2010 Weed Control Problems

Presentation provided at the Oct 12 and 13, 2010 Estes Fall CEU Workshops in Tulsa and Oklahoma City

Dennis Martin, PhD
Professor & Turfgrass Extension/Research Specialist
Questions?

• This presentation will be mounted to the web at www.turf.okstate.edu.
Generalizations about weed pressure

• Dry conditions slow or halt weed germination and growth
• Cold conditions slow or halt weed germination and growth
• Warm and moist conditions increase weed germination rates and weed growth rates
• Damaged turf allows more light to the soil surface and increases weed seed germination rates and percentages
• Damaged turf reduces turf competition with weeds, allowing for more optimal weed growth.
Reminder - Poa annua control needs to be course-wide

Image credit: Dr. Dennis Martin, Oklahoma State Univ.
Winter Annual Weeds in Dormant Bermudagrass

Image credit: Dr. Dennis Martin, Oklahoma State Univ.
Winter Annual Weed Control in Dormant Bermudagrass

- Completely dormant bermudagrass
- Lots of complaints about unsatisfactory performance of glyphosate for winter weed control in the 16-24 fl oz/Acre range with 4S (41% ai material)
- Need to be using the 32 fl oz/Acre rate of 4S or 41% material for reliable winter annual weedy grass control
- Tank mix with your favorite broad-leaf post product. Many use 2,4-D LV Ester to reduce broadleaf component cost. Just make sure for your Ester forms herbicides you check the tank mix compatibility 10 – 40 gallons carrier per acre
- Little barley and rip-gut brome frequently is resistant to 16 – 24 oz/A rate so 32 fl oz/A rate is needed in these cases.
- Annual bluegrass, downy brome, cheat are more susceptible than rip-gut brome.
• Frequently saturated soils, heavy snows, extended periods of ice/snow cover and colder temperatures contributed to increased winter-kill of bermudagrass seen in spring 2010.

Image credit: Dr. Dennis Martin, Oklahoma State Univ.
Example: Jan 25, 2010 canopy brushing reveals high number of green aerial shoots in Bowie Buffalograss

Image credit: Dr. Dennis Martin, Oklahoma State Univ.
Several large, firm, white rhizomes have survived (see Arrows). This bermuda stand had delayed greenup due to loss of aerial shoots to winter-kill but regenerated rapidly from the rhizomes.

Image credit: Dr. Dennis Martin, Oklahoma State Univ.
An Example of Winter-kill

Image credit: Dr. Dennis Martin, Oklahoma State Univ.
Lack of surviving nodes/lateral buds on either aerial shoots, stolons or rhizomes. This grass is toast!

Image credit: Dr. Dennis Martin, Oklahoma State Univ.
In an area of less traffic just a few feet away, 100% live green cover. Note rhizomes.

Image credit: Dr. Dennis Martin, Oklahoma State Univ.
Nutsedge emerging where bermudagrass was winter-killed.

Image credit: Dr. Dennis Martin, Oklahoma State Univ.
Bermudagrass may be more sensitive to herbicides during greenup or when plant energy reserves are minimal.

Image credit: Dr. Dennis Martin, Oklahoma State Univ.
Most Pre-emergent Herbicides Affect Root Cell Division and Thus Plant Health.


Club roots. Consistent with injury from DNA type pre-emerge herbicide
Root inhibition on bermudagrass stolon

Image credit: Dr. Dennis Martin, Oklahoma State Univ.
Crabgrass

- Crabgrass germination begins at surface temperatures of 58 to 60 F consistently and moist at the surface.
- South and west facing slopes with thin turf canopy and heavy seed supply are first areas to germinate.

Image credit: Dr. Dennis Martin, Oklahoma State Univ.
Pre-emergent herbicides

• Major Pre-emergent Herbicides for Crabgrass/Goosegrass Control in bermudagrass turf
  – Barricade (prodiamine), Dimension (dithiopyr), Pendulum (Pendimethalin), Surflan (oryzalin)
  – All of these can inhibit root generation from stolons and slow recovery from winter-kill or from new sprigging. Lower label rates are less injurious than maximum label rates.
  – All are inhibitory to bermudagrass seed germination for a certain period of time. See the label for the reseeding interval. Perform a test seeding (bioassay).
Ronstar (oxadiazon)
Not for residential lawns

• Ronstar 50 WP or 2G or on fertilizer carrier
• Labeled for use on newly sprigged bermudagrass
• Generally not injurious to bermudagrass roots or stolons at labeled rates. Injurious to bermudagrass establishment from seed.
• Typically looking at 2 lbs ai/A with second application of 1 or 2 lbs ai/A if stand remains thin
• If greenup and grow in is suitable, second application of split program could proceed with other pre-emergent herbicides.
• WP formulation should be applied to dormant turf, granular can be used on green turf. Some Superintendents have used WP on green turf followed by rapid irrigation and have minimized phytotoxicity
Post-emergent Crabgrass Program

• MSMA 6 lb ai/Gallon product
• Typically used at 1 fl oz/1,000 sq. ft. for post-crabgrass control, repeat applications allowed.
• Reasonable tolerance of recently sprigged bermudagrass and bermudagrass recovering from winter injury.
Post-emergent Crabgrass Program

• Drive 75DF (1 lb product/A application) and Drive XLR8 (64 fl oz/A application) – active ingredient quinclorac.
• +/- methylated seed oil at 1.5 pts/acre
• Sequential applications allowed, 1.5 lb ai/A limit per year on Drive products.
• Can be used on recently sprigged or seeded bermudagrass. Some phytotoxicity and pgr effect on bermudagrass can occur.
Turf Injury and Increased Weed Pressure May Continue to be a problem the next year after winter-kill

• Urge your customers to keep the lawn irrigated during late fall and winter dry periods even when bermudagrass is dormant.

• Bermudagrass areas that suffered winter-kill in 2009/2010 do not have the root development or rhizome mass that they had before – they will be more susceptible to winter desiccation in the winter of 2010/2011.

• This can lead to winter-kill again, even though temperatures may not be low, more injury means more weed pressure
Winter-kill is a potty for some… and a pot of gold at the end of the rainbow for others.
Winter-kill is a gold mine for some!
Natural rainfall may be low but if your customer irrigates their turf, the effect of drought is negated and weed germination and growth will be more optimal!!!!
OCTOBER TEMPERATURE OUTLOOK

Darker brown A = greatest chance for above normal temp
Lighter brown A = greater chance for above normal temp
White EC = equal chance for above, normal or below normal temp

ONE-MONTH OUTLOOK
TEMPERATURE PROBABILITY
0.0 MONTH LEAD
VALID OCT 2010
MADE 30 SEP 2010

EC MEANS EQUAL CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW
OCTOBER THRU DECEMBER TEMPERATURE OUTLOOK

Darker brown A = greatest chance for above normal temp
Lighter brown A = greater chance for above normal temp
White EC = equal chance for above, normal or below normal temp
OCTOBER RAINFALL OUTLOOK

Darker brown B = greatest chance for below normal rainfall
Lighter brown B = greater chance for below normal rainfall
White EC = equal chance for above, normal or below normal rainfall

ONE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
0.0 MONTH LEAD
VALID OCT 2010
MADE 30 SEP 2010

EC MEANS EQUAL CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW
OCTOBER THRU DECEMBER RAINFALL OUTLOOK

Darker brown B = greatest chance for below normal rainfall
Lighter brown B = greater chance for below normal rainfall
White EC = equal chance for above, normal or below normal rainfall
U.S. Seasonal Drought Outlook
Drought Tendency During the Valid Period
Valid October 7, 2010 - December 2010
Released October 7, 2010

KEY:
- Brown: Drought to persist or intensify
- Orange: Drought ongoing, some improvement
- Green: Drought likely to improve, impacts ease
- Yellow: Drought development likely

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. “Ongoing” drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.
AVERAGE OBSERVED LAST SPRING FREEZE

Last Freeze of Spring
Average Observed Occurrence
(c) 2002 Oklahoma Climatological Survey
1971–2000
AVERAGE OBSERVED FIRST AUTUMN FREEZE

First Freeze of Autumn
Average Observed Occurrence
(c) 2002 Oklahoma Climatological Survey

1971–2000
This next slide indicates your long-term chances of growing truly trophy sized weeds!!!
Average Length of Frost Free Period
2010, It was a Tough One!

• It was a tough winter followed by a tough summer, rarely have we seen such brutal turf conditions in winter and summer, back to back. Welcome to Oklahoma and the southern Great Plains!

• It was tough elsewhere also......
Summer Annual Grassy Weeds

Image credit: Dr. Dennis Martin, Oklahoma State Univ.
Summer Annual Broadleaf Weeds

- knotweed
- prostrate spurge

Image credit: Dr. Dennis Martin, Oklahoma State Univ.
yellow nutsedge  purple nutsedge

Summer perennials

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

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

purple nutsedge tuber  yellow nutsedge tuber

Image credit: Dr. John Boyd, Univ of Arkansas
Annual Sedge (*Cyperus compressus*)

Image credit: Dr. John Boyd, Univ of Arkansas
New Turf Herbicide Products
Celsius

GROUP B-2 O-4 HERBICIDE

Celsius™ WG HERBICIDE

A Herbicide for Control of Annual and Perennial Broadleaf Weeds and Grasses in Warm-Season Turf Types (St. Augustinegrass, Bermudagrass, Centipedegrass, Zoysiagrass) listed in this label in Commercial and Residential Sites

ACTIVE INGREDIENTS: Thienacarbazon-methyl (CAS Number 51795-83-1) ........................................ 8.7%
Iodosulfuron-methyl-sodium (CAS Number 144650-36-7) .................................................. 1.9%
Bensulide (CAS Number 1318-00-8) .......................................................... 57.4%
OTHER INGREDIENTS: .......................................................................................... 32.0%
TOTAL: ........................................................................................................ 100.0%

CELSIUS™ WG is formulated as a 98% water dispersible granule

*Do not use on bahiagrass or cool-season turf types, including tall fescue, fine fescue, Kentucky bluegrass, perennial ryegrass, or creeping bentgrass.

EPA Reg. No. 432-14507

STOP - READ THE LABEL BEFORE USE
KEEP OUT OF REACH OF CHILDREN

CAUTION
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)

Net Contents
10 Ounces
79714858
Product of Germany
79325816 091022A

BACKED by BAYER.
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 herbicide 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.

![Certainty Turf Herbicide Logo]

Weed Control in Landscaped Areas and Ornamental Nurseries

Keep out of reach of children.

**CAUTION!**

In case of an emergency involving this product, call Collect, day or night, 314-394-4000.

**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 products performance information.

<table>
<thead>
<tr>
<th>Weed Name</th>
<th>Habitat</th>
<th>Habit 1</th>
<th>Habit 2</th>
<th>Habit 3</th>
<th>Habit 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barley, little</td>
<td>Hordeum pusillum</td>
<td>Gladiolus hybridus</td>
<td><em>Gladiolus</em> sp.</td>
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<tr>
<td>Bedstraw, catchweed</td>
<td>Galeopsis aparine</td>
<td>Arrhenatherum elatius</td>
<td><em>Arrhenatherum</em> sp.</td>
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<tr>
<td>Bigbluegrass, Florida</td>
<td>Dactylis glomerata</td>
<td><em>Dactylis glomerata</em></td>
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<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, roughleaf</td>
<td>Poa trivialis</td>
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<td>Buttercup</td>
<td>Ranunculus arvensis</td>
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<td>Chamber bitter</td>
<td>Myrrhis terminalis</td>
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<td>Chickweed, common</td>
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<td>Trifolium repens</td>
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<td>Crowfootgrass</td>
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<td>Fescue, tall</td>
<td>Festuca arundinacea</td>
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<tr>
<td>Garlic, wild</td>
<td>Allium vavillii</td>
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<td>Habit 5</td>
<td>Geranium carolinianum</td>
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</tbody>
</table>

* Suppression or partial control only

Certainty is a registered trademark of Monsanto Technology LLC.
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 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 Sod Farms, Golf Course Fairways and Roughs, Roadside, Utility right-of-ways, Railways and Industrial areas

EPA Reg. No. 279-3223  EPA Est. No. 62171-MS-001

Active Ingredient:  By Wt.  Sulfentrazone-N-Hy-1,4-dichlore-5,4,4-ctfluorocarbonyl-4, 5-dihydro-3-methyl-5-oxo-1,1,2,4-hiazol - 1-yl]phenyl)methanesulfonamide .................................................. 13.6%  Prochlorocarb (N.N-Di-n-propyl-2,4-dinitro-8  (trifluoromethyl)-m-phenylenediamine ........................................ 27.3%  Other Ingredients: ................................................................. 59.1%  Enthalke SC contains 50 pounds of active ingredient per gallon

U.S. Patent No. 4,610,275

KEEP OUT OF REACH OF CHILDREN  CAUTION

See additional precautionary information contained inside label before use.

FIRST AID

If Inhaled:  Remove person to fresh air.  If person is not breathing, call 911 or an ambulance, have them treated promptly by a medical professional.  If breathing has stopped, give artificial respiration.  If severe discomfort, consult a physician.

If Swallowed:  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 eye open and flush with plenty of water for at least 15 minutes.  Remove contact lenses, if present, after the first 5 minutes, then continue flushing 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 anything by mouth to an unconscious person.

HOTLINE NUMBER

Have the label of this product available when calling the hotline.  EPA Hotline:  1-800-438-4318

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 other mist.  Avoid contact with skin, eyes, or clothing.  Protective gloves and goggles are necessary for contact while mixing or handling.  Wash and wash equipment before eating or smoking.

Personal Protective Equipment (PPE)  Appropriate and other hardatra must wear long-sleeved shirt and long pants, experimental gloves, and shoes plus socks.  Eye protection and either amber colored glasses, that have been designated as a splash liquid splash or are in compliance with the standard for personal protective equipment.  Special notes:  When in use, all the PPE is to be considered personal protective equipment.  Follow manufacturer instructions for cleaning and maintaining PPE.  Do not use the PPE separately from personal protective equipment.

User Safety Recommendations:  Customer should remove clothing immediately if product gets inside. Then wash thoroughly and put on clean clothing.

Environmental Hazards

This product is harmful to aquatic life.  Do not apply directly to water.  If runoff occurs when water is applied to treated areas, do not permit water to enter lakes, streams, or other water sources.  Do not contaminate water when disposing of equipment wash water or rinsate.

Groundwater advisor:  Sulfentrazone is known to pass through soils.  If irrigation or groundwater control is needed, see the soil documentation guide for guidance, evaluation, and water use.  Follow local water treatment.  It may be in groundwater contamination.  Do not use on lawns with high organic matter.  Surface water is the only surface water unaffected.
Echelon 4SC

- From FMC
- Prodimine + sulfentrazone in 2:1 ratio
- 4SC formulation: 2.67 lbs prodimine 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
Dismiss™
TURF HERBICIDE

For Selective Weed Control in Turf Sod including Residential and Institutional Lawns, Athletic Fields, Commercial Sod Farms, Golf Course Fairways and Roughs.

EPA Reg. No 270-3206

Active Ingredient: Sulfentrazone
By Wt: 39.8%
Other Ingredients: 60.2%

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

FMC Corporation
Agricultural Products Group
1735 Market Street
Philadelphia, PA 19103

Net Contents:

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 15 to 20 minutes.
- Call a poison control center or doctor for further treatment advice.

If in eyes
- Hold eye open and rinse slowly and gently with water for 15 to 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.
- 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 1-800-321-5772 for emergency medical treatment information.

For Information Regarding the Use of this Product Call 1-800-591-11MC (1962).

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)

Applicator and other handlers must wear long-sleeved shirt and long pants, waterproof gloves, and说完 plastic socks.

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

User Safety Recommendations

Users should:
- Remove clothing immediately if possible gets inside. Then wash thoroughly and put on clean clothing.
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

- 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 zoysiaagrasses.
- Do not use in cool-season turf
### Active Ingredients:
- quinclorac, 3,7-dichloro-5-quinoxalinecarboxylic acid .................................................. 16.96%
- mecoprop, (+)-R-2-(2-methyl-4-chlorophenoxy) propionic acid ........................................ 7.08%
- dicamba, (S)-3,6-dichloro-2-anisic acid .............................................................................. 2.13%

**Total**: .......................................................................................................................... 26.27%

**Other Ingredients**: .................................................................................................... 73.73%

**Total**: .......................................................................................................................... 100.00%

Equivalent to:
1.56 lbs quinclorac, 3,7-dichloro-5-quinoxalinecarboxylic acid equivalent per gallon
0.75 lb (+)-R-2-(2-methyl-4-chlorophenoxy) propionic acid equivalent per gallon
0.29 lb (S)-3,6-dichloro-2-anisic acid equivalent per gallon

Home-applied by AMDG Methods
Contains the single isomer form of mecoprop-p

EPA Reg. No. 7969-267

### WARNING/AVISOS

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

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.

In case of an emergency endangering life or property involving this product, call day or night, 1-800-832-HELP (4357).

### Net Contents:

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**BASF Corporation**
26 Davis Drive
Research Triangle Park, NC 27709
Onetime

- 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. Augustinegrass is sensitive
- Note phytotoxicity increase with higher temperatures
- 21 to 64 fl oz/A use rate
Q4 Plus

- From PBI Gordon
- a.i. are quinchlorac (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, zoysiagrass and buffalograss
- 5 – 7 pints/A use rate
KEEP OUT OF REACH OF CHILDREN

CAUTION

See other panels for additional precautionary information.

FMC Corporation
Agricultural Products Group
1735 Market Street
Philadelphia PA 19103

Net Contents: 1 Pound
Solitare

• From FMC
• a.i. are Sulfentrazone 18.75% + quinchlorac 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
SPECTACLE 20WSP Herbicide

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

DO NOT USE FOR THE MANUFACTURING OF FERTILIZER

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

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

EPA Reg. No. 432-4459
EPA Est. 800264-DEU-001

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 1.888-331-2067

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.

PRECAUTIONARY STATEMENTS

HAZARD TO HUMANS
CAUTION
Harmful if absorbed through the skin. Harmful if swallowed. Causes moderate eye irritation. Avoid contact with skin, eyes, or clothing.

PERSONAL PROTECTIVE EQUIPMENT (PPE)
Applicators and other handlers must wear long-sleeved shirt and long pants, chemical-resistant gloves made of any waterproof material such as nitrile or latex gloves, and shoe protectors.

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 handlers use closed systems or enclosed cab in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides (40 CFR 170.240 (g) (4)-(6)), the handler PPE requirements may be reduced or modified as specified in the WPS.
Specticle 20 WSP

- Bayer Environmental Science
- Active ingredient indaziflam
- Labeled for most warm season turfgrasses including bahia, bermuda, buffalo, centipede, St. Augustine, and zoysiagrass.
- 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
**TRIMEC 1000**

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

### ACTIVE INGREDIENTS

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4-D, dicamba ester (DCN)</td>
<td>58.59%</td>
</tr>
<tr>
<td>2,4-D, dichlorprop ester (DCP)</td>
<td>32.20%</td>
</tr>
<tr>
<td>2,4-D, chlorimuron ester (DCA)</td>
<td>2.17%</td>
</tr>
<tr>
<td>Chlorsulfuron</td>
<td>2.68%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

**FERT INGREDIENTS**

- 2.5% to 6.3% Hydrophilic polyacrylamide polymer
- 0.025 to 0.05% Non-ionic surfactant
- 0.0025 to 0.005% Phosphoric acid

**DIRECTIONS FOR USE**

**User Safety Requirements**

Follow manufacturer’s instructions for cleaning and handling PPE. If no such instructions are available, use capes and hot water. Keep and wash PPE separately from other laundry. Discard clothing and other absorbent material that have been chemically or heavily contaminated. Do not allow them to come in contact with livestock or wildlife.

**User Sensitivity Statements**

- Avoid contact with eyes and mouth after handling. If contact occurs with eyes, wash with water for 15-30 minutes.
- Avoid contact with skin. If present, wash with soap and water for 15-30 minutes.
- Avoid contact with clothing. If present, wash with soap and water.
- Avoid contact with livestock or wildlife. If present, wash with soap and water.

**First Aid**

- **If in eyes:**
  - Hold eye open and flush slowly and gently with water for 15-30 minutes.
  - If necessary, remove contact lenses, after first 6 minutes, continue rinsing eyes.
  - Call a poison control center or doctor for further advice.

- **If swallowed:**
  - Call a poison control center or doctor immediately for treatment advice.
  - Have person also a glass of water if able to swallow.
  - 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.

**Emergency Phone Numbers**

- **For environmental hazards:**
  - Call a green waste disposal or contact your local authority.

**Application Information**

- This product is for use on non-food bearing crops. It is not to be used within 300 feet of any food or animal feed crop.

**Engineered Control Statements**

- When handling tank, transport or storage chemical, be sure to observe appropriate precautions and follow label instructions. Do not allow contact with livestock or wildlife. If present, wash with soap and water.

**Agricultural Use Requirements**

- **Use this product only in accordance with the labeling and with the Worker Protection Standard (WPS).**

**NOTE:** **PPE:** PPE (personal protective equipment) must include the use of a face mask to prevent inhalation of dust or gas.
Tenacity™

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

KEEP OUT OF REACH OF CHILDREN.

CAUTION

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

EPA Reg. No. 100-1257
EPA Est. 100-NE-001
SCP 1267A-L1B 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.
Supplemental Label

Amended use directions in turfgrass on golf courses

Active Ingredients*: dinoterb and 4- [2-chloro-N-[(1-methyl-2-methoxy)ethyl][N-(2,4-dimethyl-thiophen-3-yl)-acetamide .......... 62.9%
Other Ingredients**: ____________________________________________________________ 37.1%
Total: ______________________________________________________________________ 100.0%

* Contains 6.0 pounds of active ingredient per gallon
** Contains water as diluent

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 treating a small area prior to large-scale use. User assumes all risk.

Tolerant Turfgrass Species

<table>
<thead>
<tr>
<th>Cool Season</th>
<th>Bentgrass*, Bluegrass, annual*, Bluegrass, Kentucky, Bluegrass, roughstalk*, Fine fescue, perennial ryegrass, Tall fescue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warm Season</td>
<td>Bahiagrass, Bermudagrass, common; Bermudagrass, hybrid; Buffalograss; Centipedegrass; Kikuyagrass, St. Augustinegrass, Seashore paspalum, Zoysia grass</td>
</tr>
</tbody>
</table>

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

BASF Corporation
26 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.