

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

A wide-angle photograph of a field of dormant bermudagrass. The grass is dry and yellowish-brown, with some small, dark green weeds scattered throughout. The background shows a clear, bright sky.

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.



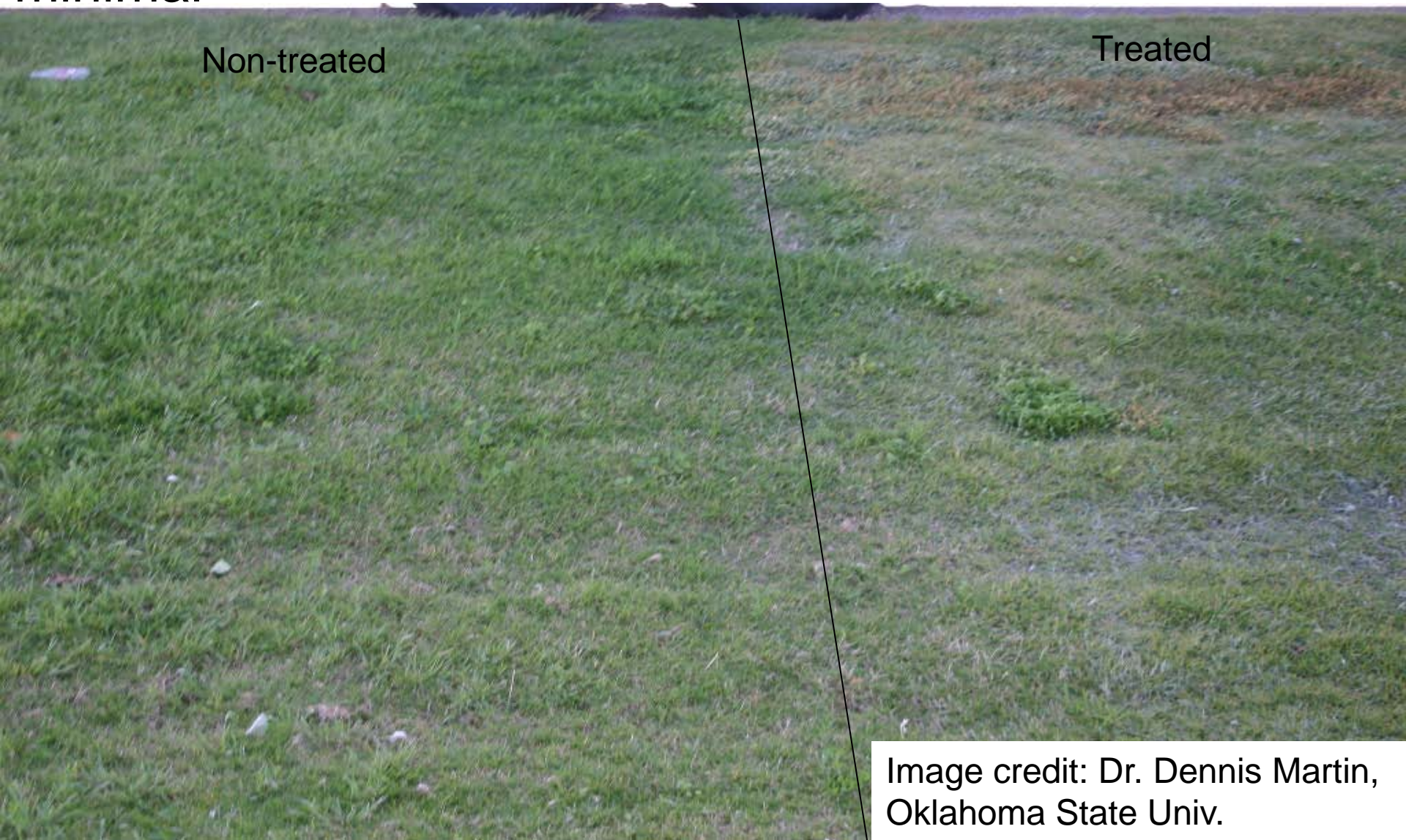
Image credit: Dr. Dennis Martin,
Oklahoma State Univ.

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



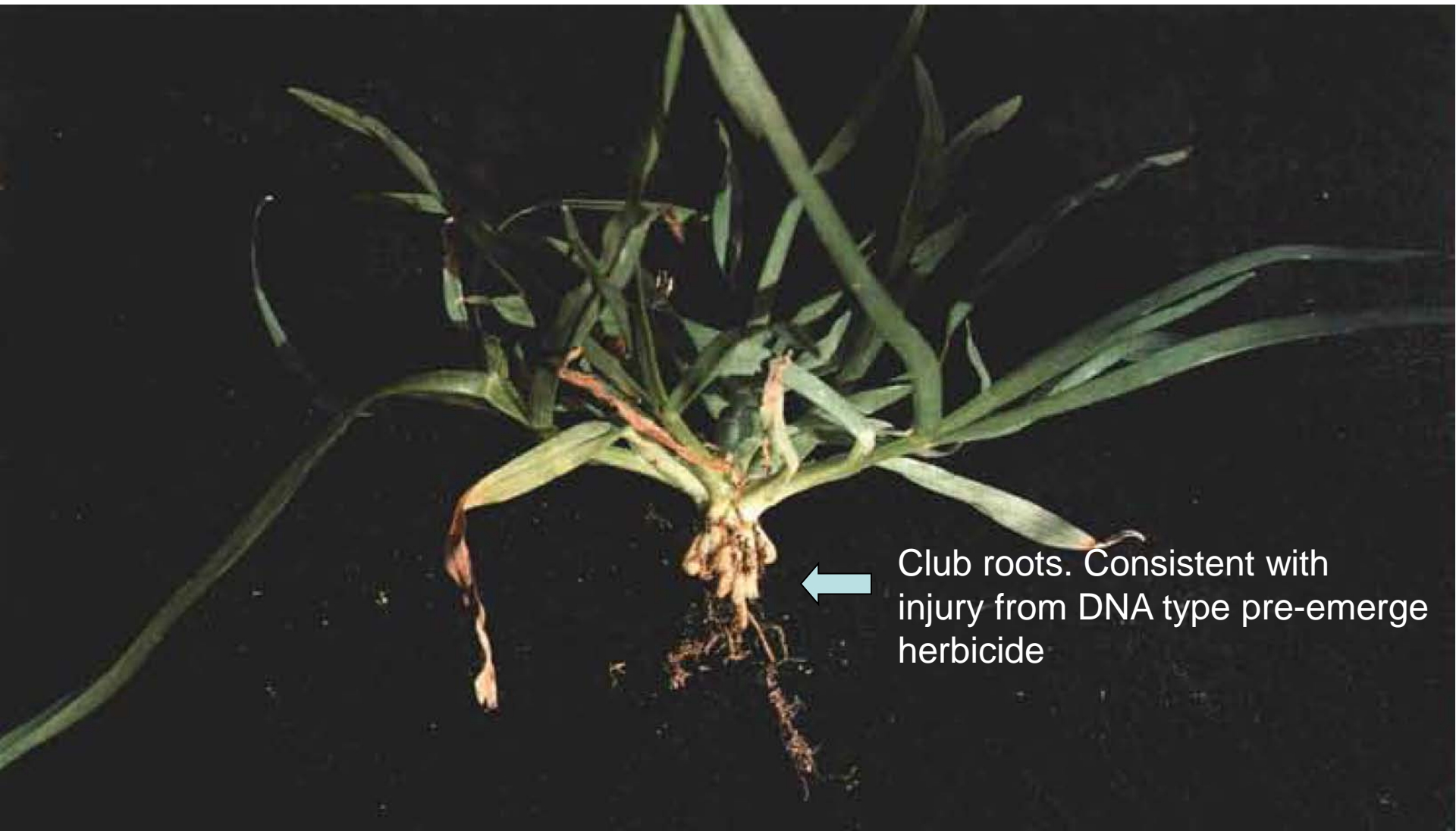
Non-treated

Treated

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

Most Pre-emergent Herbicides Affect Root Cell Division and Thus Plant Health.

Photocredit: Frank Rossi. 1992. To Pre or not to Pre- Summer Annual Weed Control Strategies. USGA Greens Section Record. Sept/Oct pp 15-17.



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



Image credit: Unknown. Appreciation extended to original photographer.

Winter-kill is a gold mine for some!

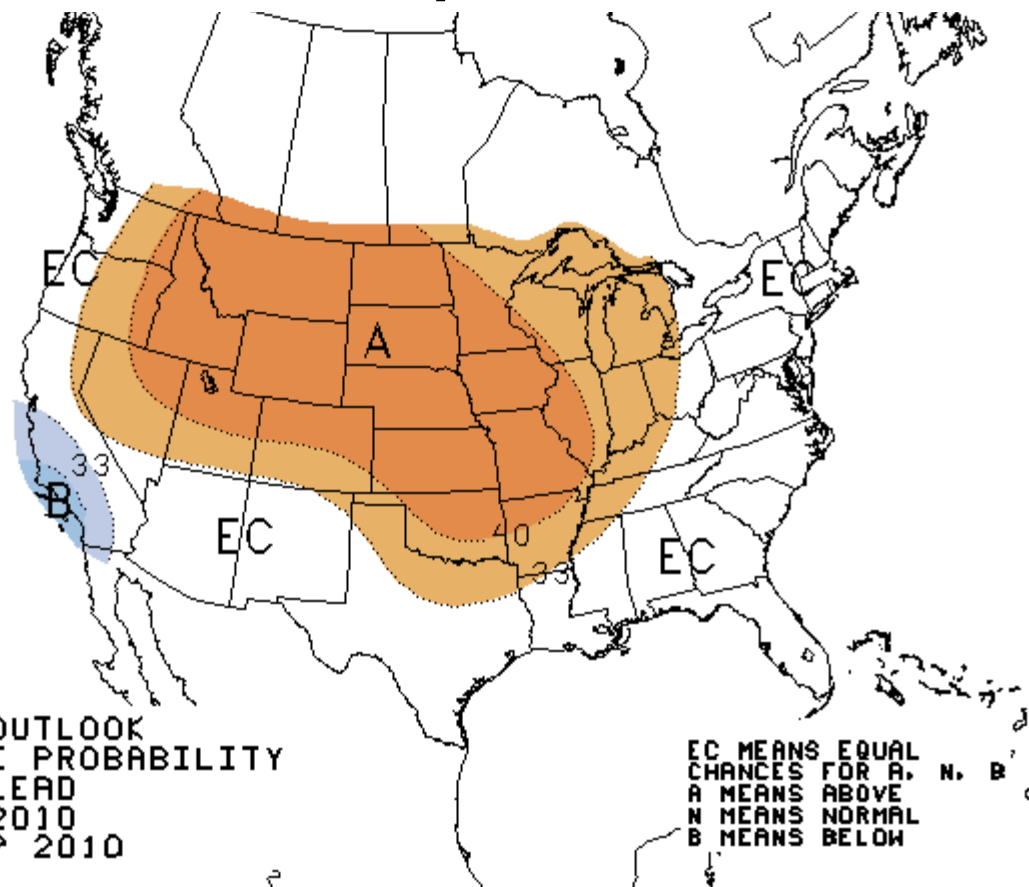


Image credit: Mr. Craig Evans,
Oklahoma State Univ.

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!!!!

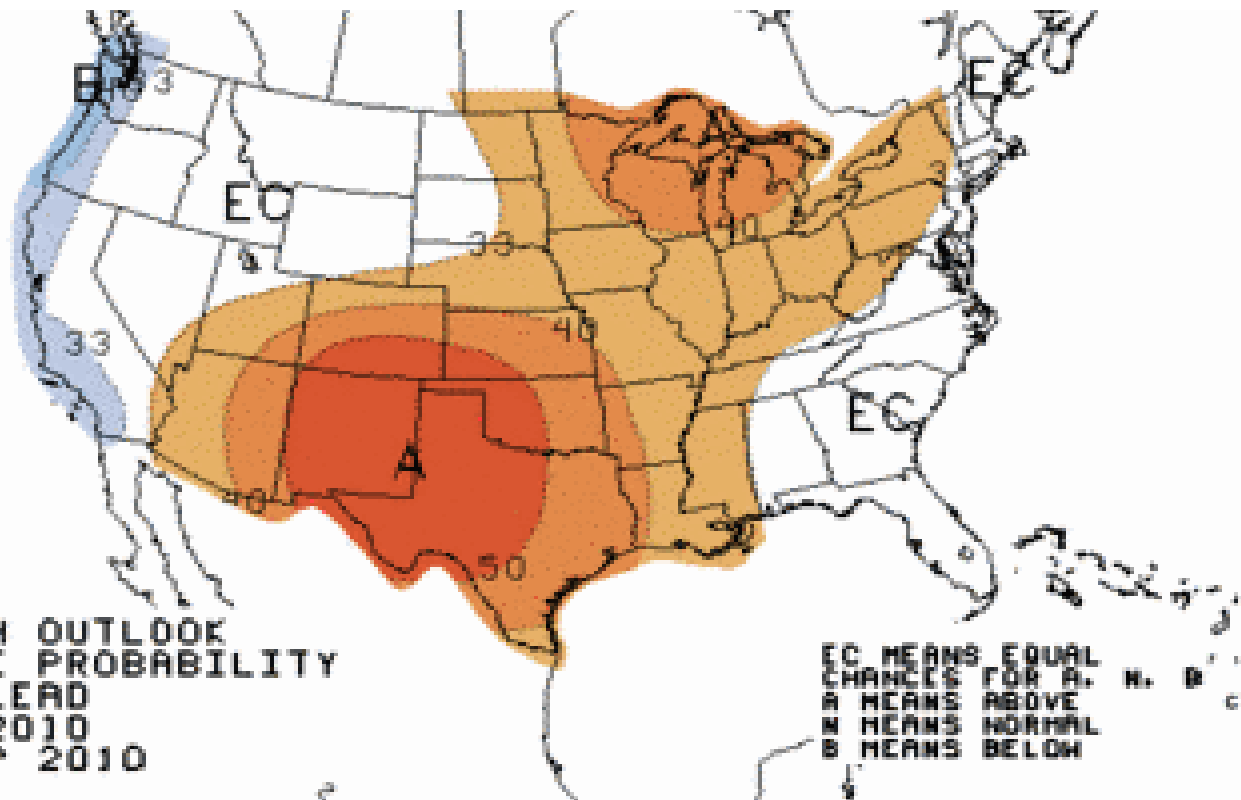
OCTOBER TEMPERATURE OUTLOOK

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



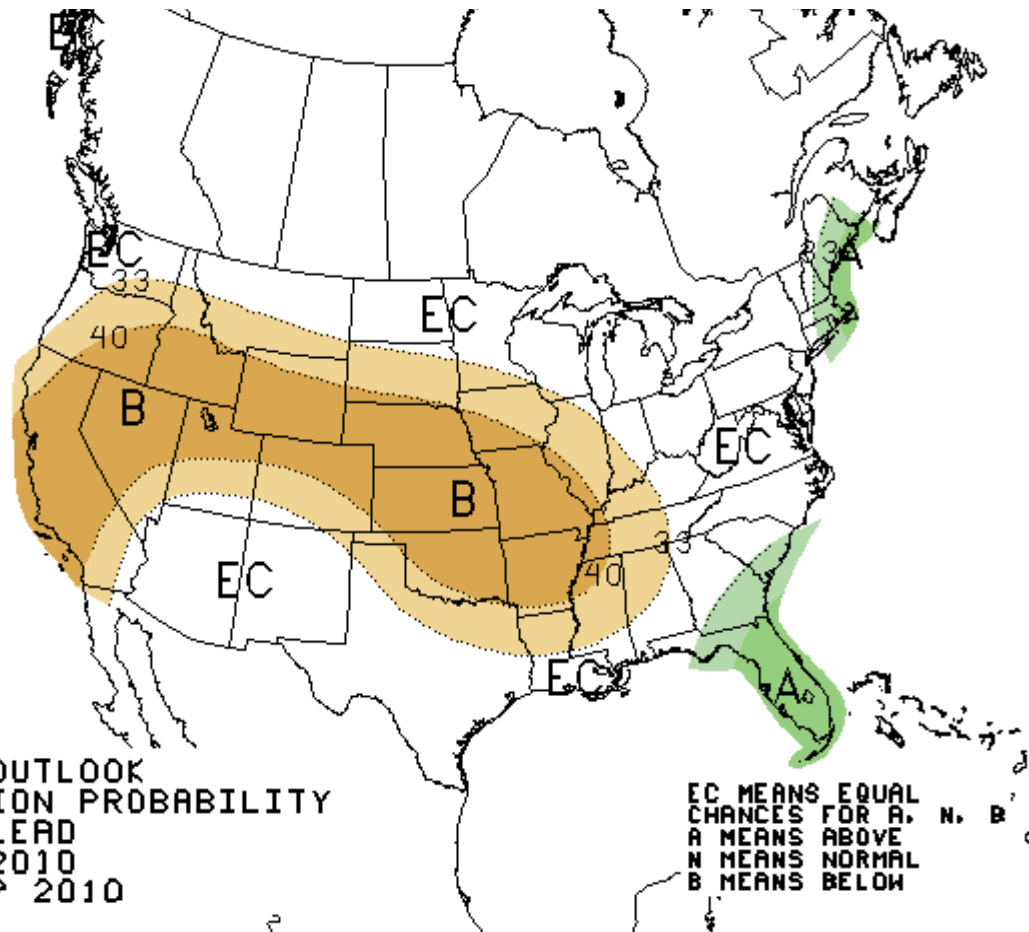
OCTOBER THRU DECEMBER TEMPERATURE OUTLOOK

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

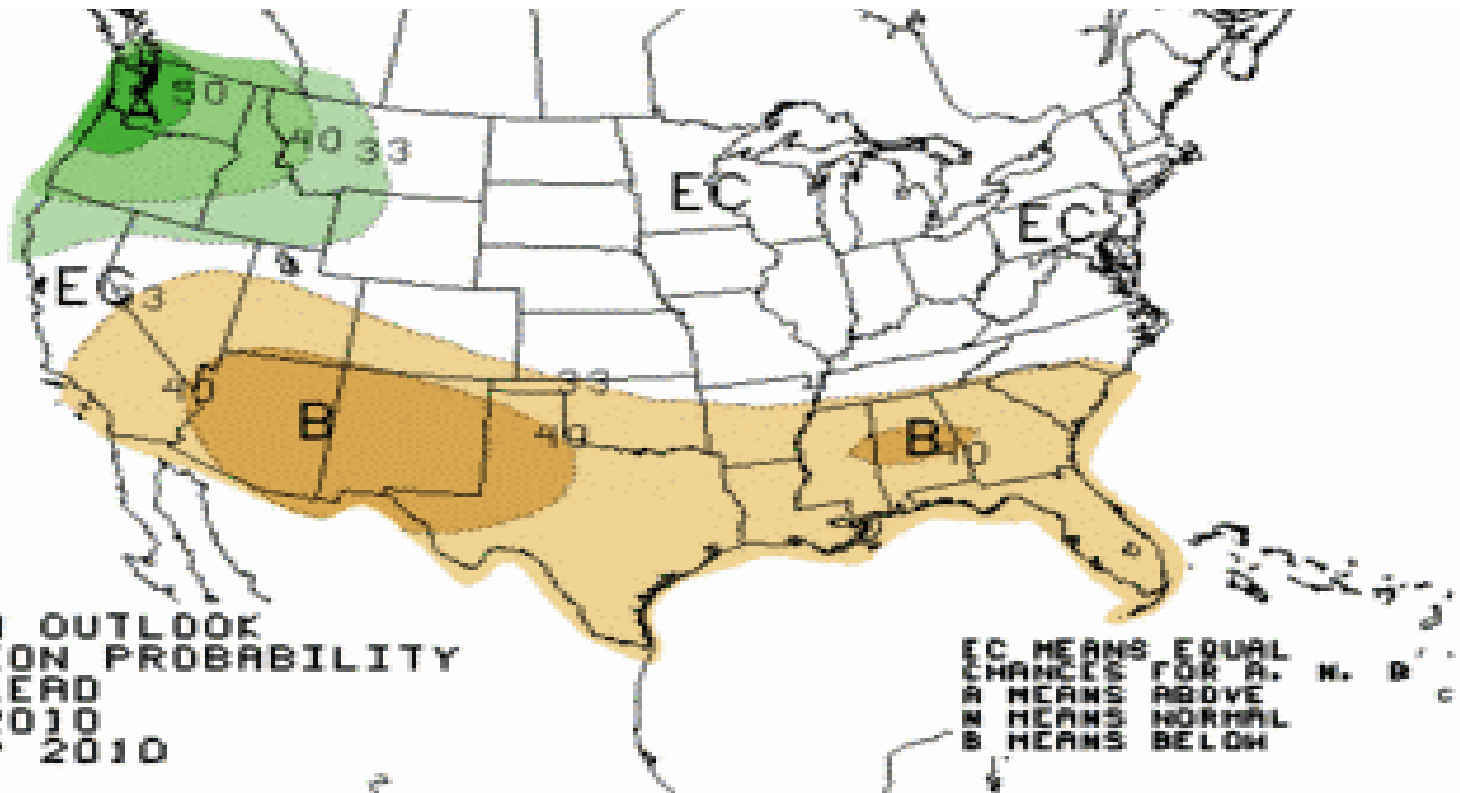


OCTOBER THRU DECEMBER RAINFALL OUTLOOK

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



THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
0.5 MONTH LEAD
VALID QND 2010
MADE 16 SEP 2010

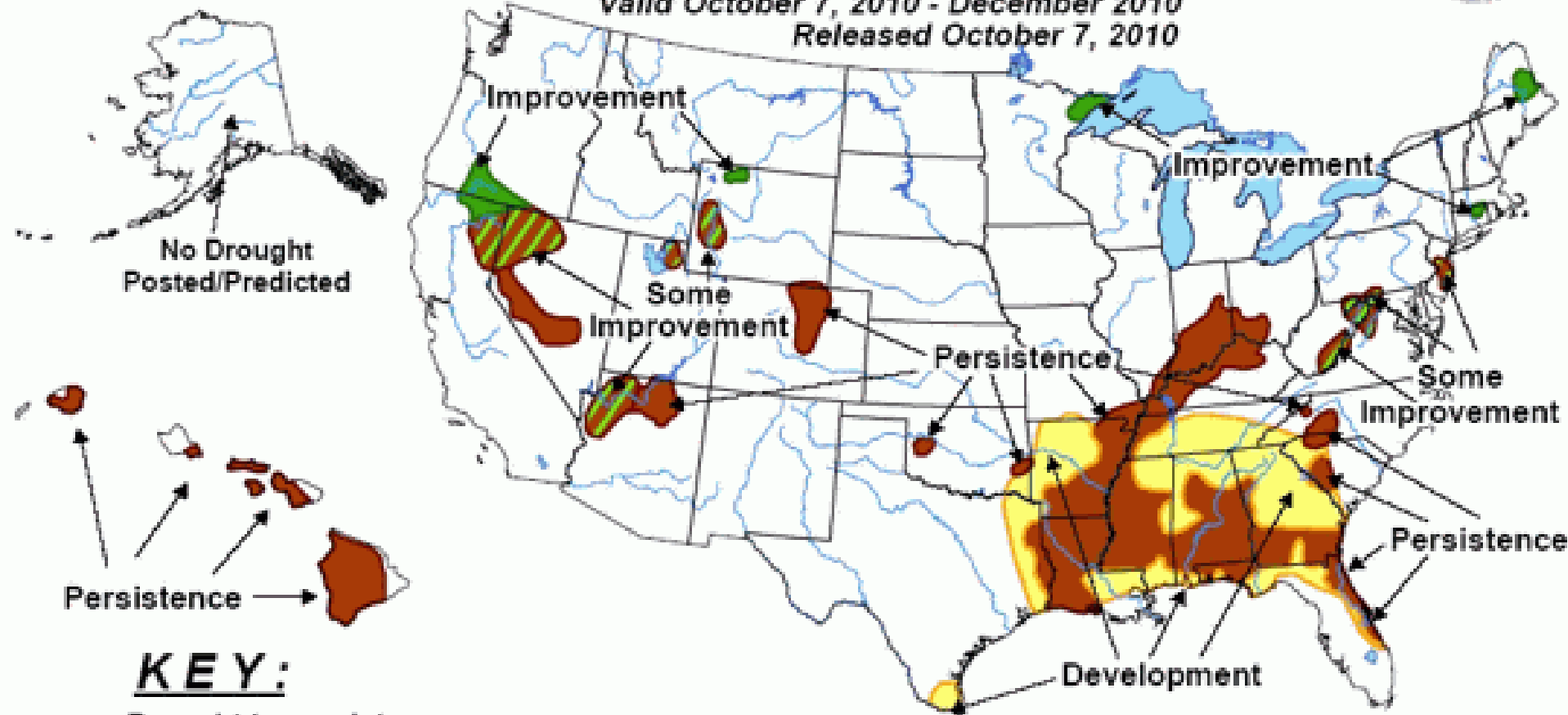
EC MEANS EQUAL
CHANCES FOR A. N. B.
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW



U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

Valid October 7, 2010 - December 2010
Released October 7, 2010



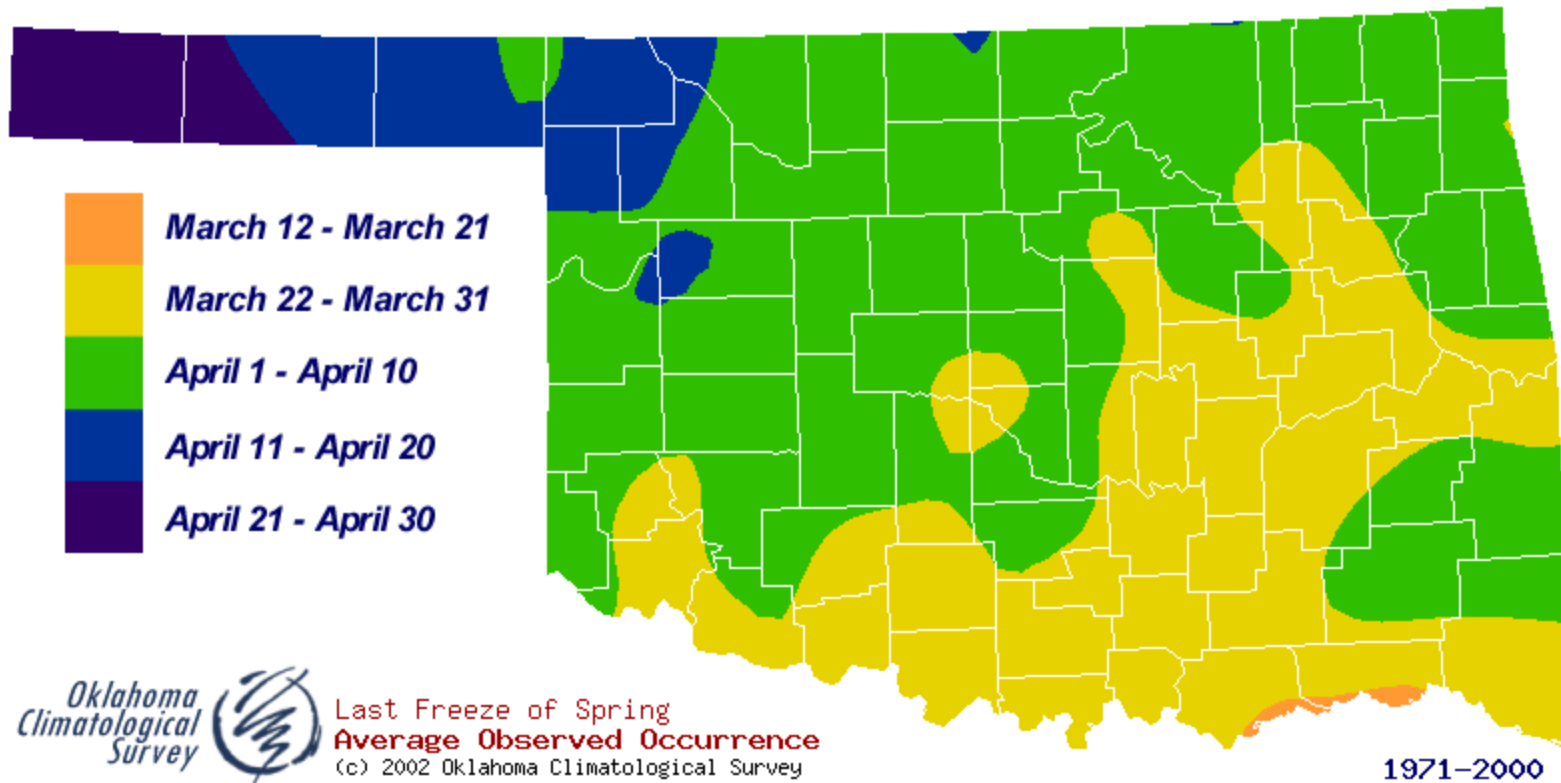
KEY:

-  Drought to persist or intensify
-  Drought ongoing, some improvement
-  Drought likely to improve, impacts ease
-  Drought development likely

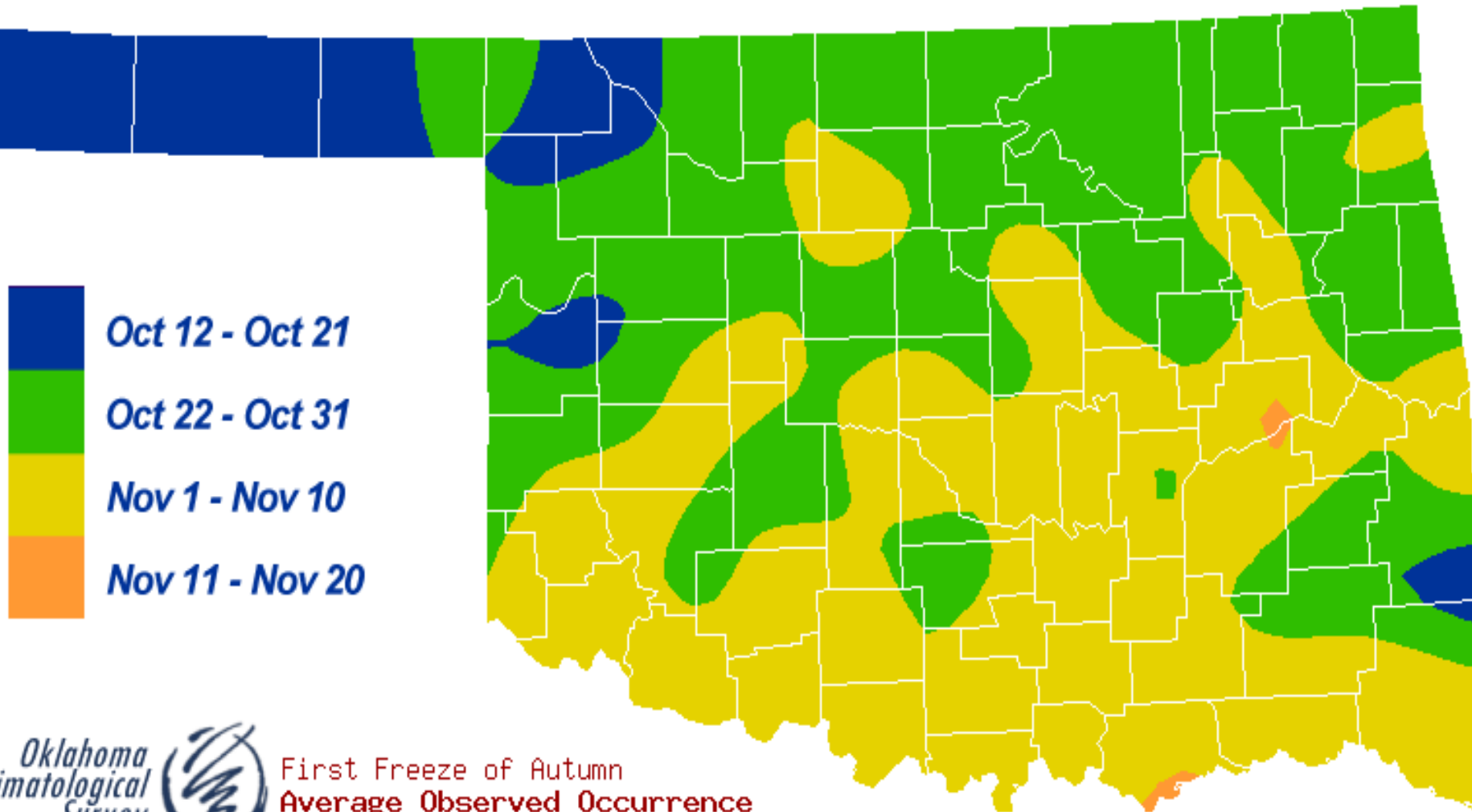
No Drought Posted/Predicted 

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



AVERAGE OBSERVED FIRST AUTUMN FREEZE

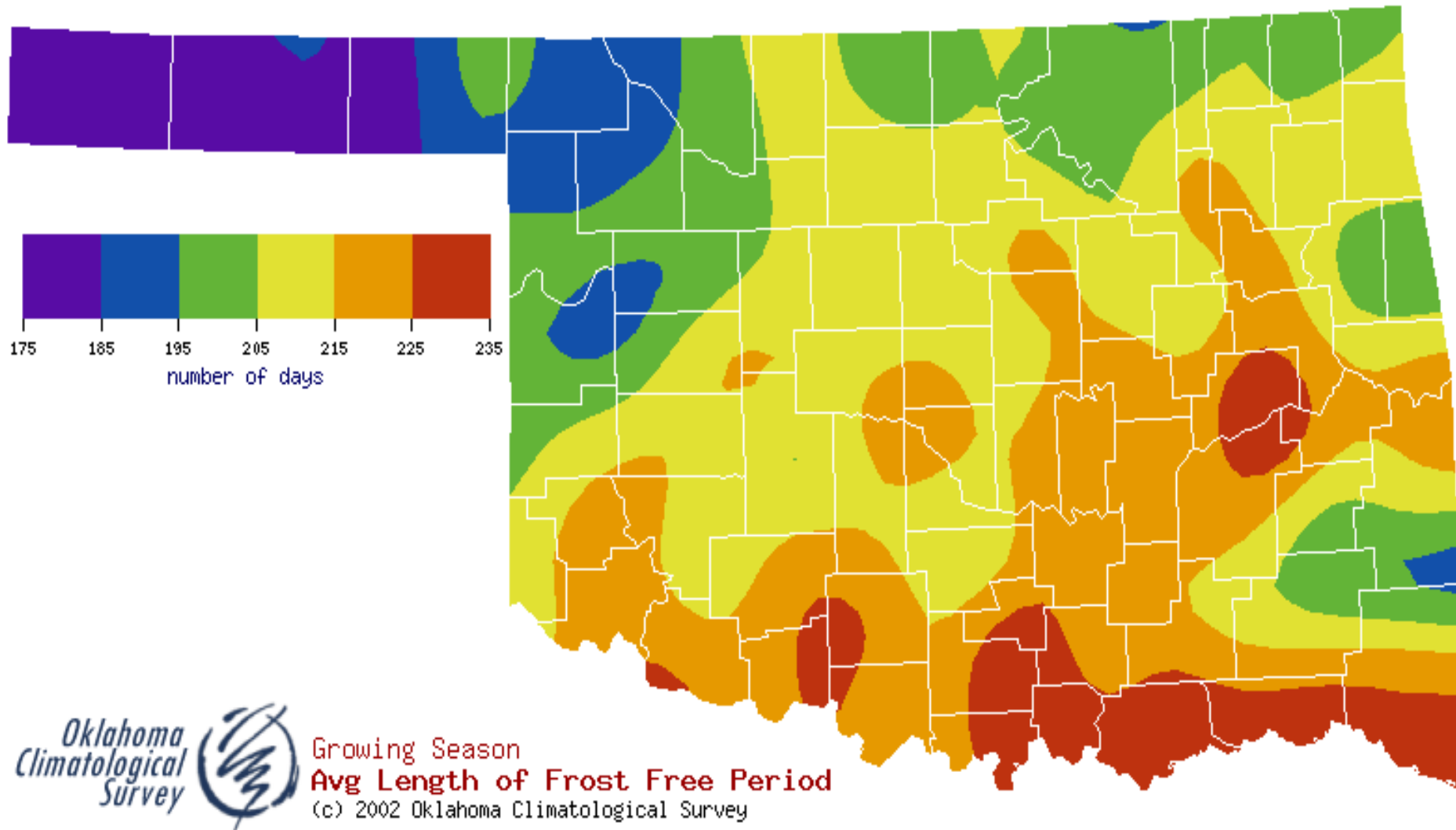


First Freeze of Autumn
Average Observed Occurrence
(c) 2002 Oklahoma Climatological Survey

1971-2000

This next slide
indicates your long-
term chances of
growing truly trophy
sized weeds!!!

Average Length of Frost Free Period



Mesonet AgWeather

<http://agweather.mesonet.org/>

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Local. Reliable. Free.

Welcome to Agweather, a Web site designed to help agricultural producers with their weather-related decisions. Be sure to download the free WeatherScope plugin before you begin. It is essential to view weather maps and graphs.

[Download WeatherScope](#)



Current Weather at:

Stillwater

65°F

Humidity: **69%**

Rainfall Since 7pm: **0"**

10-m wind: **NNW 7 mph**

Sunrise: **7:32am**

Sunset: **6:58pm**

time of last observation: 11:15am



Starting Up



Downloads



Products



Learn More

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



crabgrass



crabgrass



goosegrass

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

Summer Annual Broadleaf Weeds

- knotweed
- prostrate spurge



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

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

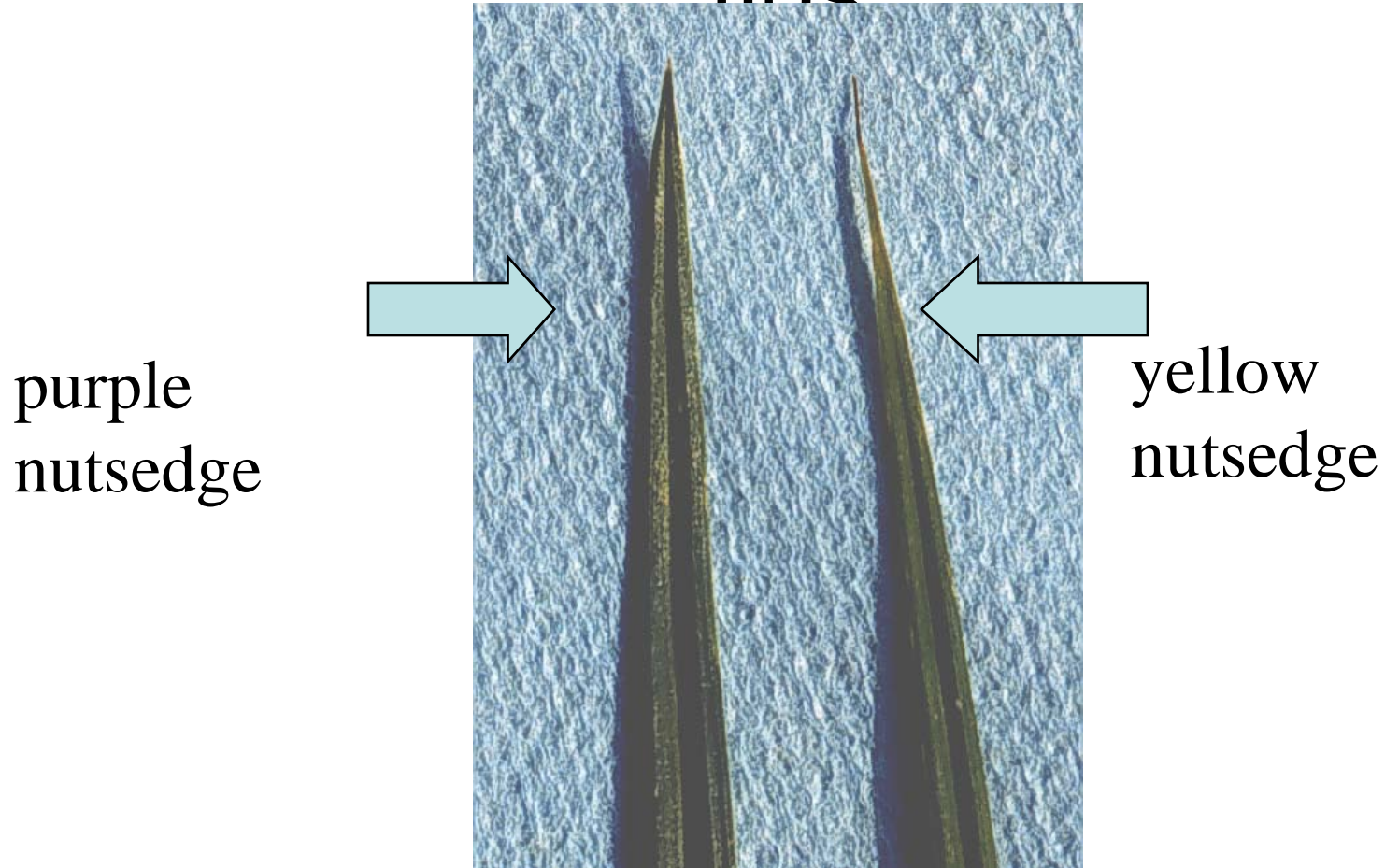


Image credit: Dr. John Boyd, Univ of Arkansas

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: Thiencarbazone-methyl (CAS Number 317815-83-1)	8.7%
Iodosulfuron-methyl-sodium (CAS Number 144550-36-7)	1.9%
Dicamba (CAS Number 1918-00-9)	57.4%
OTHER INGREDIENTS:	32.0%
TOTAL:	100.0%

CELSIUS™ WG is formulated as a 68% 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. 432-1507

EPA Est. No. 264-DEU-001

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
79925816 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.



EPA Reg. No. 524-534

Certainty is a registered trademark of Monsanto Technology LLC.

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, 314-694-4000.

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 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.

Barley, little
Bedstraw, catchweed
Beggarweed, Florida¹
Bluegrass, annual
Bluegrass, bulbous
Bluegrass, roughstalk
Burweed, lawn
Buttercup
Chamber bitter
Chickweed, common
Clover, white
Crowfootgrass
Dandelion
Dichondra, Carolina
Fescue, tall
Garlic, wild
Geranium, Carolina¹
Henbit¹

Hordeum pusillum
Galium aparine
Desmodium tortuosum
Poa annua
Poa bulbosa
Poa trivialis
Soliva pterospema
Ranunculus arvensis
Phyllanthus urinaria
Stellaria media
Trifolium repens
Dactyloctenium aegyptium
Taraxacum officinale
Dichondra carolinensis
Festuca arundinacea
Allium vineale
Geranium carolinianum
Lamium amplexicaule

Ivy, ground¹
Johnsongrass
Kyllinga, false green
Kyllinga, fragrant
Kyllinga, green
Mustard, wild
Nutsedge, purple
Nutsedge, yellow
Pennycress, field
Pennywort, lawn¹ (dollarweed)
Quackgrass¹
Ryegrass, perennial
Sedge, globe
Sedges, annual
Shepherd's-purse
Violet, wild¹
Woodsorrell, yellow¹

Glechoma hederacea
Sorghum halepense
Kyllinga gracillima
Kyllinga sesquiflora
Kyllinga brevifolia
Sinapis arvensis
Cyperus rotundus
Cyperus esculentus
Thlaspi arvense
Hydrocotyle sibthorpioides
Elytrigia repens
Lolium perenne
Cyperus croceus
Cyperus spp.
Capsella bursa-pastoris
Viola pratincola
Oxalis stricta

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



Echelon™ 4SC

HERBICIDE

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 Sod Farms, Golf Course Fairways and Roughs, Roadsides, Utility right-of-ways, Railways and Industrial areas

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

Active Ingredient:	By Wt.
Sulfentrazone: N-[2,4-dichloro-5-[4-(difluoromethyl)-4,5-dihydro-3-methyl-5-oxo-1H-1,2,4-triazol-1-yl]phenyl]methanesulfonamide	13.6%
Prodiamine: [N3,N3-Di-n-propyl-2,4-dinitro-6-(trifluoromethyl)-m-phenylenediamine	27.3%
Other Ingredients:	59.1%
	100.0%

Echelon 4 SC contains 4.0 pounds of active ingredient per gallon
U.S. Patent No. 4,818,275

KEEP OUT OF REACH OF CHILDREN CAUTION

See additional precautionary information contained inside label booklet.



FMC Corporation
Agricultural Products Group
Philadelphia PA 19103

Net Contents

09-04-07

FIRST AID	
If inhaled	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.
If in eyes	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Call poison control center or doctor immediately for treatment advice. • Do not give any liquid 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 1-800-331-3148 for emergency medical treatment information.	
For Information Regarding the Use of this Product Call 1-800-321-1FMC (1362).	

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. Prolonged or frequently repeated skin contact while mixing or handling may cause allergic reactions in certain individuals.

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 drenched or heavily contaminated with this product. 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.

User Safety Recommendations:

- Users should remove clothing immediately if product gets inside. Then wash thoroughly and put on clean clothing.

Environmental Hazards

This product is toxic to marine/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 wash waters or rinsate.

Groundwater advisory: Sulfentrazone is known to leach through soil 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.

Do not use on coarse soils classified as sand which have less than 1% organic matter.

Surface water advisory: Sulfentrazone can contaminate surface water through spray drift. Under some conditions, sulfentrazone may also

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



Dismiss™

TURF HERBICIDE

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 279-3295

EPA Est. 279-IL-1

Active Ingredient:	By Wt.
Sulfentrazone*	39.6%
Other Ingredients:	60.4%
	100.0%

*N-(2,4-dichloro-5-(4-(difluoromethyl)-4,5-dihydro-3-methyl-5-oxo-1H-1,2,4-triazol-1-yl)phenyl)methanesulfonamide.
Contains 4.0 pounds of active ingredient per gallon.
U.S. Patent No. 4,618,275

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:

2-25-08-C

FIRST AID

If inhaled	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for further treatment advice.
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CAUTION

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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 drenched or heavily contaminated with this product. 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.

User Safety Recommendations:

Users should:

- Remove clothing immediately if pesticide 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

Not all products listed are available for purchase or authorized for use in every state. In addition, some states, counties and cities may require special licensing and training to sell, purchase or apply some of the products presented in this product literature. It is the responsibility of the distributor, retailer or professional applicator to verify, before product sale/purchase, that the product is approved for the use intended in their state, county and city.



Katana™

TURF HERBICIDE

ACTIVE INGREDIENT: Flazasulfuron By Wt. 26.0%
 OTHER INGREDIENTS: 75.0%
 TOTAL 100.0%

14-[(4,6-dimethoxy-2-pyrimidinyl)amino]carbonyl-3-(1-fluoroethyl)-2-pyridinesulfonamide.
 Contains 0.25 pounds active ingredient per pound of formulated product.

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.)

Not Intended for Residential Use

READ ENTIRE LABEL CAREFULLY AND USE ONLY AS DIRECTED.

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

CAUTION: Harmful, if swallowed or absorbed through skin. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling. Remove and wash contaminated clothing before reuse.

Personal Protective Equipment (PPE)

Applicators and other handlers must wear: long sleeved shirt and long pants, shoes plus socks, protective eyewear and chemical resistant gloves made of any waterproof material.

User Safety Requirements

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 exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

User Safety Recommendations

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Follow the 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.

First Aid

<p>If swallowed:</p>	<ul style="list-style-type: none"> • Call a poison control center or doctor for treatment 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 the poison control center or doctor. • Do not give anything by mouth to an unconscious person.
<p>If on skin or clothing:</p>	<ul style="list-style-type: none"> • 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.
<p>If in eyes:</p>	<ul style="list-style-type: none"> • 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.
<p>If inhaled:</p>	<ul style="list-style-type: none"> • 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.

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

HOT LINE NUMBER: For 24-Hour Medical Emergency Assistance call 1-877-800-6566.

Environmental Hazards

This product is toxic to fish. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash waters or rinsate.

This product may contaminate water through drift of spray in wind, or drift of soil from treated areas. This product has a high potential for runoff for several months or more after application. Poorly drained soils and soils with shallow water tables are more prone to produce runoff that contains this product. Runoff of this product would be reduced by avoiding applications when rainfall is to be expected to occur within 48 hours.

There is potential for injury to sensitive plants irrigated with run-off water containing flazasulfuron.

No bee caution required.

Physical or Chemical Hazards

Do not use or store near heat or open flame.

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 way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the Restricted Entry Interval (REI) of 4 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is: Coveralls, chemical-resistant gloves made of any waterproof materials, and shoes plus socks.

Sod and seed farms are within the scope of the Worker Protection Standard.

Non-Agricultural Use Requirements

The requirements in this box apply to uses of this product that are not within the scope of the Worker Protection Standard for agricultural pesticides, 40 CFR part 170. The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses. Turf grasses on golf courses and other non-residential turf areas such as industrial parks, tank farms, professionally managed college and professional sports fields and commercial lawns are not within the scope of the Worker Protection Standard. Do not enter or allow others to enter the treated area until sprays have dried.

Use Information

Katana™ Turf Herbicide is a selective herbicide for removal of overseeded cool-season grasses as well as control of annual and perennial grasses, sedges, and broadleaf weeds in Bermudagrass, zoysiagrass and certain other warm-season turfgrasses. This product has post-emergence and some pre-emergence activity. Katana Turf Herbicide may be used on golf courses (fairways, roughs, and tees) and the following non-residential turf areas: industrial parks, tank farms, sod farms, seed farms, cemeteries, professionally managed college and professional sports fields and commercial lawns for control of cool-season grasses and weeds from to keratin grasses.

Weed growth stops within hours after the application, however symptom progress from discoloration or chlorosis to necrosis generally requires from 3 to 6 weeks. Speed of control is generally a function of weather with faster action during warmer weather and actively growing weeds and turf.

Katana Turf Herbicide controls weeds by inhibiting the acetolactate synthase (ALS) biochemical process. Some weeds may contain naturally occurring populations that are resistant to ALS inhibiting herbicides. Applications of ALS inhibiting herbicides, when used alone, over a period of time may lead to biotypes that are resistant to ALS herbicides. This then leads to a reduction in the level of control obtained through the use of these herbicides. To prevent or delay the build-up of ALS resistant weeds, weed management programs should include the use of appropriate registered herbicides for control of these weeds that have a different mode of action. Applications of herbicides with a different mode of action should be used during the same year or in sequential years.

Application Restrictions

- Do not apply Katana Turf Herbicide aerially.
- Do not apply Katana Turf Herbicide through any irrigation system.
- Repeat applications may be made at 2 to 6 weeks after the application for optimum weed control.
- The maximum yearly application rate is 9.0 oz. per acre.
- Use only on turfgrasses listed below (unless listed under weeds controlled) or severe injury may result.
- Do not apply to new seeded, sodded or sprigged turfgrass until well established.
- Allow at least 2 weeks from the last application to the time of overseeding when applied at 1.5 oz./A. Allow 4 weeks for rates above 1.5 oz./A.
- Do not use on golf course putting greens.

Katana

- From PBI Gordon
- a.i. is flazasulfuron, a sulfonamide
- 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 zoysagrasses.
- Do not use in cool-season turf

Onetime®

H E R B I C I D E

Active Ingredients:

quinclorac: 3,7-dichloro-8-quinolinecarboxylic acid	15.96%
mecoprop (+)-(R)-2-(2-methyl-4-chlorophenoxy) propionic acid	7.96%
dicamba (3,6-dichloro-o-anisic acid)	2.13%

Other Ingredients:

Total: 73.94%

Equivalent to:

1.50 lbs quinclorac: 3,7-dichloro-8-quinolinecarboxylic acid equivalent per gallon

0.75 lb (+)-(R)-2-(2-methyl-4-chlorophenoxy) propionic acid equivalent per gallon

0.20 lb 3,6-dichloro-o-anisic acid equivalent per gallon

Isomer-specific by AOAC Methods

Contains the single isomer form of mecoprop-p

EPA Reg. No. 7969-267

EPA Est. No.

**KEEP OUT OF REACH OF CHILDREN
WARNING/AVISO**

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.)

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:

Onetime

- From Bayer
- Quinchlorac + 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

Not all products listed are available for purchase or authorized for use in every state. In addition, some states, counties and cities may require special licensing and training to sell, purchase or apply some of the products presented in this product literature. It is the responsibility of the distributor, retailer or professional applicator to verify, before product sale/purchase, that the product is approved for the use intended in their state, county and city.



**Turf Herbicide
for Grassy & Broadleaf Weeds**

ACTIVE INGREDIENTS:	
Quinclorac.....	8.43%
Sulfentrazone.....	0.89%
2,4-D, dimethylamine salt.....	11.81%
Dicamba, dimethylamine salt.....	1.49%
INERT INGREDIENTS:	77.58%

TOTAL 100.00%

THIS PRODUCT CONTAINS:

0.75 lb. 3,7-di-tert-butyl-8-quinolinecarboxylic acid per gallon or 8.43%.

0.06 lb. N-[2,4-dichloro-5-[4-(2-chlorophenyl)-4,5-dihydro-3-methyl-6-oxo-1H-12,4-tiazolo[1,4-b]pyridine-3-carbonyl]amino]propanamide per gallon or 0.89%.

0.99 lb. 2,4-dichlorophenoxyacetic acid equivalent per gallon or 9.81%.

0.10 lb. 3,5-di-tert-butyl-4-cyanobenzoic acid equivalent per gallon or 1.24%.

Formulated by ADAC Herbicides.

CAS Registry Numbers: Quinclorac: 64087-01-0, Sulfentrazone: (122336-35-9), Dicamba, dimethylamine salt: (2300-66-5), 2,4-D, dimethylamine salt: (2008-39-1).

U.S. Patent 6,614,979

**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.)



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

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

CAUTION: Causes moderate eye irritation. Avoid contact with eyes or clothing. Harmful if swallowed.

Personal Protective Equipment (PPE)

Some materials that are chemical-resistant to this product are natural rubber, natural rubber blends and laminates. If you want more options, follow the instructions for category A on an EPA chemical-resistance category selection chart.

All mixers, loaders, applicators, and other handlers must wear:

- long-sleeved shirt and long pants,
- protective eyewear (such as goggles, face shield, or safety glasses),
- shoes and socks,
- chemical-resistant gloves (except for applicators using ground boom equipment) and
- chemical-resistant apron when mixing or loading, cleaning up spills or equipment, or otherwise exposed to the concentrate.

User Safety Requirements

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

User Safety Recommendations

- Users should wash hands thoroughly with soap and water before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Users should remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. If pesticide gets on skin, wash immediately with soap and water.
- Users should 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:	<ul style="list-style-type: none"> • 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:	<ul style="list-style-type: none"> • 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 on skin or on clothing:	<ul style="list-style-type: none"> • 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.
<p>Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact 1-800-600-5556 for emergency medical treatment information.</p>	

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 intertidal areas below the mean high water mark. Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas. Do not contaminate water when disposing of equipment wash waters or rinsate.

This chemical has properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. Application around a cistern or well may result in contamination of drinking water or groundwater.

Physical and Chemical Hazards

Combustible. Do not use or store near heat or open flame.

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 way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application.

For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170.

This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 48 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water is:

- coveralls worn over short-sleeved shirt and short pants,
- chemical-resistant footwear plus socks,
- chemical-resistant gloves made of any water-proof material and,
- protective eyewear

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



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. 279-3355

EPA Est. 279-IL-1

Active Ingredient:	By Wt.
Sulfentrazone*	18.75%
Quinclorac*	56.25%
Other Ingredients:	25.00%
Total:	100.0%

*Solitare Herbicide contains 0.75 pounds of active ingredient per one pound of product (0.1875 pounds a.i. of Sulfentrazone and 0.5625 pounds a.i. of Quinclorac)

U.S. Patent No. XXXXXXXXXX

**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

FIRST AID	
IF SWALLOWED	<ul style="list-style-type: none"> 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 the poison control center or doctor. Do not give anything by mouth to an unconscious person.
IF ON SKIN OR CLOTHING	<ul style="list-style-type: none"> 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.
IF IN EYES	<ul style="list-style-type: none"> 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 INHALED	<ul style="list-style-type: none"> 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.
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 1-800-331-3148 for emergency medical treatment information.	
For Information Regarding the Use of this Product Call 1-800-321-1FMC (1362).	

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 drenched or heavily contaminated with this product. 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.

User Safety Recommendations:

Users should:

- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

Environmental Hazards

This pesticide is toxic to marine/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 rinsate.

Groundwater advisory: The active ingredients in this product are known to leach through soil 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% + 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

SPECTICLE 20WSP Herbicide

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

DO NOT USE FOR THE MANUFACTURING OF FERTILIZER

ACTIVE INGREDIENT:

Indaziflam.....20%

OTHER INGREDIENTS:

.....80%

Total.....100%

EPA Reg. No. 432-1499

EPA Est. 000264-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 1-800-331-2867

FIRST AID

If swallowed:	<ul style="list-style-type: none"> • 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:	<ul style="list-style-type: none"> • 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:	<ul style="list-style-type: none"> • 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 butyl gloves, and shoes plus socks.

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

ENGINEERING CONTROLS STATEMENTS:

When handlers use closed systems or enclosed cabs 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.

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

CLICK HERE TO JUMP TO USE DIRECTIONS



TRIMEC[®]1000

LOW ODOR
BROADLEAF HERBICIDE

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

Mixed • Amine Formula

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

THIS PRODUCT CONTAINS:
237 lbs. 2,4-dichlorophenoxyacetic acid equivalent per gallon or 24.45%.
0.65 lb. (4-[(7)-2-(2-methyl-4-chlorophenoxy)propionyloxy]acetic acid equivalent per gallon or 6.67%.
0.22 lb. 3,6-dichloro-o-anisic acid equivalent per gallon or 2.23%.

Isomer Specific by AOAC Methods.
TRIMEC[®] is a registered trademark of PBI Gordon Corporation.



KEEP OUT OF REACH OF CHILDREN WARNING-AVISO

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 some one to explain it to you in detail.)

KEEP FROM FREEZING

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170.



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

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals
WARNING: Causes substantial but temporary eye injury. Do not get in eyes or on clothing. Harmful if swallowed.

Personal Protective Equipment (PPE)
Some materials that are chemical-resistant to this product are natural rubber. If you want more options, follow the instructions for category A on an EPA chemical-resistance category selection chart.

All mixers, loaders, applicators and other handlers must wear:
• protective eyewear (goggles, face shield, or safety glasses),
• long-sleeved shirt and long pants,
• shoes and socks,
• chemical-resistant gloves (such as natural rubber, selection category A)
• chemical-resistant apron when mixing or loading, cleaning up spills or equipment, or otherwise exposed to the concentrate.

See engineering controls for additional requirements.

Engineering Control Statements
When handlers use closed systems or enclosed cabs 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 Requirements
Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry. Discard clothing and other absorbent material that have been drenched or heavily contaminated with the product's concentrate. Do not reuse them.

User Safety Recommendation s	
• Users should wash hands thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet.	
• Users should remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. If pesticide gets on skin, wash immediately with soap and water.	
• Users should 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 the poison control center or doctor. • Do not give anything by mouth to an unconscious person.
Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact 1-877-800-6556 for emergency medical treatment advice.	
NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage.	

Environmental Hazards
This pesticide is toxic to fish and aquatic invertebrates and may adversely affect non-target plants. 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 aquatic organisms in water adjacent to treated areas. Do not contaminate water when disposing of equipment wash waters or rinsate.

This chemical has properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. Application around a cistern or well 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 way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

Agricultural Use Requirements	
Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170.	
This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.	
Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 48 hours.	
(cont. on next page)	

PULL HERE TO OPEN ►

GROUP 27 HERBICIDE



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

syngenta®

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-L1B 0209
307098**

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*:

dimethenamid-P: (S)-2-chloro-N-[(1-methyl-2-methoxy)ethyl]-N-(2,4-dimethyl-thien-3-yl)-acetamide 63.9%

Other Ingredients**..... 36.1%

Total: 100.0%

* Contains 6.0 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; Perennial ryegrass; Tall fescue
Warm Season	Bahiagrass; Bermudagrass, common; Bermudagrass, hybrid; Buffalograss; Centipedegrass; Kikuyugrass; St. Augustinegrass; Seashore paspalum; Zoysiagrass

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

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.