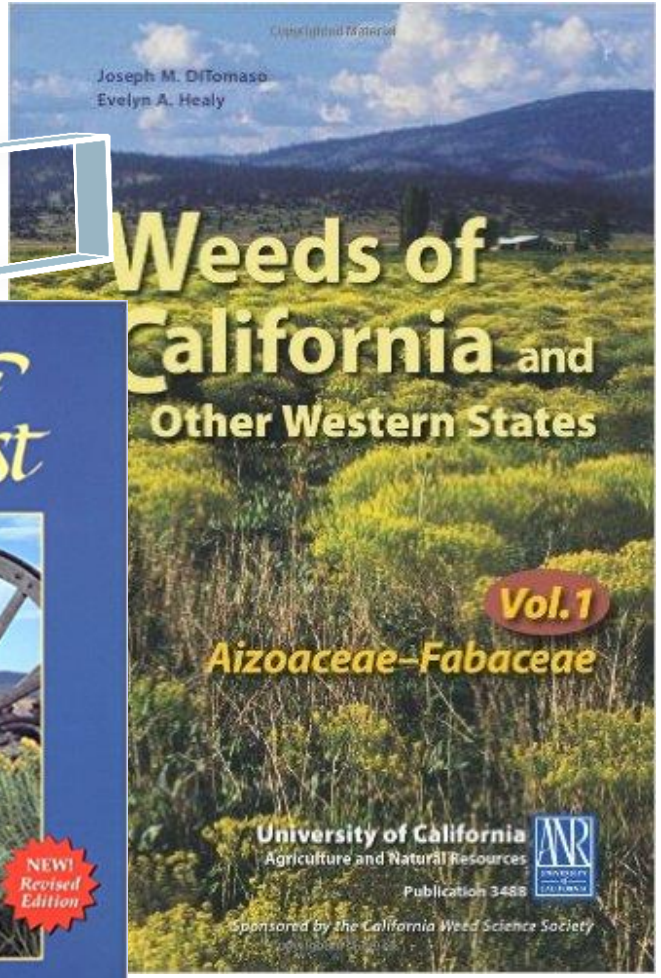
- Perennial
- Cool season
- Milky juice in stems
- Tap root
- Lobbed leaves clustered at the top of the root crown
- Yellow flowers
- White puff ball seed head
- Sunflower family

WEED MANAGEMENT

Begins with…..

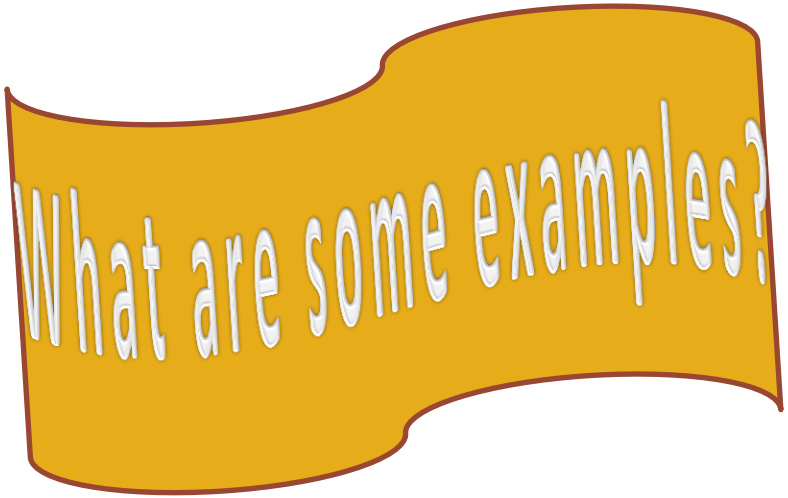
Identification





IPM in Weed Control

- Cultural Practices
- Mechanical Procedures
- Chemical Control



Cultural Practices

- High quality weed-free sod and seed
- Adequate and appropriate water supply
- Mowing at recommended height
- Fertilization
- Mulching
- Appropriate irrigation

Mechanical Procedures

- Regular mowing to remove seed heads
- Tillage to disrupt weed root systems
- Aeration & thatching

Chemical Control

- Herbicide
  - A chemical used to kill weeds
- Plant Growth Regulator (PGR)
  - Alters the growth cycle of the plant

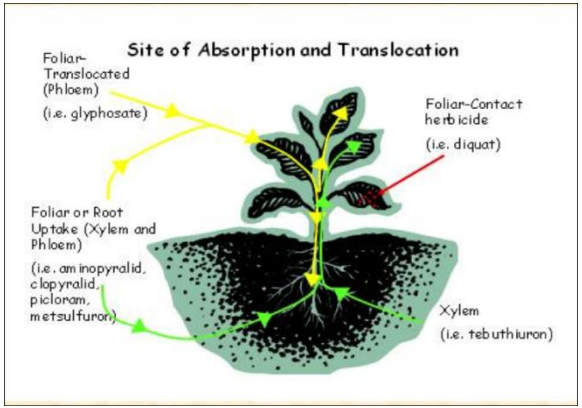
Herbicide Goals

- Prevention
  - Keep weeds from growing
- Suppression
  - Keep weeds to acceptable level
- Eradication
  - Eliminate all weeds

Chemical Control/ Herbicides

Contact herbicide

- Kills only plant parts they touch
- "Burn down"
- Useful with certain annual weeds
- May or may not be impacted by temperature
  - Reward herbicide is **not** impacted by temperature, but burns tissue it contacts



http://techlinenews.com/herbicides

Systemic herbicide

- Absorbed by leaves and transported throughout plant
- Kills roots
- May be impacted by temperature if plant is not growing
  - Round-up is slow to act in the winter because growth is slow in cold weather

Chemical Control/ Herbicides

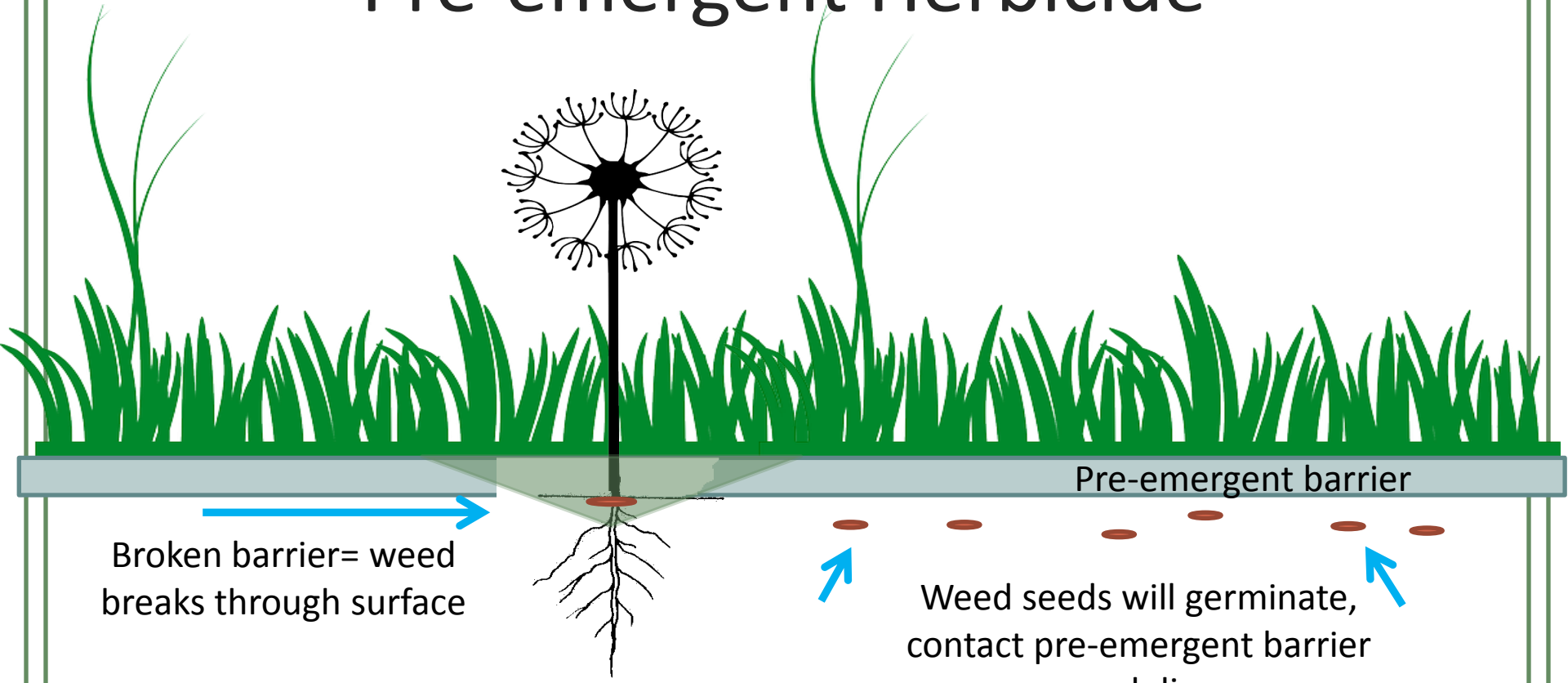
Pre-emergent

- Helps prevent weed outbreaks
- Soil applied via spray or granule
- Watered in via rain or irrigation
- Kills germinating seedlings as they emerge and contact barrier in soil

Post-emergent

- Kills growing weed
- Foliar applied
- Full coverage necessary
- Adjuvants help
  - Stickers
  - Spreaders
  - Water conditioners

Pre-emergent Herbicide



Herbicide Classification

Selective herbicide

- Control some plant species without harming desirable plants
  - Broadleaf herbicides use in turf
    - 2,4-D, MCPP, dicamba, triclopyr
  - Grass killer, safe overtop of broadleaf ornamentals
    - Fusilade II

Non-Selective herbicide

- Broad spectrum herbicides
- Will harm most plants it contacts
  - Round-up, Reward, Finale

Soil Sterilant prevents plant growth for 5+ years

27,154

Gallons equivalent to 1 inch of rain over 1 acre

Mode of Action (MOA)

- Chemical response that a plant has from the herbicide
  - Anatomical, physiological, bio-chemical
- How the plant processes the herbicide that leads to injury
- e.g. Roundup (glyphosate) depletes certain amino acids needed to make necessary proteins involved in plant growth
  - Inhibits growth, leads to chlorosis and death

Adjuvants

Adjuvants are chemicals or agents added to a pesticide mixture to help the active ingredient do a better job.

- Wetting Agents – allow wettable powders to mix better with water
- Spreaders – allow pesticide to form a uniform coating over treated surface
- Stickers – allow pesticide to stay on treated area
- Emulsifiers – allow petroleum-based products to mix with water
- Invert Emulsifiers – allow water-based pesticides to mix with petroleum carrier
- Penetrants – allow pesticide to get through outer surface to inside of treated area
- Foaming Agents – help to reduce drift
- Thickeners – help to reduce drift by increasing droplet size

Adjuvants

Purchased additives to add to tank mix or added during formulation process

Surfactants *(surface)* - group

- Wetting agents
- Spreaders
- Emulsifiers
- Stickers/Extenders

Others

- Buffers
- Compatibility agents
- Defoaming agents
- Colorants/dyes
- Safeners
- Thickeners

Weights and Measurements

Area Measurements

- 43,560 sq ft = 1 acre

Dry Measurements

- 1 lb = 16 oz
- 1 cup = 16 oz
- 1 gram= .035 oz
- 100 grams = 3.5 oz
- 500 grams = 1.10 lbs

Liquid Measurements

- 1 gallon =
  - 4 quarts
  - 128 oz
  - 8 pints
- 1 quart = 32 oz
- 1 pint = 16 oz
- 1 oz = 29.573 ml
- 1 T = 14.7868 ml
- 1 tsp= 4.92892 ml

Herbicide Selection

- Things to consider:
  - Type of turfgrass or plant to be treated
  - Risk of injury to ornamentals and trees, including if root absorbed
  - Type of application equipment needed
  - Stage of weed growth
  - Cost of treatment

Herbicide Applications

- Liquid Sprays
  - Broadcast
  - Soil incorporation
- Granular Applications
  - Drop Spreader
  - Whirly bird
- Dust Applications
  - Manual or electric duster

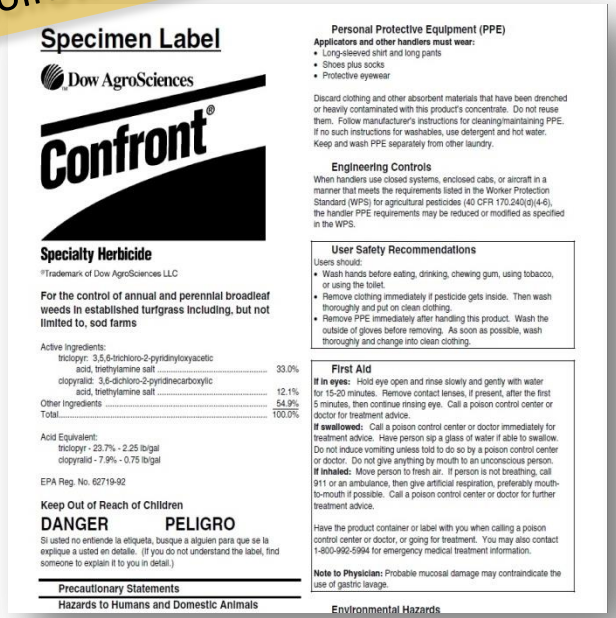
Herbicide Failures

- Application rate too high or low
- Rain within 4-8 hours after application
- Weeds not actively growing
- Herbicide leaches too deep into the soil
- Herbicide resistance
- Wrong product for targeted weed

Confront Specialty Herbicide

Work in teams to find the following information

- What is active ingredient?
- How much a.i. per pound?
- What PPE should be worn?
- Who can apply this product?



Specimen Label

Dow AgroSciences

Confront®

Specialty Herbicide

®Trademark of Dow AgroSciences LLC

For the control of annual and perennial broadleaf weeds in established turfgrass including, but not limited to, sod farms

Active Ingredients:

triclopyr: 3,5,6-trichloro-2-pyridinyloxyacetic acid, triethylamine salt	33.0%
clopyralid: 3,6-dichloro-2-pyridinecarboxylic acid, triethylamine salt	12.1%
Other Ingredients	54.9%
Total	100.0%

Acid Equivalent:
triclopyr - 23.7% - 2.25 lb/gal
clopyralid - 7.9% - 0.75 lb/gal

EPA Reg. No. 62719-92

Keep Out of Reach of Children

DANGER PELIGRO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Precautionary Statements

Hazards to Humans and Domestic Animals

Personal Protective Equipment (PPE)

Applicators and other handlers must wear:
- Long-sleeved shirt and long pants
- Shoes plus socks
- Protective eyewear

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Engineering Controls

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides (40 CFR 170.240(d)(4-6), the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

Users should:
- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

First Aid

If in eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

If swallowed: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

If inhaled: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or doctor for further treatment advice.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-992-5994 for emergency medical treatment information.

Note to Physician: Probable mucosal damage may contraindicate the use of gastric lavage.

Environmental Hazards

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A.I.

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EPA Reg. No. 62719-92

Only a licensed applicator

Keep Out of Reach of Children

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Protect yourself!

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Environmental Hazards

Confront Specialty Herbicide

- Is Confront a pre or post- emergent herbicide?
- Does it work on nutsedge?
- Can this be used at a residential site?

Broadleaf post-emergent

General Information

Confront specialty herbicide is a broad-spectrum weed killer for control of broadleaf weeds in established cool season and warm season turfgrass, including, but not limited to, turfgrass in sod farms with noted exceptions.

Confront is recommended for use on the following turfgrass species:

Established Cool Season Turfgrass

Common Name	Scientific Name
bentgrass[1]	*Agrostis* species
bluegrass, Kentucky	*Poa pratensis*
fescue, chewing	*Festuca rubra var. commutata*
fescue, creeping red	*Festuca rubra*
fescue, sheeps	*Festuca ovina*
fescue, tall	*Festuca arundinaceae*
ryegrass, perennial	*Lolium perenne*

[1] On bentgrass, do not apply more than 1 pint of Confront per acre (0.37 fl oz or 2.5 tsp per 1000 sq ft) unless turfgrass injury can be tolerated. To minimize turfgrass injury, additional applications should be made at least four weeks apart. Avoid swath overlaps.

Established Warm Season Turfgrass[1]

Common Name	Scientific Name
bahiagrass	*Paspalum notatum var. Saurae parodi*
Bermudagrass[2]	*Cynodon dactylon*
buffalograss	*Buchloe dactyloides*
centipedegrass	*Eremochloa ophiuroides*
fescue, tall (growing in warm season areas)	*Festuca arundinaceae*
zoysiagrass	*Zoysia japonica*
zoysiagrass	*Zoysia tenuifolia*

[1] Do not treat warm season turfgrass with Confront when the mowing height is less than 1/2 inch. Do not apply more than 1 pint of Confront per acre (0.37 fl oz or 2.5 tsp per 1000 sq ft) unless turfgrass injury can be tolerated. To minimize warm season turfgrass injury, additional applications should be made at least four weeks apart. Avoid swath overlaps. The use of this herbicide in the spring when warm season turfgrass is breaking dormancy may significantly delay green up of the turfgrass.

[2] Do not apply Confront to Bermudagrass on sod farms.

Confront may discolor and/or stunt turfgrass that is not well established or is stressed or weakened due to unfavorable climatic conditions, temperature extremes, drought, nematodes, or other factors which damage or weaken turf. Apply Confront only to healthy, well-established turfgrass that has a well-anchored root system.

General Use Precautions and Restrictions

Sale and use of this product in Suffolk and Nassau counties in New York State is prohibited.

In **California, New York, Oregon** and **Washington**, turfgrass and lawn uses are restricted to golf courses only.

Do not use on residential turf. Turfgrass and lawn uses are restricted to non-residential sites.

Do not apply to Bermudagrass on sod farms.

The use of this herbicide in the spring when warm season turfgrass is breaking dormancy may significantly delay green up of the turfgrass.

For ground application only.

Apply this product only as specified on this label.

Application Restrictions: Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application.

Do not apply to exposed roots of shallow rooted trees and shrubs.

Do not allow sprays of Confront to contact exposed suckers and/or roots of trees and shrubs or injury may occur.

This product can affect susceptible broadleaf plants directly through foliage and indirectly by root uptake from treated soil. **Do not** apply Confront directly to, or allow spray drift to come into contact with, flowers, grapes, tomatoes, potatoes, beans, lentils, peas, alfalfa, sunflowers, soybeans, safflower, or other desirable broadleaf crops and ornamental plants or soil where these sensitive crops will be planted the same season.

Do not reseed for three weeks after application.

Do not use Confront on golf course putting greens or tees.

Do not send grass clippings to a compost facility.

Do not collect grass clippings for mulch or compost.

Applicator must give notice to landowners/property managers to not use grass clippings for composting.

Do not apply on ditches used to transport irrigation water.

Chemigation: Do not apply this product through any type of irrigation system.

Do not contaminate irrigation ditches or water used for irrigation or domestic purposes.

Do not apply where runoff or irrigation water may flow onto susceptible crops as injury may result.

Treatment of Turfgrass Species Not Listed on the Label for Confront
Users who wish to use Confront on a turfgrass species not recommended on this label may determine the suitability for such uses by treating a small area at a recommended rate. Prior to treatment of larger areas, the treated area should be observed for any sign of herbicidal injury during 30 days of normal growing conditions to determine if the treatment is safe to the target species. **The user assumes the responsibility for any plant damage or other liability resulting from use of Confront on species not recommended on this label.**

Preparing the Spray

Add one-half the desired amount of clean water to spray tank. Add Confront and complete addition of water with agitation running. Mix thoroughly and continue agitation while spraying.

Closely review restrictions

Confront Specialty Herbicide

- How much product will you use for black medic control in perennial ryegrass?
- Should you use a surfactant with this application?

Application Directions

Make application using equipment that will insure uniform coverage (see specific application directions below). Sprays should be applied when weeds are actively growing. Application under drought conditions may provide less than desirable results. Broadleaf weed species germinate at different times. Only emerged weeds present at time of application are controlled.

Apply 1 to 2 pints of Confront per acre to control broadleaf weeds. A maximum of 0.19 lb ae clopyralid/0.56 lb ae triclopyr per acre (2 pints of Confront per acre) per application is recommended. To minimize turfgrass injury, repeat applications, if required, should be made not less than 4 weeks apart. Newly seeded turf should be mowed 2 or 3 times before treating. Do not water for 6 hours after application.

Restrictions:

- Do not use more than 0.38 lb ae clopyralid/1.125 lb ae triclopyr per acre (4 pints of Confront per acre) per year of treatment.
- In Florida and New York, the maximum use rate is 0.25 lb ae clopyralid/0.74 lb ae triclopyr per acre (2 2/3 pints of Confront per acre) per growing season.
- **Do not** use on residential turf. Turfgrass and lawn uses are restricted to non-residential sites.
- **Do not** send grass clippings to a compost facility.
- **Do not** collect grass clippings for mulch or compost.
- Applicator must give notice to landowners/property managers to not use grass clippings for composting.
- In the states of **California, New York, Oregon** and **Washington**, turfgrass and lawn uses are restricted to golf courses only.

Avoid overlapping of the spray pattern which could result in higher than recommended application rates. Rates above those recommended on this label could result in turf injury.

Avoiding Injurious Spray Drift

Apply Confront in a manner to avoid contacting nearby susceptible crops or other desirable plants. Applications should be made only when hazards from spray drift are at a minimum. Very small quantities of spray, which may not be visible, may seriously injure susceptible plants including ornamental trees and shrubs. Do not spray when the wind will carry spray mist toward susceptible crops or ornamental plants.

Ground Application

With ground equipment, spray drift can be reduced by keeping the spray boom as low as possible; by applying no less than 20 gallons of spray per acre (except under Low Volume Application); by keeping the operating spray pressures at the manufacturer's minimum recommended pressures for the specific nozzle type used; and, by spraying when the wind velocity is low (follow state regulations). Avoid application under completely calm conditions which may be conducive to air inversion. In hand-gun applications, select the minimum pressure required to obtain adequate plant coverage without forming a mist. **Do not** apply with a mist blower.

Standard Broadcast Application

Apply 1 to 2 pints of Confront in enough water to deliver 20 to 200 gallons of total spray mix per acre (0.5 to 5 gallons spray per 1000 sq ft). Higher application volumes may be used when Confront is tank mixed with fertilizers.

Low Volume Application

Apply 1 to 2 pints of Confront in enough water to deliver from 5 to 20 gallons of total spray mixture per acre (1/8 to 1/2 gallon spray per 1000 sq ft). Use low pressures and application equipment capable of delivering a uniform droplet size that can wet the weed leaf surface. To improve spray coverage, the addition of an non-ionic surfactant at a rate of 1/4 to 1/2 pint per acre is suggested. Use the higher rates of surfactant for lower rates of product and lower spray volumes.

The use of ULV applications is not recommended.

Spot Treatment of Ornamental Turfgrass Using Portable Sprayers

Mix 0.5 fl oz of Confront in enough water to make 1 gallon of spray and apply at any time broadleaf weeds are susceptible by wetting foliage of undesirable plants to point of runoff. This is enough spray to treat approximately 1000 sq ft of turf.

Weeds Controlled and Use Rate Recommendations

Use the higher rates when hard to control species are prevalent, when applications are made in late summer on mature weeds, and during periods of drought stress.

Weeds	Suggested Use Rate		
	pt/acre	fl oz/1000 sq ft	tsp/1000 sq ft
black medic hop clover red clover white clover	1[1]	0.37 (11 mL)	2.5
American burnweed common chickweed common cocklebur common vetch creeping beggarweed dwarf beggarweed false dandelion hawkweed henbit matchweed mouse ear chickweed round leaf mallow sheep sorrel spotted catsear spurweed	1.5	0.55 (16 mL)	3.5
broadleaf plantain burdock coffeeweed common dandelion common ragweed lambsquarters narrowleaf plantain (buckhorn) shepherd's purse Virginia pepperweed	1.5 - 2	0.55 - 0.74 (16 - 22 mL)	3.5 - 4.5

Adjuvant

Use rate

Watch for restrictions: Review label prior to selecting herbicide to confirm it is appropriate product for your site and targeted pest

General Information

Confront® specialty herbicide is a broad-spectrum weed killer for control of broadleaf weeds in established cool season and warm season turfgrass, including, but not limited to, turfgrass in sod farms with noted exceptions.

Confront is recommended for use on the following turfgrass species:

Established Cool Season Turfgrass

Common Name	Scientific Name
bentgrass[1]	*Agrostis species*
bluegrass, Kentucky	*Poa pratensis*
fescue, chewing	*Festuca rubra var. commutata*
fescue, creeping red	*Festuca rubra*
fescue, sheeps	*Festuca ovina*
fescue, tall	*Festuca arundinaceae*
ryegrass, perennial	*Lolium perenne*

[1] On bentgrass, do not apply more than 1 pint of Confront per acre (0.37 fl oz or 2.5 tsp per 1000 sq ft) unless turfgrass injury can be tolerated. To minimize turfgrass injury, additional applications should be made at least four weeks apart. Avoid swath overlaps.

Established Warm Season Turfgrass[1]

Common Name	Scientific Name
bahiagrass	*Paspalum notatum var. Saurae*
Bermudagrass[2]	*Cynodon dactylon*
buffalograss	*Buchloe dactyloides*
centipedegrass	*Eremochloa ophiuroides*
fescue, tall (growing in warm season areas)	*Festuca arundinaceae*
zoysiagrass	*Zoysia japonica*
zoysiagrass	*Zoysia tenuifolia*

[1] Do not treat warm season turfgrass with Confront when the mowing height is less than 1/2 inch. Do not apply more than 1 pint of Confront per acre (0.37 fl oz or 2.5 tsp per 1000 sq ft) unless turfgrass injury can be tolerated. To minimize warm season turfgrass injury, additional applications should be made at least four weeks apart. Avoid swath overlaps. The use of this herbicide in the spring when warm season turfgrass is breaking dormancy may significantly delay green up of the turfgrass.

[2] Do not apply Confront to Bermudagrass on sod farms.

Confront may discolor and/or stunt turfgrass that is not well established or is stressed or weakened due to unfavorable climatic conditions, temperature extremes, drought, nematodes, or other factors which damage or weaken turf. Apply Confront only to healthy, well-established turfgrass that has a well-anchored root system.

General Use Precautions and Restrictions

Sale and use of this product in Suffolk and Nassau counties in New York State is prohibited.

In **California, New York, Oregon** and **Washington**, turfgrass and lawn uses are restricted to golf courses only.

Do not use on residential turf. Turfgrass and lawn uses are restricted to non-residential sites.

Do not apply to Bermudagrass on sod farms.

The use of this herbicide in the spring when warm season turfgrass is breaking dormancy may significantly delay green up of the turfgrass.

For ground application only.

Apply this product only as specified on this label.

Application Restrictions: Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application.

Do not apply to exposed roots of shallow rooted trees and shrubs.

Do not allow sprays of Confront to contact exposed suckers and/or roots of trees and shrubs or injury may occur.

This product can affect susceptible broadleaf plants directly through foliage and indirectly by root uptake from treated soil. **Do not** apply Confront directly to, or allow spray drift to come into contact with, flowers, grapes, tomatoes, potatoes, beans, lentils, peas, alfalfa, sunflowers, soybeans, safflower, or other desirable broadleaf crops and ornamental plants or soil where these sensitive crops will be planted the same season.

Do not reseed for three weeks after application.

Do not use Confront on golf course putting greens or tees.

Do not send grass clippings to a compost facility.

Do not collect grass clippings for mulch or compost.

Applicator must give notice to landowners/property managers to not use grass clippings for composting.

Do not apply on ditches used to transport irrigation water.

Chemigation: Do not apply this product through any type of irrigation system.

Do not contaminate irrigation ditches or water used for irrigation or domestic purposes.

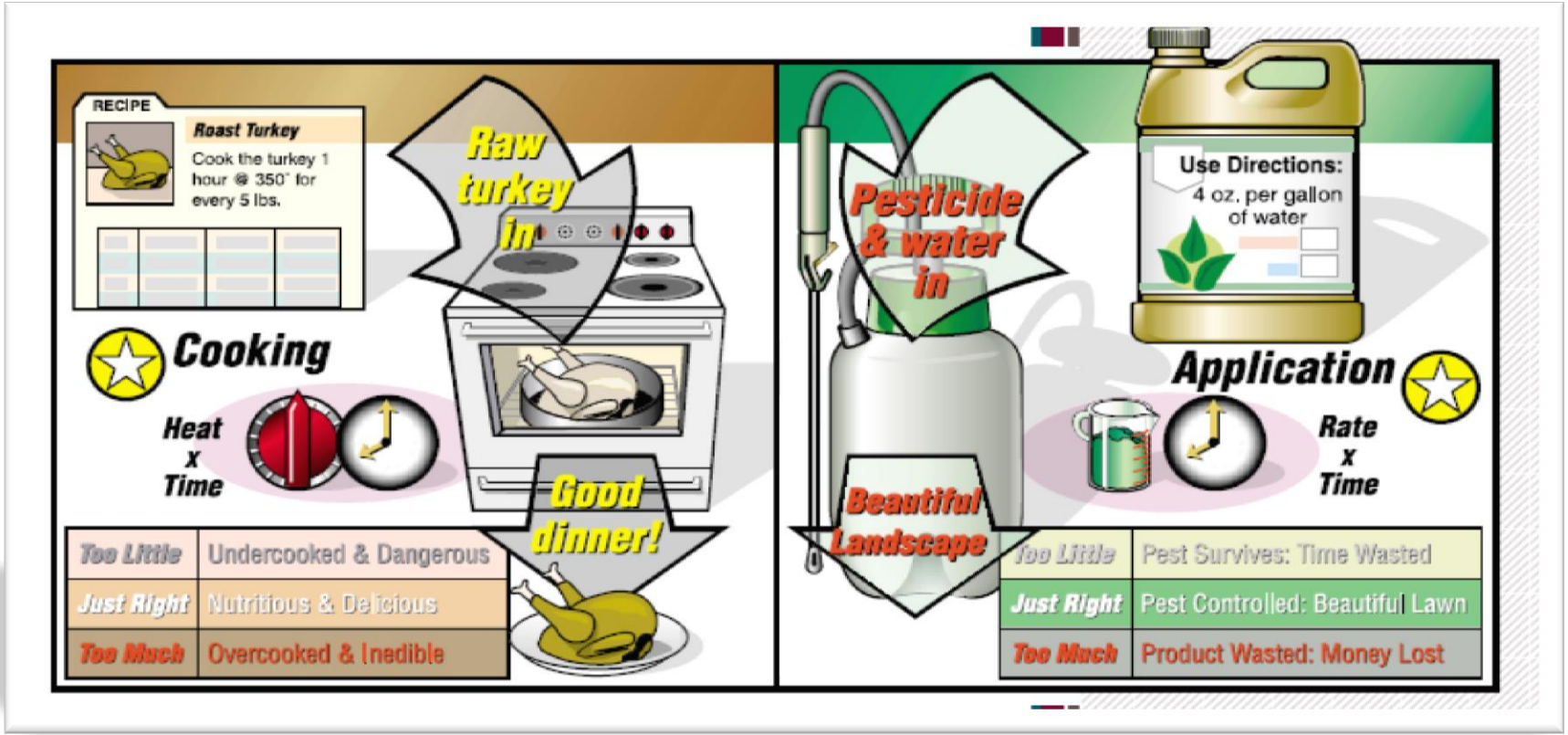
Do not apply where runoff or irrigation water may flow onto susceptible crops as injury may result.

Treatment of Turfgrass Species Not Listed on the Label for Confront
Users who wish to use Confront on a turfgrass species not recommended on this label may determine the suitability for such uses by treating a small area at a recommended rate. Prior to treatment of larger areas, the treated area should be observed for any sign of herbicidal injury during 30 days of normal growing conditions to determine if the treatment is safe to the target species. **The user assumes the responsibility for any plant damage or other liability resulting from use of Confront on species not recommended on this label.**

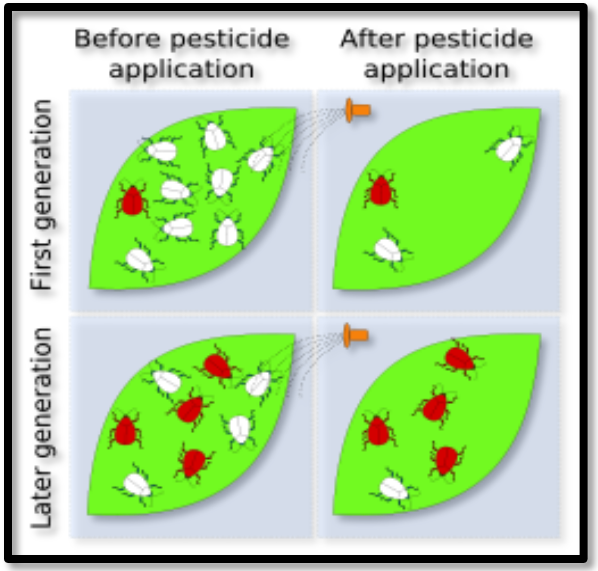
Preparing the Spray

Add one-half the desired amount of clean water to spray tank. Add Confront and complete addition of water with agitation running. Mix thoroughly and continue agitation while spraying.

Analogy from Fred Whitford
Pesticide Education Program, Purdue University



Applying Too Little Pesticide. . .



- **May result in poor pest control**
- **May lead to pesticide resistance**
- **Research shows that several factors can lead to resistance**

Factors that impact the amount of product that is applied to the site:

Travel speed

Spray pressure

Swath width

Flow rate

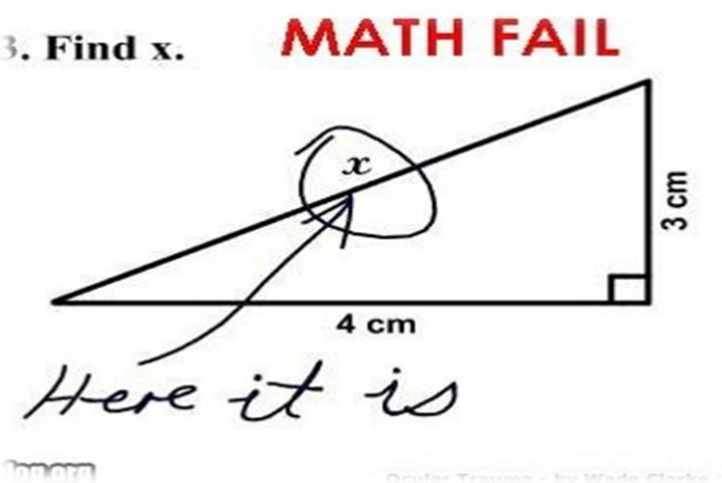
Nozzle height

Tank capacity

OTHER FACTORS

Maybe you just don’t pedal as quickly on Friday as you do on Tuesday.

OTHER FACTORS



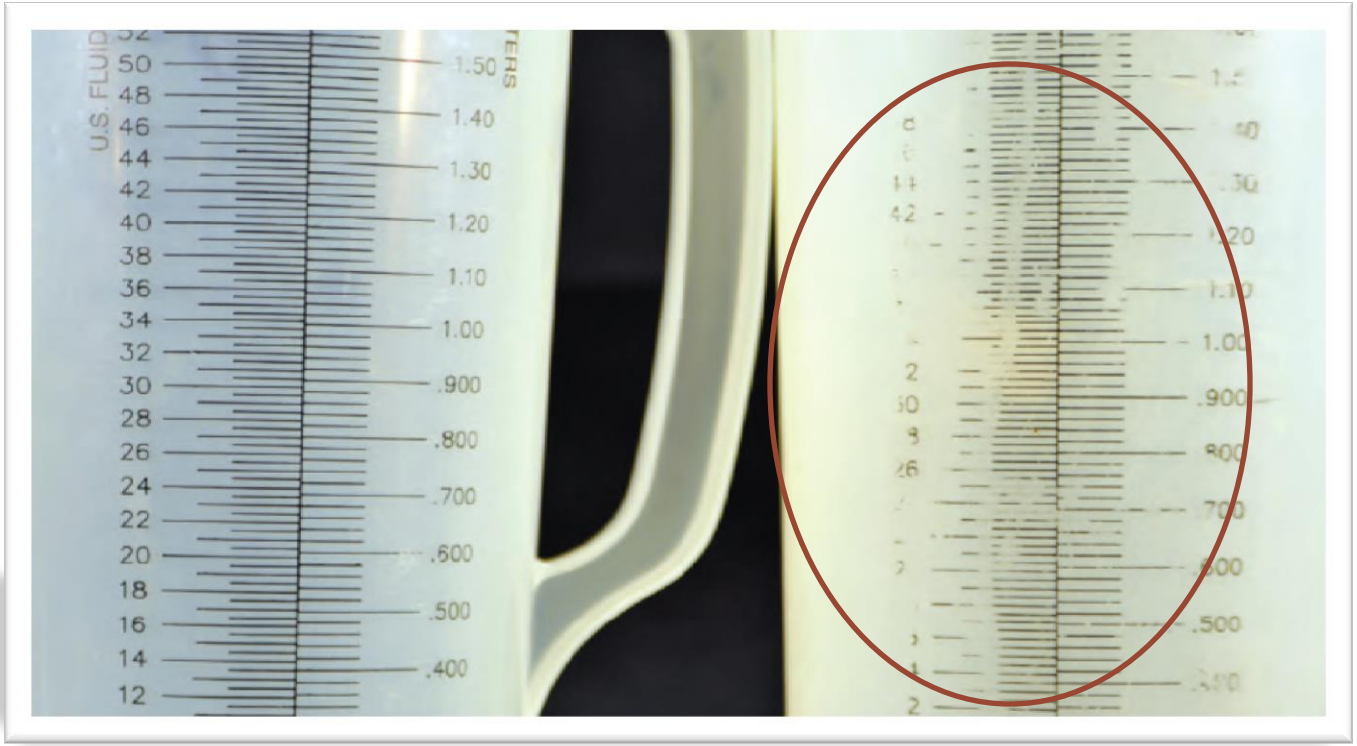
Perhaps geometry is not your strength.

Measuring Pesticides

Overlooked steps to getting the correct rate

(From Purdue Pesticide Program booklet "PPP-96")

As pesticide manufacturers develop products that require smaller weights or volumes to treat larger areas, the importance of accurate measurement tools is essential.



Are you confident that is a 3 and not an 8?

Measuring Devices

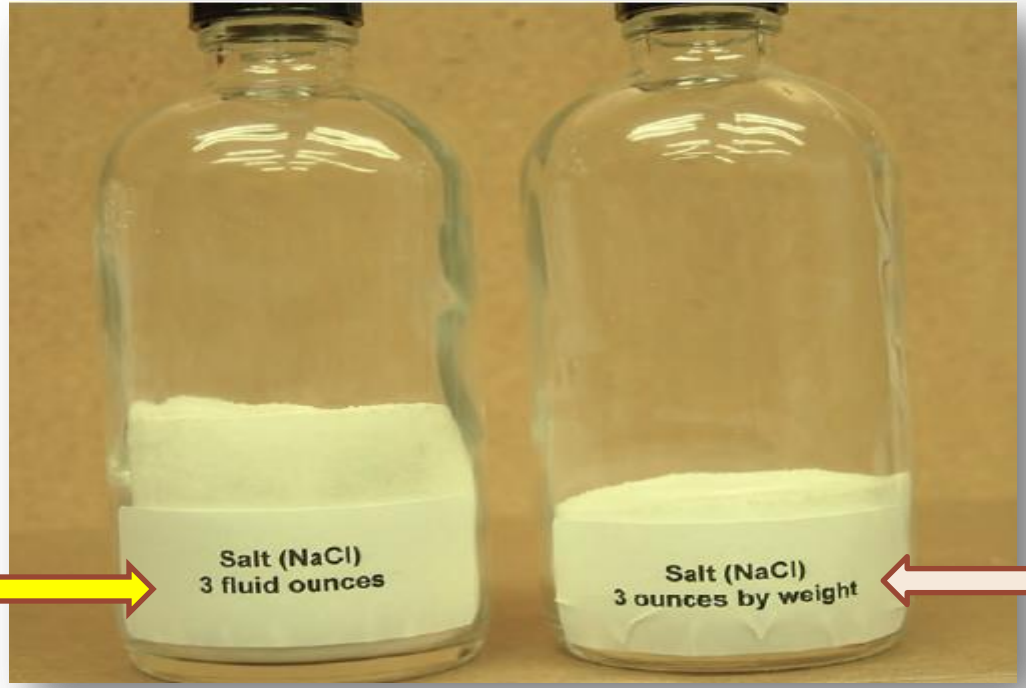
Some pesticide products come with their own measuring devices. "Tip and pour" products are easy to measure and can be safer to use.

Measuring Devices

Liquid Pesticides

Dry Formulations

Do You Notice a Difference?



Formulas for Measuring Treatment Sites

You determined from a calibration test that your boom sprayer delivers 8 gallons of water over a 0.25-acre (1/4 acre) test area. You need to apply pesticide to a 10-acre field. How much spray mixture is needed for the 10-acre application area?

What do we already know?

What do we want to know?

You determined from a calibration test that your boom sprayer delivers 8 gallons of water over a 0.25-acre (1/4 acre) test area. You need to apply pesticide to a 10-acre field. How much spray mixture is needed for the 10-acre application area?

What do we already know?

Sprayer delivers 8 gallons of water over a 0.25-acre (1/4 acre) test area

What do we want to know?

How much spray mixture is needed for the 10-acre application area?

You determined from a calibration test that your boom **sprayer delivers 8 gallons of water over a 0.25-acre (1/4 acre) test area.** You need to apply pesticide to a 10-acre field. How much spray mixture is needed for the 10-acre application area?

What do we already know?

Sprayer delivers 8 gallons per 0.25 acre.

What do we want to know?

How many gallons will your sprayer deliver for each acre?

How many ¼ of an acre are in 1 acre?

There are **4, ¼ acres in 1 acre.**

8 gallons x 4 = **32 gallons per acre**

You determined from a calibration test that your boom sprayer delivers 8 gallons of water over a 0.25-acre (1/4 acre) test area. You need to apply pesticide to a 10-acre field. **How much spray mixture is needed for the 10-acre application area?**

What do we already know?

8 gallons x 4 = **32 gal/acre**

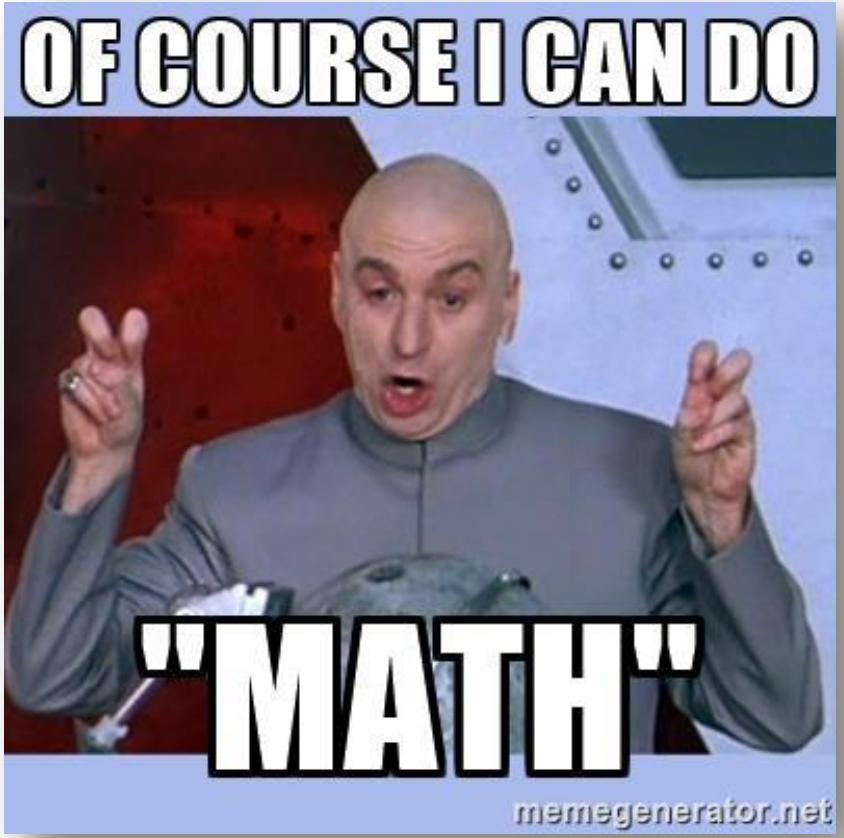
What do we want to know?

How much spray mixture is needed for 10 acres?

32 gallons per acre x 10 acres

32 x 10 = 320

= **You will need 320 gallons for the application area**



Is it making sense?

Any questions on weeds and their management?