

**EFFECTIVE HERBICIDE USE
ON TURF WEEDS
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SAFE HERBICIDE USE

1. Protective clothing and Equipment
2. Pesticide Poisoning
3. Pesticides and the Environment
4. Pesticide Selection
5. Disposal and Storage

PROTECTIVE CLOTHING AND EQUIPMENT

1. Coveralls
2. Elbow length gloves (neoprene, nitrile, or P.V.C.)
3. Boots (unlined)
4. Water repellent hat
5. Water repellent suit (i.e. KleenGuard EP, Saranex 23P)
6. Goggles
7. Respirator (chemical cartridge, canister)

PESTICIDE POISONING

Entry Points:

Ingestion
Dermal
Inhalation

Absorption Rates:

Ear canal - 47%
Scalp - 32%
Palms - 12%
Forearm - 8.6%
Eyes & scrotal area - 100%

PREVENTION

Skin Contact

- wear protective clothing
- wash after application
- observe re-entry period

Ingestion

- store properly in original container
- use face shield when mixing

Inhalation

- wear respirator
- do not smoke while applying pesticides
- observe re-entry period

PESTICIDES AND THE ENVIRONMENT

1. Persistence - pesticides can move from application site and contaminate water supplies i.e. atrazine
2. Bio-accumulation - pesticides can reach a concentration in body tissues to cause harm. Can also build up in the food chain i.e. DDT
3. Volatilization - results in vapor drift of pesticide to non-target sites i.e. ester formulations
4. Adsorption - binding of pesticides to soil particles especially those high in clay or organic matter
5. Surface run-off - pesticides move from land to water sources.
6. Leaching - downward movement of pesticides dissolved in water through the soil. Can lead to contamination of ground water.

PESTICIDE SELECTION

The chosen pesticide should:

- be registered
- fit in work schedule i.e. - re-entry period
- represent least hazard to applicator and by-standers
- have least affect on beneficial species
- not cause pesticide resistance problems
- be compatible if tank mix is required
- minimize exposure (select best formulation)

DISPOSAL AND STORAGE

1. Rinse container because 1% of original product is left before rinsing
2. Destroy container by puncturing
3. Avoid surplus tank mix; never re-spray treated field

Do not store:

- close to livestock
- with grain, hay or other feed
- near well, cisterns, or water supplies

Spills

- cover with thick layer of soil, kitty litter, or vermiculite
- sweep or shovel into waste drum
- refer to M.S.D.S. sheet for decontamination steps

WHY CONTROL WEEDS

1. To improve texture, growth and color of turf
2. To decrease spread of diseases and insects
3. To maintain quality and playability of turf

WEED LIFE CYCLES

1. Annuals - weeds which germinate, bloom, produce seed and die in one growing season
Examples: crabgrass, prostrate knotweed
2. Winter Annuals - weeds which germinate and produce a leafy rosette in the fall and then bloom, seed, and die the following summer
Examples: shepherd's purse, chickweed
3. Biennials - weeds which germinate and produce a leafy rosette in the fall during their first growing season, and then flower, complete their life cycle and die during the next
Examples: mallow, wild carrot
4. Perennials - weeds which live a number of years, developing each year from underground stems, or roots, or crowns and usually flowering each year but dying back to the ground each winter
Examples: dandelion, quackgrass

NEW HERBICIDES - Broadleaves

1. Quinclorac - IMPACT
0.75 to 2.0 kg/Ha - apply postemergent (1 - 4 leaf)
CONTROL - dandelion, clover spp., solanum spp. and amaranthus spp.

TOLERANT TURF SPECIES - Annual bluegrass, Kentucky Bluegrass, Annual Ryegrass, Perennial Ryegrass, Tall Fescue, Bermudagrass, Zoysia

OVERSEEDING - Pre-emergent to tolerant species

DO NOT APPLY WITHIN 4 WEEKS AFTER PERENNIAL RYEGRASS HAS EMERGED OR 8 WEEKS AFTER KENTUCKY BLUEGRASS HAS EMERGED

2. Clopyralid/Triclopyr - CONFRONT
0.72 to 0.85 kg/Ha - apply postemergent

CONTROL - Medick, Cocklebur, Vetch, Clover spp., Plantain, Dandelion, Burdock, Shepherd's Purse, Thistle

TOLERANT TURF SPECIES - Kentucky Bluegrass, Tall Fescue, Perennial Ryegrass

OVERSEEDING - Do not reseed tolerant species for 3 weeks after application

Newly seeded turf should be mowed 3 times before being treated

NEW HERBICIDES - Grasses

1. Dithiopyr - DIMENSION
0.42 to 0.56 kg/Ha
pre and early postemergent (1-3 leaf)

CONTROL - crabgrass

TOLERANT TURF SPECIES -Bentgrass, Fine Fescue, Tall Fescue, Kentucky Bluegrass, Perennial Ryegrass

OVERSEEDING - 2 to 3 months after application

2. Fenoxaprop-ethyl - ACCLAIM
0.20 kg/Ha
postemergent (1-3 tiller to multi-tillered)

180 LAWN CARE

CONTROL - crabgrass

TOLERANT TURF SPECIES - Kentucky Bluegrass, Perennial Ryegrass, Fine Fescue, Tall Fescue

OVERSEEDING - 7 to 10 days after application

DO NOT APPLY TO BENTGRASS

3. Pendimethalin - PROWL

1.68 kg/Ha
preemergent

CONTROL - crabgrass

TOLERANT TURF SPECIES - Kentucky Bluegrass, Perennial Ryegrass, Fine Fescue, Tall Fescue

OVERSEEDING - do not overseed for 5 months after application

DO NOT APPLY TO BENTGRASS OR ANNUAL BLUEGRASS

PESTICIDE OPTIMIZATION

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Why do we want to optimize pesticide use?

REASON: Less pesticide is used resulting in the following benefits

1. Reduced environmental and health impact.
 - exposure risks reduced
 - non-target effects reduced
 - pollution reduced
 - stewardship promoted
2. Time saving
 - less time spent spraying
 - more time for other endeavors
3. Money saving
 - reduced chemical and labor costs
 - less repair of damaged turf
4. Similar efficacy with less chemical

REMEMBER

Before trying to optimize pesticide use, consider eliminating the use of a particular pesticide. Two key factors that are involved in reducing overall pesticide use are:

1. Determining the level of pest control you want
 - complete versus partial control
2. Establish a dense, healthy, competitive stand of turf. This is done by using management strategies that involve:
 - fertility
 - mowing

- watering
- type of species
- type of cultivar

WHAT IS PESTICIDE OPTIMIZATION?

1. Using the prescribed amount of pesticide while improving the pest control.
2. Using less pesticide than is prescribed without reducing the efficacy of the pesticide.

FACTORS INVOLVED IN OPTIMIZING PESTICIDE USE

1. Spray equipment
 - calibration
 - type of application
2. Pesticide properties
 - pre- vs post-emergent
 - granular vs EC
 - chemical formulation
3. Timing
 - time of day
 - time of year
4. Weather conditions
 - rain
 - temperature
 - wind
5. Organism's life cycle
 - annual vs perennial
 - growth and development

SPRAYER CALIBRATION

1. Nozzle type
2. Screens
3. Nozzle spacing
4. Boom height
5. Pressure
6. Speed
7. Spray pattern

To increase herbicide output:

1. Decrease speed
2. Increase pressure
3. Change nozzle type

*Do not exceed specified tolerances of the nozzle.

SPRAYER CALIBRATION

1. Check your tractor speed
2. Know your inputs
 - nozzle type
 - application water volume
 - tractor speed
 - nozzle spacing

3. Calculate required nozzle output

$$\text{L/min} = \frac{\text{L/ha} \times \text{km/h} \times \text{W}}{60,000}$$

L/min	=	liters/minute/nozzle
L/ha	=	liters/hectore
km/h	=	kilometers/hour
W	=	Nozzle spacing (in centimeters) for broadcast spraying

4. Set correct pressure for nozzle
5. Check nozzle output by collecting water from nozzles
6. Check spray pattern
7. Ready to spray

PESTICIDE PROPERTIES**Type of Chemistry**

Herbicides used for the control of crabgrass have changed significantly over the past 5 years. These changes are a good example of how changing pesticide chemistry can optimize crabgrass control.

Mixtures of Crabgrass Herbicides

Mixtures of the postemergent herbicide ACCLAIM with preemergent herbicides such as:

- DACHTHAL
- DIMENSION
- BETASAN
- TREFLAN

control germination of the second flush of crabgrass in July and August.

PESTICIDE CHEMISTRY**Mixtures of Broadleaf Herbicides**

Postemergent broadleaf herbicides like 2,4-D, mecoprop, and dicamba have different selectivities. Mixtures of these broadleaf herbicides have expanded the window of broadleaf weed control.

Herbicide Mixtures

Mixing of phenoxy herbicides like 2,4-D, mecoprop, MCPA, and dicamba with ACCLAIM antagonize the herbicidal action of ACCLAIM.

Mixtures of Broadleaf Herbicides

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PESTICIDE PROPERTIES**Preemergent Herbicides**

Ideally all preemergent herbicides used on turfgrass should be incorporated by the addition of rain or irrigation waters. Water carries these herbicides into the thatch and upper soil where germinating weed seeds are located.

Dirty spray water can affect the efficacy of ROUNDUP and PARAQUAT because these herbicides can bind to negatively charged clay particles and organic matter present in the water.

Hard water can affect the efficacy of ROUNDUP. The addition of ammonium sulphate to the tank can improve the efficacy of ROUNDUP.

Granules versus EC

When granular formulations of 2,4-D or other phenoxy herbicides are used for broadleaf weed control 2 to 3 times more active ingredient is required to provide the same weed control as one unit of an emulsifiable concentrate (EC) formulation of the same herbicides.

Use of Synergists

The efficacy of ACCLAIM can be improved significantly by the addition of the synergist fenchlorazole-ethyl.

TIMING

1. Time of year
 - spring vs fall for postemergent broadleaf weed control (knotweed, dandelion, chickweed)
 - spring vs fall for preemergent grassy weed control (crabgrass, a. bluegrass)
2. Time of day
 - PARAQUAT in the evening
 - phenoxy, ROUNDUP when the uptake and translocation are best
3. A time delay should occur between the application of most herbicides and mowing or cultivation (phenoxy, ROUNDUP)

WEATHER CONDITIONS

1. Rainfall
 - can wash off the herbicide before sufficient uptake has occurred
2. Wind
 - active ingredient may be blown away from the target site
 - use a shielded sprayer or increase the droplet size
3. Temperature/Moisture
 - long hot, dry periods result in weeds that have thicker cuticles, are less active physiologically in such processes as translocation, and have abnormal hormone levels

ORGANISM'S LIFE CYCLE

Herbicides that are translocated within the plant are best applied when a perennial plant is actively growing.

There is no use applying a herbicide to an annual weed in the fall because it will soon die when the first frosts occur (knotweed, crabgrass).