Turf Weed and Herbicide Update

8:30 – 9:30 am Presentation at the Oct 19 (Tulsa) and Nov 4th (Oklahoma City) Fall 2010 Pesticide Applicator Continuing Education Workshops

Dennis Martin, PhD
Professor & Turfgrass Extension Specialist
Oklahoma State University
Types of Turfgrass Weeds

Broadleaves
- Net venation, opposite, alternate or whorled leaves, showy flowers.

Grasses
- Parallel venation, alternate or 2-ranked leaves, rounded or flattened stems.

Sedges
- Parallel venation, 3-ranked leaves, triangular stems

Image credit: Dr. John Boyd, Univ of Arkansas
boat-shaped leaf tip

winter annual

annual bluegrass

Image credit: Dr. John Boyd, Univ of Arkansas
winter annual

prominent auricles

Annual ryegrass

Image credit: Dr. John Boyd, Univ of Arkansas
winter annual

parsley piert

Image credit: Dr. John Boyd, Univ of Arkansas
fruit

lawn burweed

winter annual

Image credit: Dr. John Boyd, Univ of Arkansas
winter annual

Image credit: Dr. John Boyd, Univ of Arkansas
winter annual

sticky chickweed

Image credit: Dr. John Boyd, Univ of Arkansas
common chickweed

Image credit: Dr. John Boyd, Univ of Arkansas
Johnny Jump-up violet

Winter Annual Broadleaf
winter annual

field madder

Image credit: Dr. John Boyd, Univ of Arkansas
winter annual corn speedwell

Image credit: Dr. John Boyd, Univ of Arkansas
winter annual

hairy bittercress – winter annual

Image credit: Dr. John Boyd, Univ of Arkansas
field madder

winter annual
Noxious Weed - must control to keep it from setting seed as per the law

1st year: vegetative growth
2nd year: flowers and dies.

Musk thistle rosette - vegetative stage

Flower - reproductive stage
winter annual

shepherd’s purse

fruit

Image credit: Dr. John Boyd, Univ of Arkansas
winter annuals

red deadnettle

henbit

Image credit: Dr. John Boyd, Univ of Arkansas
winter annual

Spotted burclover

Image credit: Dr. John Boyd, Univ of Arkansas
wild garlic – winter perennial
large crabgrass

Image credit: Dr. John Boyd, Univ of Arkansas
Summer Annual Grassy Weeds

- Crabgrass
- Goosegrass
sandbur

summer perennial

Image credit: Dr. John Boyd, Univ of Arkansas
goosegrass seedling

Summer Annual Grass

This is a **monocot** because it has 1 seed leaf

henbit seedling

Broadleaf, Winter Annual

This is a **dicot** because it has 2 seed leaves

Image credit: Dr. John Boyd, Univ of Arkansas
summer annual

goosegrass

Image credit: Dr. John Boyd, Univ of Arkansas
Annual or perennial

Image credit: Dr. John Boyd, Univ of Arkansas
summer annual

prostrate spurge

milky sap

Image credit: Dr. John Boyd, Univ of Arkansas
Summer Annual Broadleaf Weeds

- knotweed
- prostrate spurge
Summer perennials

yellow nutsedge

purple nutsedge

Image credit: Dr. John Boyd, Univ of Arkansas
purple and yellow nutsedge flowers

purple nutsedge  yellow nutsedge

Image credit: Dr. John Boyd, Univ of Arkansas
yellow and purple nutsedge leaf tips

purple nutsedge  yellow nutsedge
yellow and purple nutsedge tubers

purple nutsedge tuber

yellow nutsedge tuber
Annual Sedge (*Cyperus compressus*)

Image credit: Dr. John Boyd, Univ of Arkansas
seedhead

seedhead

bahiagrass – summer perennial

Image credit: Dr. John Boyd, Univ of Arkansas
bermudagrass – summer perennial

Image credit: Dr. John Boyd, Univ of Arkansas
summer perennial
dallisgrass

Image credit: Dr. John Boyd, Univ of Arkansas
tall fescue

cool-season perennial

Image credit: Dr. John Boyd, Univ of Arkansas
Virginia buttonweed  summer perennial

Image credit: Dr. John Boyd, Univ of Arkansas
perennial

white clover

Image credit: Dr. John Boyd, Univ of Arkansas
winter perennial

dandelion

Image credit: Dr. John Boyd, Univ of Arkansas
perennial

ground ivy

Image credit: Dr. John Boyd, Univ of Arkansas
lespedeza

summer annual

Image credit: Dr. John Boyd, Univ of Arkansas
perennial blackseed plantain

Image credit: Dr. John Boyd, Univ of Arkansas
perennial

Image credit: Dr. John Boyd, Univ of Arkansas
Phase II of MSMA Phase Out

- For golf courses:
  - Spot treatments only (100 sq feet per spot), not to exceed 25 percent of the total golf course acreage per year
  - One broadcast treatment for newly constructed courses only

- For sod farms:
  - 1-2 broadcast applications
  - 25 foot buffer around permanent water bodies

- For highway rights-of-way:
  - Two broadcast applications ONLY on highway rights-of-way
  - 100 foot buffer around permanent water bodies
Golf Course, Sod Farm & Right-of-Way

- Sale of MSMA by Registrants is prohibited after December 31, 2012;
- Distributors can sell MSMA until the close of June 30, 2013.
- Use of MSMA on golf courses is prohibited after December 31, 2013.
Residential, Commercial & Sports Field Turf Areas

- Distributors are able to sell products purchased before December 31, 2009, until December 31, 2010.

- After December 31, 2010, existing stocks of MSMA can legally be used for weed control on residential, commercial and sports field turf until they are exhausted, provided that these uses comply with the EPA-approved label and labeling of the affected product.
New Turf Herbicide Products
Celsius WG

- From Bayer
- 68% WG formulation
- 8.7% Iodosulfuron-methyl sodium + 1.9% dicamba
- Combined post-emergent control of many broadleaves and a few annual grasses
- Moderate post brome control and large crabgrass. Small crabgrass not listed and have not tried it on smooth crabgrass
- Label claims post sandbur control at high rate, have not tried it for this use, repeat apps may be needed
- Labeled for St. Aug, bermuda, buffalo, centipede, zoysia.
- Do not use on bahia or cool-season grasses
SUPPLEMENTAL LABELING

READ THE ENTIRE LABEL FOR CERTAINTY® TURF HERBICIDE BEFORE PROCEEDING WITH THE USE DIRECTIONS CONTAINED IN THIS SUPPLEMENTAL LABELING.

When using Certainty turf herbicides as permitted according to this supplemental labeling, read and follow all applicable directions, restrictions, and precautions on the label booklet provided with the pesticide container and on this supplemental labeling. This supplemental labeling must be in the possession of the user at the time of pesticide application.

Weed Control in Landscaped Areas and Ornamental Nurseries

Keep out of reach of children.

CAUTION!

In case of an emergency invoking this product, Call Collect, day or night, 314-594-1030.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in any manner inconsistent with its labeling. This labeling must be in the possession of the user at the time of herbicide application.

See "PRODUCT INFORMATION" and "MIXING" sections of the label booklet for Certainty turf herbicide for essential product performance information.

This product is for use in established woody ornamentals, perennial groundcovers and warm-season ornamental grasses growing in landscaped areas or field production nurseries. For selective control or suppression of weeds listed in this section, apply this product at 1.25 ounces per acre. A second application of 1.25 ounces per acre may be made 4 or more weeks after the initial treatment, if needed. Best results are obtained when target weeds are actively growing and not disturbed by mowing for at least 2 days before and 2 days after application.

<table>
<thead>
<tr>
<th>Barley, little</th>
<th>Hordeum jubatum</th>
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</thead>
<tbody>
<tr>
<td>Blackgrass, chickenfoot</td>
<td>Dactyloctenium aegyptium</td>
</tr>
<tr>
<td>Bermuda, Florida</td>
<td>Cynodon dactylon</td>
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<tr>
<td>Bluegrass, annual</td>
<td>Poa annua</td>
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<tr>
<td>Bluegrass, bulbous</td>
<td>Poa bulbosa</td>
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<tr>
<td>Bluegrass, roughstalk</td>
<td>Poa trivialis</td>
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<tr>
<td>Burdock, small</td>
<td>Sonchus asper</td>
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<tr>
<td>Butetch</td>
<td>Raphanus raphanistrum</td>
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<tr>
<td>Chamber bitter</td>
<td>Stellaria media</td>
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<tr>
<td>Chickweed, common</td>
<td>Cerastium tomentosum</td>
</tr>
<tr>
<td>Clover, white</td>
<td>Trifolium repens</td>
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<tr>
<td>Cockfootgrass</td>
<td>Dactylis glomerata</td>
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<tr>
<td>Dandelion</td>
<td>Taraxacum officinale</td>
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<tr>
<td>Dichondra, Carolina</td>
<td>Dichondra caroliniana</td>
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<tr>
<td>Desert willow</td>
<td>Atriplex canescens</td>
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<tr>
<td>Echinochloa, Carolina</td>
<td>Echinochloa crus-galli</td>
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<tr>
<td>Erdbarb, wild</td>
<td>Calendula officinalis</td>
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<tr>
<td>Garlic, wild</td>
<td>Allium sativum</td>
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<tr>
<td>Geranium, Carolina</td>
<td>Geranium carolinianum</td>
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<tr>
<td>Hairy groundcherry</td>
<td>Solanum hederifolium</td>
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<td>Johnsongrass</td>
<td>Sorghum halepense</td>
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<tr>
<td>Knotweed</td>
<td>Polygonum reptans</td>
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<tr>
<td>Lepregrass, perennial</td>
<td>Ryegrass</td>
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<tr>
<td>Malvina, globe</td>
<td>Malva neglecta</td>
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<tr>
<td>Mustard, wild</td>
<td>Sinapis arvensis</td>
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<tr>
<td>Nasturtium, garden</td>
<td>Nasturtium officinale</td>
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<tr>
<td>Nasturtium, wild</td>
<td>Nasturtium officinale</td>
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<tr>
<td>Nettles, common</td>
<td>Urtica dioica</td>
</tr>
<tr>
<td>Parthenium, yellow</td>
<td>Parthenium hysterophorus</td>
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<tr>
<td>Pennycress, field</td>
<td>Thlaspi arvense</td>
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<tr>
<td>Pennywort, lawn (Haworthia)</td>
<td>Hydrocotyle spectabilis</td>
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<tr>
<td>Quackgrass</td>
<td>Cotula rubra</td>
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<tr>
<td>Ryegrass, perennial</td>
<td>Lolium perenne</td>
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<tr>
<td>Shepherds purse</td>
<td>Capsella bursa-pastoris</td>
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<tr>
<td>Violet, wild</td>
<td>Viola tricolor</td>
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<tr>
<td>Woodsorrel, yellow</td>
<td>Oxalis stricta</td>
</tr>
</tbody>
</table>

1 Suppression or partial control only
Certainty receives supplemental label in landscape areas and ornamentals

- From Monsanto
- a.i. is sulfosulfuron
- Major use was post-nutsedge control in warm-season turfgrass
- Now has supplemental label in nursery/ornamentals for certain uses
- Over the top post-emergence application/control of nutsedge in Lirope or Monkeygrass
For Preemergence and early Postemergence Control of Crabgrass, Selective Preemergence and Postemergence Control of Annual Grasses, Broadleaf weeds and Sedges in Turf Sites Including Residential and Institutional Lawns, Athletic Fields, Commercial Golf Farms, Golf Course Fairways and Roughs, Roadways, Utility right-of-ways, Railways and industrial areas.

EPA Reg. No. 279-3323  EPA Est. No. 62171-MS-001

Active Ingredient:  Sulfentrazone [(2,4-dichloro-5-[4-(difluoromethyl)-1H-1,2,4-triazolyl]phenyl)methanesulfonamide] 13.6%  Propanil [(2,4-CPH-propyl)-(2,4-dinitro-6-[[trifluoromethyl]amino]aniline) 27.3%
Other Ingredients:  ................................................................. 50.1%

Echelon 4SC contains 4 pounds of active ingredient per gallon.
U.S. Patent No. 4,016,387

**KEEP OUT OF REACH OF CHILDREN**

**CAUTION**

See additional precautionary information contained inside label booklet.

**FIRST AID**

**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 poison center or doctor for further treatment advice.

**Ingestion**
- Take an oral activated charcoal.
- Rinse mouth thoroughly with water for 1 to 2 min.
- Call poison center or doctor for further treatment advice.

**Skin**
- Wash area of skin exposed to product thoroughly with soap and water for 15 to 20 minutes.
- Remove contaminated clothing. If necessary for skin irritation, then continue rinsing.
- Call a poison control center or doctor for further treatment advice.

**Eye**
- Hold open eye and rinse gently with water for 15 to 20 minutes.
- Remove contaminated glasses, if present, after first rinse, then continue rinsing.
- Call a poison control center or doctor for further treatment advice.

**Inhaling**
- Do not give any fluid to the person.
- Do not induce vomiting in an unconscious person.

**HOTLINE NUMBER**

For emergencies, call 1-888-326-5995.

For additional information, call 1-888-326-5995, FMC Corporation.

**PRECAUTIONARY STATEMENTS**

**Hazard to Humans (and Domestic Animals)**

**CAUTION**

Causes moderate eye irritation. Harmful if swallowed, absorbed through skin, avoid breathing vapor or spray. Avoid contact with eyes, skin or clothing. Produgol or frequently operated skin contact when mixing or handling may cause allergic reactions in certain individuals.

**Personal Protective Equipment (PPE)**

Provide other handling must wear long-sleeved shirt and long pants, waterproof gloves, and closed shoes.

**Environmental Hazards**

This product is toxic to mammals and may be harmful to birds. Do not apply directly to water bodies, streams, ditches or irrigation systems. Do not contaminate water by allowing runoff from precipitation to contact soil, water supplies, ponds, rivers, streams, or lakes. Do not apply this product to areas with watercourses or wetlands, or areas that are located above the water table. Do not contaminate water by allowing runoff from precipitation to contact water bodies, streams, lakes, ponds, rivers. Do not contaminate water bodies by applying this product to areas where water may be used for stock watering. Do not contaminate water bodies by applying this product to areas where water may be used for drinking. This product is harmful to birds and may be harmful to beneficial insects, bees, and fish. Use care not to contaminate water bodies by applying this product to areas where water may be used for drinking.

**Net Contents**

3004-07
Echelon 4SC

- From FMC
- Prodiamine + sulfentrazone in 2:1 ratio
- 4SC formulation: 2.67 lbs prodiamine and 1.33 lbs of sulfentrazone
- Combined pre and post-emergent annual grass, broadleaves and sedges
- Post-goosegrass and crabgrass control is pre and very early post
- Sedge pre-emergence but not full season
- Post control of many broadleaves present at time of application
- Label for warm and cool-season grasses
For Selective Weed Control in Turf Sites Including Residential and Institutional Lawns, Athletic Fields, Commercial Sod Farms, Golf Course Fairways and Roughs.

EPA Reg. No 279-3206
EPA Est. 279-IL-1

Active Ingredient: By Wt.
Sulfentrazone* .................................................. 39.3%
Other Ingredients: .................................................. 60.7%

*DP 4-dichlorophenoxyacetic acid; 4,5-dihydroxy-1,3-dimethoxybenzene; 1,4-benzenediol; DMC (dimethyl carbonate).
Contains 48 pounds of active ingredient per gallon.
U.S. Patent No. 4,487,276

KEEP OUT OF REACH OF CHILDREN
CAUTION
See other panels for additional precautionary information.

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

If on skin or clothing
• Take off contaminated clothing.
• Rinse skin immediately with plenty of water for at least 15 minutes.
• Call a poison control center or doctor for further treatment advice.

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

If swallowed
• Call a poison control center or doctor immediately for treatment advice.
• Do not give any food to the person.
• Do not induce vomiting unless told to do so by the poison control center or doctor.
• Do not give anything by mouth to an unconscious person.

HOTLINE NUMBER
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-337-9248 for emergency medical treatment information.

PRECAUTIONARY STATEMENTS
Hazards to Humans (and Domestic Animals)
CAUTION
Causes moderate eye irritation. Harmful if inhaled, swallowed, or absorbed through skin. Avoid breathing vapor or spray mist. Avoid contact with skin, eyes or clothing.
Personal Protective Equipment (PPE)
Appropriate and other handlers must wear long-sleeved shirt and long pants, waterproof gloves, and shoes plus socks.
Dry-cleaning and other absorbent materials that have been drenched or heavily contaminated with this product. Do not reuse them.

User Safety Recommendations
• Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

FMC Corporation
Agricultural Products Group
1735 Market Street
Philadelphia PA 19103

Net Contents:
365-06C

Page 1
Dismiss herbicide

- From FMC
- a.i. is Sulfentrazone
- Labeled for residential, golf course, commercial lawns, sod farms, sports fields, plus.
- 4-12 fl oz/A rates
- Labeled for use in cool and warm-season turfgrasses
- Controls a number of sedges and broadleaf weeds, split apps sometimes needed
- Early post-goosegrass control, pre-tiller
- Surfactant not recommended
**Katana™ TURF HERBICIDE**

**PRECAUTIONARY STATEMENTS:**

**FIRST AID:**

**IF INHALED:**

- Get fresh air immediately.
- If not breathing, give artificial respiration.
- If breathing stops, call a physician immediately.

**IF SWALLOWED:**

- Do not induce vomiting.
- Give 1-2 cups of milk or water with activated charcoal.
- Call a physician immediately.

**IF SKIN OR EYES EXPOSED TO CONTENTS:**

- Wash thoroughly.
- Call a physician immediately.

**IF IN CONTACT WITH EYES:**

- Wash thoroughly.
- Call a physician immediately.

**IF IN CONTACT WITH SKIN:**

- Wash thoroughly.
- Call a physician immediately.

**INHALATION:**

- Call a physician immediately.

**INGESTION:**

- Call a physician immediately.

**HAZARDS TO HUMANS AND DOMESTIC ANIMALS:**

- Avoid contact with eyes, skin, and clothing.
- Avoid contact with food, water, and livestock.
- Use personal protective equipment (PPE) as indicated.

**IN CASE OF CONTACT:**

- Wash thoroughly.
- Call a physician immediately.

**DISPOSAL:**

- Dispose of container and contents in accordance with local, state, and federal regulations.

**OTHER INFORMATION:**

- Katana™ TURF HERBICIDE is a selective herbicide for the control of annual and perennial grasses, broadleaf weeds, and other problem plants in turfgrass and row crops. It is a systemic herbicide that is absorbed by the plant and moves through the plant's system to the roots, killing the plant from the inside out.

**EPA REGISTRATION NUMBER:**

- EPA Reg. No. 6274-192000

**STATE OF CALIFORNIA TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF NEW YORK TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF PENNSYLVANIA TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF WASHINGTON TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF MARYLAND TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF MONTANA TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF VERMONT TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF WISCONSIN TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF MICHIGAN TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF MINNESOTA TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF IOWA TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF NEBRASKA TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF SOUTH DAKOTA TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF NORTH DAKOTA TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF KANSAS TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF OKLAHOMA TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF ARKANSAS TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF TENNESSEE TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF GEORGIA TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF FLORIDA TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF ALABAMA TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF MISSISSIPPI TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF LOUISIANA TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF TEXAS TURFGRASS REGISTRATION:**

- CATURF 207

**STATE OF MEXICO TURFGRASS REGISTRATION:**

- CATURF 207
Katana

- From PBI Gordon
- a.i. is flazasulfuron, a sulfonylurea
- 1.5 to 3 oz/A use rate
- Post-emergent on some broadleaves, tall fescue clump removal in bermudagrass, some sedge suppression
- Good safety on many bermudagrasses and zoysia grasses.
- Do not use in cool-season turf
Active Ingredients:
- Quinclorac: 3,7-dichloro-8-quinolinocarboxylic acid ........................................... 16.95%
- Mesoprop: (R)-2-(2-methyl-4-chlorophenox) propionic acid .................................. 7.05%
- Cisameb: (3,5-dichloro-o-aminic acid) ................................................................. 2.15%
Other Ingredients: .................................................................................................... 74.91%
Total: ..................................................................................................................... 100.00%
Equivalent to:
- 1.50 lbs quinclorac: 3,7-dichloro-8-quinolinocarboxylic acid equivalent per gallon
- 0.78 lb (R)-2-(2-methyl-4-chlorophenox) propionic acid equivalent per gallon
- 0.30 lb (3,5-dichloro-o-aminic acid equivalent per gallon

Contains the single isomer form of mesoprop-<p>Keep out of reach of children</p><p>Warning/Aviso</p><p>Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand this label, find someone to explain it to you in detail.)</p><p>See inside for complete First Aid, Precautionary Statements, Directions For Use, Conditions of Sale and Warranty, and state-specific crop and/or use site restrictions.</p><p>In case of an emergency endangering life or property involving this product, call day or night, 1-800-822-HELP (4357)</p><p>Net Contents:</p>
One time

- From Bayer
- Quinclorac + MCPP + dicamba
- 1.5 + 0.75 + 0.2 lbs per gallon
- 32 fl oz/A use rate
- Post-emergent crabgrass + wide spectrum of broadleaf weeds
- Good tolerance but slight discoloration of bermudagrasses, zoysiagrass, buffalograss, tall fescue, Kentucky bluegrass and perennial ryegrass. St. Augustine grass is sensitive
- Note phytotoxicity increase with higher temperatures
- 21 to 64 fl oz/A use rate
Turf Herbicide for Grassy & Broadleaf Weeds

KEEP OUT OF REACH OF CHILDREN

CAUTION

READ THE ENTIRE LABEL. FIRST OBSERVE ALL PRECAUTIONS AND FOLLOW DIRECTIONS CAREFULLY.

PRECAUTIONARY STATEMENTS

Hazard to Humans and Domestic Animals

CAUTION: Causes moderate eye irritation. Avoid contact with eyes or clothing. Wear protective eyewear. Use gloves and protective clothing.

Personal Protective Equipment (PPE)

Some materials that are used in the manufacture of this product are natural rubber, natural rubber blends and materials. If you have any questions, follow the instructions for category A in the EPA chemical resistance category selection chart.

All safety, loading, and other hazards must be:

- Wear goggles and face mask.
- Protective gloves (except for applicators using ground boom equipment).
- Chemical-resistant boots or shoes.
- Safety glasses or face shield.
- Chemical-resistant protective clothing (except for applicators using ground boom equipment).

User Safety Requirements

Follow manufacturer's instructions for cleaning and disposing PPE. If no such instructions are available, use detergent and hot water and keep PPE separate from other clothes.

User Safety Recommendations

- Users should wash hands thoroughly with soap and water before eating, drinking, cooking, using tobacco, or handling the label.
- Users should remove PPE immediately if personal gets in skin, eyes, nose, mouth, or lungs.
- Users should not smoke, eat, drink, or chew gum or tobacco before or during the use of this product.
- Wash the outside of clothing before reusing it.
- Wash thoroughly and change into clean clothing.

First Aid

If swallowed:
- Store in a location where it may be hazardous to health, if water intake is too high, and not to be used in a location where it may be hazardous to health.
- Call a poison control center or doctor immediately for treatment advice.
- Do not induce vomiting unless told to do so by a poison control center or health professional.
- Do not give anything by mouth to an unconscious person.

If exposed:
- Remove any contaminated clothing and wash with soap and water.
- Wash any material with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

If on skin or on clothing:
- Wash thoroughly and change into clean clothing.
- Take off contaminated clothing.
- Wash any material with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

Environmental Hazards

This pesticide may be toxic to fish and aquatic invertebrates. Do not apply directly to water, to areas where surface water is present, or to areas where water is diverted for irrigation. Do not contaminate water when cleaning equipment or rinsing equipment or personal protective equipment.

Physical and Chemical Hazards

Consult the label for more information on physical and chemical hazards.

DIRECTIONS FOR USE

Mix the product of the label, as directed, before using. If you do not understand a label, seek assistance from a qualified professional.
Q4 Plus

- From PBI Gordon
- a.i. are quinclorac (0.75 lb), sulfentrazone (0.06 lb), 2,4-D (0.88 lb) and dicamba (0.10 lb per gallon)
- Post-emergent crabgrass, early post goosegrass, post nutsedge, post-emergent against most broadleaf species
- Labeled for use in cool-season grasses. Currently only labeled for dormant application to bermuda, zoysia grass and buffalograss
- 5 – 7 pints/A use rate
Solitare®
HERBICIDE

For Selective Weed Control in turf including Residential, Commercial and Institutional Lawns, Athletic Fields, Commercial Sod Farms, Golf Course Fairways and Roughs, and Other Non-crop Sites

EPA Reg. No. 270-3356  EPA Est. 270-IL-1

Active Ingredient:  By Wt.
Solifenazine* .............................................. 18.75%
Quinclorac* ............................................. 26.25%
Other Ingredients ........................................ 25.00%
Total: ....................................................... 150.00%

*Solifenazine contains 0.75 pounds of active ingredient per one pound of product (5.0175 pounds of Solifenazine with 0.50325 pounds of Quinclorac).

U.S. Patent No. 3,005,000

KEEP OUT OF REACH OF CHILDREN

CAUTION

See other panels for additional precautionary information.

FIRST AID

F-SWALLOWED
- Call a Poison Control Center or doctor immediately for first aid.
- If person is vomiting, give 1/2 glass of water 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.

F-ON SKIN OR CLOTHING
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-30 minutes.
- Call a Poison Control Center or doctor immediately.

F-IN-INS
- Wash your eyes and then rinse steadily and gently with water for 15-30 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a Poison Control Center or doctor immediately.

F-INHALED
- More severe than nose, eyes, skin.
- If person is not breathing, call 911 or an ambulance. Keep nostrils open. Provide re-breathing or mouth-to-mouth, if possible.
- Call a Poison Control Center or doctor if further treatment advisable.

HOTLINE NUMBER

Based on the product container label with you when calling a Poison Control Center or doctor for first aid. You may also contact 1-800-982-4FMC (4362) or your local emergency medical treatment personnel.

For information regarding the use of this product: Call 1-800-982-4FMC (4362).

PRECAUTIONARY STATEMENTS

Hazards to Humans (and Domestic Animals)

CAUTION
- Harmful if swallowed. Avoid contact with skin or clothing. Causes moderate eye irritation.

Personal Protective Equipment (PPE)
- Applicators and other handlers must wear long sleeved shirt and long pants, waterproof gloves, and shoes plus socks.
- Discard clothing and other absorbent materials that have been splashed or heavily contaminated with this product. Do not reuse them.
- Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions are available, use detergent and hot water. Keep and wash PPE separately from other laundry.

User Safety Recommendations:
- Wash clothes immediately if pesticide gets on clothes. Then wash thoroughly and put on clean clothing.

Environmental Hazards
- This product is toxic to marine and estuarine invertebrates. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Drift and runoff may be hazardous to terrestrial and aquatic plants in neighboring areas. Do not contaminate water when disposing of equipment washwaters or rinsates.
- Minor non-ionic surfactants. The active ingredients in this product are known to break down into groundwater under certain conditions as a result of label use. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.
Solitare

- From FMC
- a.i. are Sulfentrazone 18.75% + quinclorac 56.25%
- Post-crabgrass, post-broadleaf, early post goosegrass, some pre-emergent control, post nutsedge control
- See label for rates and species.
- Labeled across most warm and cool-season turfgrass species
- 16 to 32 fl oz/A use rate
SPECTICLE 20WSP Herbicide

Preemergent Herbicide for the Control of Annual Grasses, Annual Weeds, and Broadleaf Weeds in Turfgrass, Landscape Ornamentals, Christmas Trees, and Hedges

DO NOT USE FOR THE MANUFACTURING OF FERTILIZER

ACTIVE INGREDIENT:
Indaziflam .......................................................... 20%

OTHER INGREDIENTS: .......................................................... 80%
Total ............................................................................ 100%

CPA Reg. No. 432-1439 CPA Est. 000204-DCU 991

KEEP OUT OF REACH OF CHILDREN

CAUTION

For MEDICAL and TRANSPORTATION Emergencies ONLY Call 24 Hours A Day 1-800-334.7577
For PRODUCT USE Information Call 1-800-334-2867

FIRST AID

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 to an unconscious person.

If in eyes:
• Hold eyes 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.
• Call a poison control center or doctor for treatment advice.

If on skin or clothing:
• Take off contaminated clothing.
• Rinse skin immediately with plenty of water for 15-20 minutes.
• Call a poison control center or doctor for treatment advice.

Have the product container or label with you when calling a poison control center or doctor or going for treatment.

HAZARD TO HUMANS

CAUTION

Harmful if swallowed through the skin. Harmful if inhaled. Causes moderate eye irritation. Avoid contact with skin, eyes, or clothing.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Applications and other handlers must wear long-sleeved shirt and long pants, chemical resistant gloves made of any waterproof material such as nitrile or butyl gloves, and shoes plus socks.

Follow manufacturer’s instructions for cleaning/maintaining PPE. If no such instructions exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

ENGINEERING CONTROLS STATEMENTS:

When handling or mixing in a closed system or in an enclosed space in a manner that meets the requirements listed in the Vapor Protection Standard (VPS) for agricultural pesticides [40 CFR 170.240(d) (4)(3)], the handler PPE requirements may be reduced or modified as specified in the VPS.
Specticle 20 WSP

- Bayer Environmental Science
- Active ingredient indaziflam
- Labeled for most warm season turfgrasses including bahia, bermuda, buffalo, centipede, St. Augustine, and zoysia grass.
- Do not use on cool-season turfgrasses
- Pre-emergent for many annual grasses including crabgrass, goosegrass, tufted lovegrass, and many annual broadleaves.
- 2.5 to 5 fl oz/A use rate
CLICK HERE TO JUMP TO USE DIRECTIONS

GORDON'S TURF & ORNAMENTAL PRODUCTS

TRIMEC 1000 BROADLEAF HERBICIDE

Controls Dandelion, Clover, Knotweed, Kerria, Chickweed, Plantain, Spurge and many other broadleaf weeds.

ACTIVE INGREDIENT:
2,4-D, chlorophenoxy acid (CDA) ........................................ 36.56%
2,4,5-T, chlorophenoxy acid (TCA) ........................................ 1.25%
MCPP, dimethylamine salt (DMA) ......................................... 8.17%
Chlorobenzuron, chloroform salt (CB) ................................. 2.63%
INERT INGREDIENTS: .................................................. 55.53%

TOTAL: 100.00%

KEEP OUT OF REACH OF CHILDREN

WARNING
This product is toxic to fish and aquatic invertebrates and may be harmful to non-target plants. Do not apply directly to water bodies. Do not apply this product to areas where water is present or to the banks of streams, rivers or lakes. Do not contaminate waterways by applying this product to areas where water is present. Do not apply to land or water that is connected to surface water. Do not apply this product to areas that are to be used for recreation or drinking water supplies. Do not apply to areas that may result in groundwater contamination. Application to a pond, stream, river or lake may result in contamination of drinking water or groundwater.

DIRECTIONS FOR USE

Follow all directions and precautions for this product carefully. Do not apply in windy conditions. Do not apply this product to aquatic areas or wetlands or to areas where water is present or to the banks of streams, rivers or lakes. Do not apply to land or water that is connected to surface water. Do not apply to areas that are to be used for recreation or drinking water supplies. Do not apply to areas that may result in groundwater contamination. Application to a pond, stream, river or lake may result in contamination of drinking water or groundwater.

Environmental Hazards

This product is a systemic, post-emergent herbicide and may be harmful to non-target plants. Do not apply directly to water bodies. Do not apply this product to areas where water is present or to the banks of streams, rivers or lakes. Do not contaminate waterways by applying this product to areas where water is present. Do not apply to land or water that is connected to surface water. Do not apply to areas that are to be used for recreation or drinking water supplies. Do not apply to areas that may result in groundwater contamination. Application to a pond, stream, river or lake may result in contamination of drinking water or groundwater.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Do not apply this product in a manner that will contact workers or other persons, animals, seeds or other plants. Only protected handlers may be in the area during application. For any questions or issues, contact your State or Local Agriculture or Natural Resources agency.

Precautionary Statements

READ THE ENTIRE LABEL FIRST. OBSERVE ALL PRECAUTIONS AND DIRECTIONS CAREFULLY.

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A herbicide for the selective contact and residual control of weeds in ornamental turfgrasses

Active Ingredient:
Mesotrione* ........................................ 40.0%

Other Ingredients: .................................. 60.0%

Total: .............................................. 100.0%

Contains 4 lbs. of active ingredient mesotrione per gallon.

*CAS No. 104206-82-8

1 gallon
Net Contents

Tenacity™
GROUP 27 HERBICIDE

KEEP OUT OF REACH OF CHILDREN.
CAUTION

See additional precautionary statements and directions for use in attached booklet.

EPA Reg. No. 100-1267
EPA Est. 100-NE-001
SCP 1267A-L18 0209 307098

syngenta®
Tenacity

- From Syngenta
- a.i. is mesotrione
- Labeled for use in post-crabgrass and some pre/post broadleaves in cool-season turf
- Not for use in bermuda or zoysiagrass
- Foliar bleaching symptoms of sensitive species
- See label for various restrictions
- Labeled for a number of turf use sites but spot treatments only on cool-season lawns
- 4 – 8 fl oz/A use rate, sequential application allowed.
Amended use directions in turfgrass on golf courses

Active Ingredients:
- dimethenamid-P: (S)-2-chloro-N-[(1-methyl-2-naphthoyl)ethyl]-N-(2,4-dimethylthien-3-yl)-acetamide ........ 63.3%
- Other Ingredients **: ........................................................................................................................................ 36.7%
- Total: .......................................................................................................................................................... 100.0%

* Contains 5.0 pounds of active ingredient per gallon
** Contains petroleum distillates

EPA Reg. No. 7969-239

Directions For Use

Refer to the Tower® herbicide main label, EPA Reg. No. 7969-239, for complete Directions For Use and all applicable restrictions and precautions. When following the instructions on this supplemental label, the user must have this label and the entire Tower container label in possession at the time of pesticide application.

It is a violation of federal law to use this product in a manner inconsistent with its labeling.

Tower may be used as part of a preemergence weed management program in maintained turfgrass on golf courses. Tower applied as directed will provide preemergence control or suppression of weeds listed in Table 3, Weeds Controlled on the main container label for Tower. Tower may be applied to both cool-season and warm-season turfgrass species as described in the Tolerant Turfgrass Species table following. Turfgrass species not listed on this label may be evaluated for tolerance by testing a small area prior to large-scale use. User assumes all risk.

Tolerant Turfgrass Species

| Cool Season | Bentgrass*, Bluegrass, annual*, Bluegrass, Kentucky; Bluegrass, roughstalk*; Fine fescue; Parenchymatous fescue; Tall fescue |
| Warm Season | Bahiagrass; Bermudagrass, common; Bermudagrass, hybrid; Buffalograss; Centipedegrass; Kentucky bluegrass; St. Augustinegrass; St. Augustinegrass, St. Augustinegrass, Zoysia, Zoysia, Zoysia |

* Only established stands of 1/2-inch height or taller. Applications to annual bluegrass may result in yellowing and stand reduction

BASF Corporation
25 Davis Drive, Research Triangle Park, NC 27709

The Chemical Company
Tower

- From BASF
- Active ingredient Dimethenamid-P
- 6 lbs ai/gallon
- Not currently labeled for lawns, grounds or sports fields
- Currently turf usage is for Golf Course Turf only, through a supplemental label, not on putting greens
- Pre-emergent for spurge, goosegrass, annual sedges
- 21 – 32 fl oz/A in up to 2 split applications
Questions?

- This presentation will be mounted to the web at www.turf.okstate.edu shortly.