Challenges in Sports Field Weed Management

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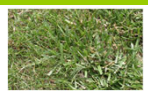

CONFERENCE & TRADE SHOW
FEBRUARY 22-24, 2022

EXTENSION

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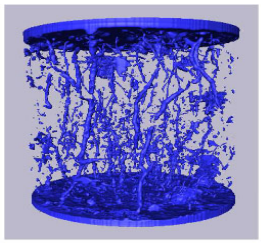

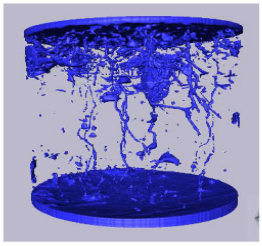

Control Compacted

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Compacted Soil = Prostrate knotweed, goosegrass, and crabgrass

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Cultivation Practices

- Core cultivation
- Slicing
- Spiking
- Deep-tine cultivation
- Drilling
- Solid-tine cultivation

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Participants can help work in the seed

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Weed Control Options in Seedings

Start Early Be Aggressive

- Tenacity (Mesotrione)
  - PRE on bare soil
  - Post over turfed areas
  - Crab + Broadleaves + Nutsedge
- Drive (Quinclorac)
  - Anytime on TF
  - 7 days prior and Post 28 days after emergence on KBG
  - Crab + broadleaves
- SquareOne (Quinclorac+Carfentrazone)
  - Post 7 DAE
  - Crab + Broadleaves

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Weed Control Options in Seedings

- Pylex (Topramezone)
  - Anytime before seeding
  - Grassy and broadleaf weeds
  - Goosegrass
- Tupersan (Siduron)
  - Before seeding
- Quicksilver (Carfentrazone)
  - Post
  - Broadleaves

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YouTube video
https://youtu.be/FaK_985pfNw

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New (or modified) weed control products 2018-2021

- Sure Power (2,4-D ester + triclopyr + fluroxypyr + flumioxazin)
- Boulder 6.3 (triclopyr ester)
- SUREPYC (sulfentrazone)
- SedgeMaster (halosulfuron)
- Vexis (pyrimsulfan)
- NativeKlean (2,4-D + aminopyralid)
- GameOn (2,4-D + fluroxypyr + halauxifen-methyl)

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Sure Power

- 2,4-D ester + triclopyr + fluroxypyr + flumioxazin
- Cool season turf
- 250 broadleaf weeds, including ground ivy and wild violet
- Spray residue should be completely dry prior to entering treated areas as accumulation on tires can lead to tracking
- Avoid applications during conditions of fog, high moisture, and wet foliage
- Avoid applications for at least 14 days following freezing conditions or frost
- Optimal timing: June 15 – September 15

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Boulder 6.3

- triclopyr ester
- Cool season turf except bentgrass
- Good broadleaf spectrum, low cost

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SUREPYC (sulfentrazone)
SedgeMaster (halosulfuron)

- SUREPYC
  - Same AI as Dismiss, similar properties
- SedgeMaster
  - Same AI as SedgeHammer, similar properties

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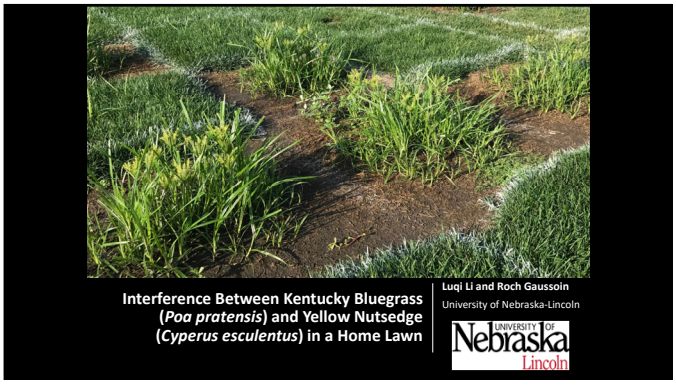

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<6,700 VS. > 44,500 tubers per 1000 sq ft

From 8" dia soil core

Polyculture Sample Monoculture Sample

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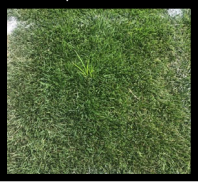
Summary:

- The presence of an actively growing turf impedes tuber and shoot production of yellow nutsedge from 65 to 98 %
- The non-irrigated plots had less yellow nutsedge than ET or overwatered plots in mono- and polyculture
- The non-fertilized plots had less yellow nutsedge than the fertilized plots



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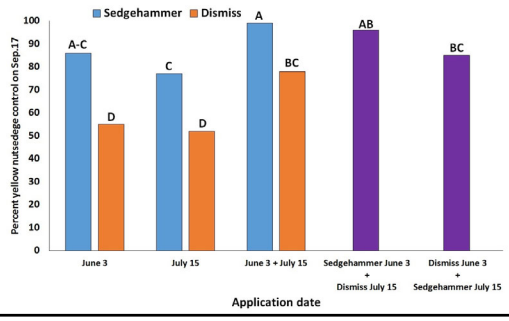
Effect of application timing on yellow nutsedge control when Sedgehammer (1 oz/A) and/or Dismiss (4 oz/A) was applied on June 3 and/or July 15.



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Celero (imazosulfuron)

- Add NIS at 0.25% (v/v)
- Repeat application 21 days after the initial application if needed
- Do not apply to moist or wet turf
- Do not apply to golf course putting greens

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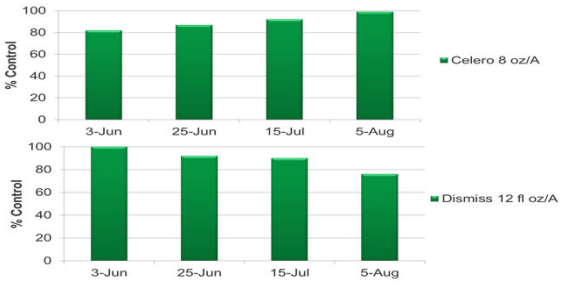
UNL-Mead Site



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Vexis

- pyrimsulfan
- Targets nutsedge
- "shake and bake"
- Granular product
- Does not require watering in
- Convenience

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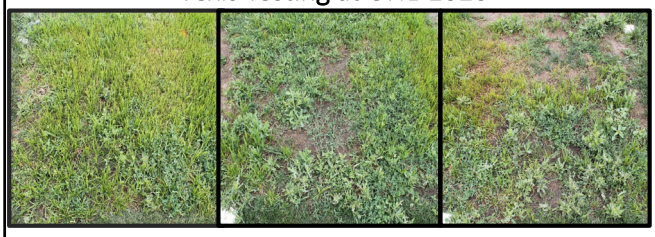
Vexis Testing at UNL-2020



Control | 1 app 3 tiller 40 dait | 2X app 3 tiller 40dait 10dat (2nd)

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Rotating MOA's for Resistance Management

- Resistance in yellow nutsedge has been reported (Tehranchian et al., 2015)
- Rotate halosulfuron, imazosulfuron or pyrimisulfan (***Group 2***) with mesotrione (***Group 27***) or sulfentrazone (***Group 14***) or bentazon (***Group 8***) for postemergence yellow nutsedge control

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How to control yellow nutsedge

- Yellow nutsedge herbicide control programs should be implemented early in the season and in consecutive years
- As early as it is visible – early June
  - Tubers are immature
  - Controls/suppresses tuber formation
  - Herbicides are more readily translocated to roots, rhizomes and tubers
- Sequential application
  - Make a second application 3 or 6 weeks after the initial application
  - Sequential application works better than single app for most herbicides
  - Rotate modes of action

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NativeKlean

- 2,4-D + aminopyralid
- targets broadleaf weeds, including invasive and noxious weeds and woody plants, in native or natural grass areas that are not regularly mowed or maintained
- residual control for more than three months
- native or natural forbs will be injured or controlled
- Economical niche product

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GameOn

- 2,4-D + fluroxypyr + halauxifen-methyl
- broad spectrum, fast acting
- reduced non target injury - 2,4-D choline

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Trial Info

- Location: Mead, NE (John Seaton Anderson Turf Research Farm)
- Kentucky bluegrass with heavy dandelion and white clover
- GameOn Specialty Herbicide @3, 3.5 and 4.0 pt/A
  - 2 Industry standards
  - 1 experimental
- UTC

- Application date: October 2
- Image taken in the spring

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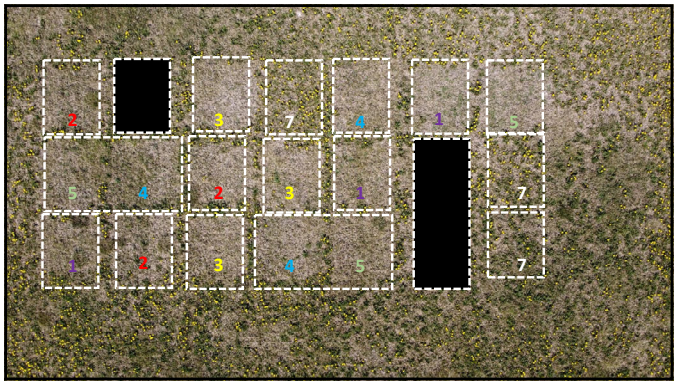

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Prostrate knotweed

- Summer annual….sort of
- ultimate indicator weed for compacted, low O_2 soils
  - *alleviate problem, minimize weed opportunity*
- early germination and grass-like seedling stage compound id and control
- post germination growth rate increases exponentially, creating a dense mat of residue
- dead wire-like stems persist through winter
- Once established, control is very difficult

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Preemergence Control

- Late fall (November or December) applications of isoxaben (Gallery, Isoxaben 75WG)
- Other preemergence herbicides will work, but less effective than isoxaben
- Late winter apps work, but spraying conditions may be unfavorable
  - *dead wire-like stems persist through winter to ID hot spots*
- It is difficult to predict when prostrate knotweed might germinate

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Postemergence Control

- 2,4-D by itself will provide only fair control of prostrate knotweed
- 2,4-D + triclopyr (Turflon Ester, Ultra or Triclopyr 4) or dicamba (Banvel, Vanquish) provide excellent control. Other products that contain 2,4-D and triclopyr include 4-Speed XT, Chaser, Chaser 2 Amine, Momentum FX2, Sure Power, Turflon II amine, and TZONE
- Combination products that contain 2,4-D and dicamba (Trimec 992 and SpeedZone) provide good control
- ***Hit it hard and hit it early***

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Change-Up (MCPA, fluroxypyr and Dicamba) Efficacy on Prostrate Knotweed

Spring and Summer, 2019

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Visual percent control of prostrate knotweed following treatment with Change-Up. Initiated April 20, 2019.

	13 DAA May 3	26 DAA May 16	41 DAA May 31	55 DAA June 14	68 DAA June 27
Change-Up[2]	42.5 A	81.3 A	81.3 A	77.5 A	72.5 A

1 Change-Up applied at 3 pt/A

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Table 2. Percent control of prostrate knotweed following treatment with Change-Up applied at 3 pt/A . Initiated July 12, 2019.

	14 DAA July 25	22 DAA August 2	36 DAA August 16	42 DAA August 22	49 DAA August 29	64 DAA September 13
Change-Up[2]	92.5 A	100 A	100 A	100 A	100 A	100 A

1 Change-Up applied at 3 pt/A

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Summary

- **Spring:** Change-Up reduced prostrate knotweed populations up to 41 DAA
  - Change-Up provided >70% control, but efficacy was reduced
  - Make multiple applications if applying early in the spring to compensate for germination post application
- **Summer:** Knotweed control was increased when applied in the summer
  - Change-Up provided 100% control

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Organic/natural weed control options

- Preemergence
  - Corn gluten meal
  - Distiller grains
- Postemergence
  - multiple
- Non-selective
  - multiple

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Selective postemergence trial

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Materials and Methods

Spring Applications: May 4 and May 31, 2018 (4 weeks after initial treatment)
Fall Applications: September 13 and October 5, 2018

Product	Active Ingredient	Rate
Untreated Check	N/A	N/A
Iron X	26.52% Iron HEDTA	25.2 oz/M
A.D.I.O.S.	Sodium chloride + NIS	1 lb product/gallon
ICT Halo	Eugenol, Clove Oil	10 oz/M
Fiesta Weed Killer	26.52% Iron HEDTA	12.6 fl oz/M or 25.2 fl oz/M
Fiesta Weed Killer + Xiameter OFX-0309	26.52% Iron HEDTA and Silicon Adjuvant	12.6 oz/M
Natria Lawn Weed and Disease Control	26.52% Iron HEDTA	25.2 fl oz/M
Trimec Classic	2,4-D	4 pt/A
Borax	Boric Acid	Spray to runoff
EcoSmart Weed & Grass Killer	Rosemary Oil	Spray to runoff
AgraLawn Weed and Crab Killer	Cinnamon	Shake on foliage

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Iron X	26.52% Iron HEDTA	25.2 oz/M
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ICT Halo	Eugenol, Clove Oil	10 oz/M
Fiesta Weed Killer	26.52% Iron HEDTA	25.2 fl oz/M
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Trimec Classic	2,4-D	4 pt/A
Borax	Boric Acid	Spray to runoff
EcoSmart Weed & Grass Killer	Rosemary Oil	Spray to runoff
AgraLawn Weed and Crab Killer	Cinnamon	Shake on foliage
Fiesta Weed Killer	26.52% Iron HEDTA	12.6 fl oz/M

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Conclusions

- Trimec Classic was always numerically the top performer for both trials
- Products containing iron HEDTA and ICT Halo often were statistically as effective as Trimec Classic
  - Iron X
  - Fiesta Weed Killer (full rate or w/ Xiameter)
  - Natria Lawn Weed and Disease Control
- When using most organics, multiple applications will be required
  - Unpublished UNL study showed significantly diminished effectiveness if no reapplication is made

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Cost Analysis

Product	Rate	Cost per 1000 sq. ft.
Untreated Check	N/A	--
Iron X	25.2 oz/M	$102.00
A.D.I.O.S.	1 lb product/gallon	$202.74
ICT Halo (name changed to Branch Creek Weed Shield)	10 oz/M	$6.58
Fiesta Weed Killer	25.2/12.6 fl oz/M	$16.73/$8.37
Fiesta Weed Killer + Xiameter OFX-0309	12.6 oz/M	$38.78
Natria Lawn Weed and Disease Control	25.2 fl oz/M	$17.85
Trimec Classic	4 pt/A	$0.61
Borax	Spray to runoff	$5.00/ 64 oz
EcoSmart Weed & Grass Killer	Spray to runoff	$25/ 64 oz
AgraLawn Weed and Crab Killer	Shake on foliage	$23/ 2 lb
Fiesta Weed Killer	12.6 fl oz/M	$8.37

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Organic glyphosate alternatives (non-selective)

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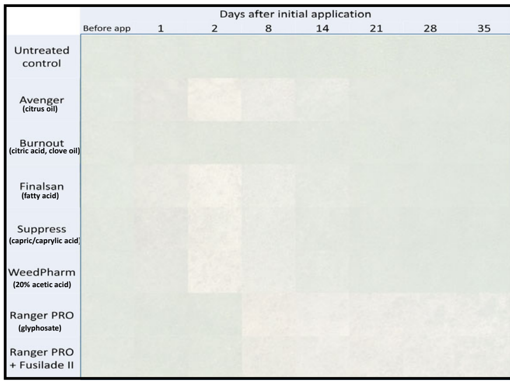

Organic alternatives to glyphosate applied to hybrid bermudagrass in central California

Credit: Maggie Reiter
@maggie_reiter
University of California
Cooperative Extension

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Comparison of Acetic Acid to Glyphosate for Weed Suppression in the Garden

Jacob C. Domenghini[1]

ADDITIONAL INDEX WORDS. garden establishment, organic garden, vinegar

SUMMARY. Interest in organic vegetable gardening has increased in recent years. Organic growers are searching for alternatives to glyphosate for weed suppression. This study was conducted twice. Each data collection period lasted 132 days during the growing seasons of 2016 and 2017 in Richmond, KY. Treatments included application of glyphosate, vinegar [5% acetic acid (AA)], 20% horticulture grade vinegar (20% AA), 30% horticulture grade vinegar (30% AA), and a negative control. Treatments were applied in a factorial arrangement with two application periods (fall and spring or spring only). The percentage of weed cover within plots was evaluated visually with a 0–10 rating scale (0 – 0% weeds or 100% of the plot is dead; 5 – 50% weed growth; 10 – 100% of the plot is alive with weeds). All plots began the study with a rating of 10. After the initial treatment applications, visual ratings of the 5%, 20%, and 30% AA declined to a rating of 0 within 48 hours, whereas the glyphosate required 7 days ($P - 0.05$). Treatments were reapplied to part of the plots (subplots) in the spring when ≈50% of the plot had regrown with weeds. Glyphosate required 71 to 80.8 days to reach 50% regrowth and required only one retreatment. The 20% and 30% AA applications required three (2016) and four (2017) retreatments. Glyphosate has proven to be more effective at weed control in vegetable gardens when compared with vinegar, although 20% AA and 30% AA are viable alternatives.

control weeds globally (Malik et al., 1989). With conservation tillage systems, glyphosate is commonly applied before planting (Bruff and Shaw, 1992) and has been successful at controlling weeds with some residual control (Buhler and Werling, 1989; Wilson and Worsham, 1988). Several studies have evaluated the effectiveness of glyphosate at controlling weeds in crop production systems (Culpepper, 2006; Griffith et al., 2006; Norris et al., 2001; Shaw and Arnold, 2002), whereas others have compared glyphosate with natural products to control weeds (Abouziena et al., 2008; Patton and Weisenberger, 2012; Young, 2004).

Research of the use of natural products to control weeds before garden establishment with continued control throughout the growing season is limited. Additionally, research comparing the efficacy of weed suppression treatments applied in the fall for a spring garden compared to spring-only weed

Table 1. Summary of the weed control products with active ingredients and manufacturer sources used during weed suppression studies in 2016 and 2017 in Richmond, KY.

Weed control product	Product name	Concn in spray solution	Product source or manufacturer
Acetic acid (5%)	Great Value distilled white vinegar	Undiluted	Walmart, Bentonville, AR
Acetic acid (20%)	Natural safe 20% vinegar	Undiluted	Factory Direct Chemicals, Long Island, NY
Acetic acid (30%)	Natural safe 30% vinegar	Undiluted	Factory Direct Chemicals
Glyphosate	FarmWorks 41% glyphosate plus	1.6% a.i.	Ragan and Massey, Ponchatoula, LA

- Results indicated that glyphosate, when compared with AA, is the more effective weed suppression method.
- Although all three AA treatments (5%, 20%, and 30%) initially damaged weeds faster than glyphosate, AA did not control weeds for an extended period like glyphosate.
- The 20% and 30% AA applications required 3 to 4 treatments for equivalent control to glyphosate.

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Organic weed control synopsis

- Pro's
  - Viable options available, with research ongoing
  - Market or regulatory niche products
- Con's
  - Product cost
  - Labor cost
  - Contact vs systemic
  - More applications
  - Selectivity
  - Efficacy

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Turfgrass Weed Control for Professionals

https://mdc.itap.purdue.edu/item.asp?Item_Number=TURF-100

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Format: Book

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Sedge Control Herbicides

From - Turfgrass Weed Control for Professionals

Sedge Control and Turfgrass Tolerance Ratings

Herbicide	Sedge Control: Sedges and Kyllinga				Turf Tolerance: Cool-season						Turf Tolerance: Warm-season		
	annual sedge	false-green kyllinga	purple nutsedge	yellow nutsedge	annual bluegrass	creeping bentgrass	fine fescue	Kentucky bluegrass	perennial ryegrass	tall fescue	bermudagrass	buffalograss	zoysiagrass
2,4-D + fluroxypyr + triclopyr + sulfentrazone (Momentum 4-Score)	P	P	P	F	S	S	S	S	S	S	NR	NR	NR
2,4-D + MCPA + dicamba + sulfentrazone (Triad SFZ Select)	P	P	P	F	S	S	S	S	S	S	S	S	S
2,4-D + quinclorac + dicamba + sulfentrazone (Q4 Plus)	P	P	P	F	S	NR	S	S	S	S	S	NR	S
2,4-D + triclopyr + dicamba + sulfentrazone (Foundation)	P	P	P	F	S	NR	S	S	S	S	NR	NR	NR
bentazon (Basagran T/O)	G	F-G	P	F	S	S	S	S	S	S	S	S	S
dimethenamid (Tower[1])	G	G	F	F-G	NR	NR	NR	NR	NR	NR	S	S	S
dimethenamid + pendimethalin (FreeHand)	G	G	F	F-G	NR	NR	NR	NR	NR	NR	S	S	S
flazasulfuron (Katana)	G	G	G-E	G-E	NR	NR	NR	NR	NR	NR	S	S	S
halosulfuron (SedgeHammer)	G	F	G	G-E	NR	S	S	S	S	S	S	S	S
halosulfuron + dicamba (Yukon[2])	G	F	G	G-E	NR	S	S	S	S	S	S	S-I	S
imazapic (Plateau)	F	F	F	F	NR	NR	NR	NR	NR	NR	S	S	NR
imazaquin (Image 70DG)	G	G-E	G	F	NR	NR	NR	NR	NR	NR	S	NR	S
imazosulfuron (Celero)	G	E	G-E	G-E	NR	S	S	S	S	S	S	NR	S
mesotrione (Tenacity)	P	P	P	G	NR	NR	S	S	S	S	NR	S	NR
metolachlor (Pennant MAGNUM)	G	F	F	G	NR	NR	NR	NR	NR	NR	S	NR	S

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Other resources:

- http://www.mobileweedmanual.com/ **Jim Brosnan, Ph.D.**

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