

# A new herbicide for weeds in bermudagrass and zoysiagrass

Controlling cool-season grasses and weeds in bermudagrass and zoysiagrass just got a little easier.

Fred Yelverton, Ph.D.

Recently, the EPA approved a new herbicide for post-emergence control of various weeds commonly found on golf courses and sod farms. Foramsulfuron (sold under the trade name Revolver) is currently registered for use only on zoysiagrass and bermudagrass, including bermudagrass putting greens. To date, this product is approved for use on common, Tifway, Tifgreen, Tifsport, Tifdwarf and Vamont bermudagrasses, and Meyer zoysiagrass. Turfgrass managers should test the product before using it on other cultivars.

## What is foramsulfuron?

Foramsulfuron belongs to a relatively new family of herbicides known as the sulfonylureas. Sulfonylurea herbicides are characterized by selective, post-emergence control of grasses and broadleaf weeds in turf, forestry, horticultural and field crops. Members of this family of herbicides are also known for being highly selective (for instance, they are highly effective on the weeds they control, but the number of weed species controlled is small compared to older herbicides). They are also known for having low use rates. Several other sulfonylurea herbicides, including chlorsulfuron (Corsair), halosulfuron (Manage), metsulfuron (Manor or Blade) and rimsulfuron (TranXit GTA), are registered for use on golf courses.

Unlike other sulfonylureas, foramsulfuron is sold as a liquid formulation. Its use rates are also higher than those of other sulfonylureas, although the pounds of active ingredient per acre are still quite low. Cool-season turfgrasses have some tolerance to chlorsulfuron, halosulfuron and metsulfuron, but they have no tolerance to foramsulfuron. Foramsulfuron, therefore, will



Photos courtesy of Fred Yelverton

Three weeks after treatment, plots with Revolver applied at 0.2 ounce per 1,000 square feet (left) still had perennial ryegrass, whereas in plots where Revolver was applied at a higher rate of 0.4 ounce per 1,000 square feet (right), much of the perennial ryegrass was already dead or dying.

never be used on cool-season grasses unless they need to be removed from bermudagrass

or zoysiagrass. In fact, removal of cool-season grasses from warm-season grasses will likely be one of the major uses of foramsulfuron.

Revolver will be sold as a suspension concentrate containing 2.34 percent or 0.19 pound active ingredient per gallon of foramsulfuron. The label carries the signal word "Caution," which places it in the least toxic category for pesticides. (Signal words are ordered from "Caution" to "Warning" to "Danger," with Caution the least toxic and Danger the most toxic.) Foramsulfuron is not a restricted-use pesticide.

## KEY points

More Info: [www.gcsaa.org](http://www.gcsaa.org)

**The EPA** has approved a new herbicide that controls weeds and removes cool-season grasses in overseeded and nonoverseeded bermudagrass and zoysiagrass.

**Foramsulfuron (Revolver)** is known to control annual bluegrass, rough bluegrass, perennial ryegrass, tall fescue, creeping bentgrass, goosegrass, centipede grass and henbit.

**Foramsulfuron** removes overseeded perennial ryegrass very quickly.

## Weeds controlled by foramsulfuron

Annual bluegrass (*Poa annua*), rough bluegrass (*P. trivialis*), perennial ryegrass (*Lolium perenne* L.), tall fescue (*Festuca arundinacea* Schreb.), creeping bentgrass (*Agrostis*

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*stolonifera*) and other cool-season grasses are controlled by foramsulfuron, as are goosegrass, centipede grass and henbit. Because foramsulfuron is new, the complete spectrum of weeds controlled is not yet known. However, research has shown that the above-mentioned species are effectively controlled. The rates will range from 0.1 to 0.6 ounce/1,000 square feet or 4.4 to 26.2 ounces/acre.

It is recommended that foramsulfuron be applied in at least 25 but not more than 60 gallons of water per acre. If the pH of the spray solution is less than 6, a buffering agent is recommended. As with any herbicide, certain precautions should be followed. The following are the most notable:

- Apply to actively growing weeds. Weeds

under stress (drought, etc.) will not be controlled effectively.

- Rainfall within two hours after application may reduce control.
- Do not use more than 1.25 ounces/1,000 square feet (54.5 ounces/acre) per season.
- Apply foramsulfuron within 24 hours of mixing.
- Do not apply foramsulfuron within two weeks of bermudagrass sprigging.
- Do not apply foramsulfuron within two weeks before overseeding bermudagrass with cool-season grasses.
- Avoid excessive aerification and verticutting within one week of application.
- Do not use on residential turf.
- Do not collect grass clippings for mulch or compost.

## Research with foramsulfuron

University researchers have tested foramsulfuron for the past three years. The removal of perennial ryegrass (and other overseeded cool-season grasses) from bermudagrass has been investigated extensively, and there is little doubt that foramsulfuron will be effective for this use. The data shown here are representative of three years of research at multiple locations.

### Removing perennial ryegrass

In a test conducted at Prestonwood Country Club in Cary, N.C., foramsulfuron was very effective in removing perennial ryegrass from a fairway. Foramsulfuron applied at 0.4 or 0.6 ounce/1,000 square feet essentially removed the perennial ryegrass in four weeks (86 and 89 percent control, respectively). In this test, the lowest rate of foramsulfuron was not effective in removing perennial ryegrass.

Metsulfuron (Manor) was effective in removing perennial ryegrass and is considered a standard treatment for this purpose, but, as the data indicate, metsulfuron did not act as quickly as foramsulfuron to kill perennial ryegrass. Note that as early as three weeks after treatment (when these pictures were taken), the perennial ryegrass in foramsulfuron-treated plots looked dead. The only turf visible in these pictures is the underlying bermudagrass.

### Speed of control

In general terms, the speed at which herbicides control perennial ryegrass is not considered a negative or a positive. Individual superintendents need to determine the speed at which they want to control perennial ryegrass.

## FORAMSULFURON VS. WEEDS

Species controlled	Application rate*	
	Ounce/1,000 square feet	Ounces/acre
Perennial ryegrass	0.2, 0.4	8.8, 17.4
Volunteer perennial ryegrass, tall fescue & other cool-season grasses	0.2, 0.4, 0.6	8.8, 17.4, 26.2
<i>Poa annua</i>	0.2, 0.4	8.8, 17.4
<i>Poa trivialis</i> , <i>P. annua</i> , & creeping bentgrass in overseeded bermudagrass greens, tees, collars & approaches	0.1, 0.2, 0.4	4.4, 8.8, 17.4
Goosegrass	0.4, 0.6	17.4, 26.2
Centipede grass	0.6	26.2
Henbit	0.4	17.4

\*Multiple applications may be required for goosegrass, volunteer perennial ryegrass or where the rate of 0.1 ounce/1,000 square feet rate is used. For goosegrass, two applications spaced seven to 14 days apart are recommended. The lower rate may be used for goosegrass in the one- to three-leaf stage, but the higher rate should be used on goosegrass with one to three tillers.

## REMOVAL OF PERENNIAL RYEGRASS

Treatment	Rate		% perennial ryegrass control		
	(ounce/1,000 square feet)	(ounces/acre)	2 WAT	4 WAT	8 WAT
Foramsulfuron	0.2	9	49	23	60
Foramsulfuron	0.4	18	58	86	100
Foramsulfuron	0.6	28	55	89	100
Metsulfuron	0.01	0.5	50	40	85

WAT = weeks after treatment.

Removal of perennial ryegrass from an overseeded bermudagrass fairway at Prestonwood CC, Cary, N.C., 2001. Applications were made May 7, 2001. Mowing height was 0.5 inch. A nonionic surfactant at 0.25 percent volume/volume was added to metsulfuron.

grass. For instance, pronamide (Kerb) is highly effective for removing perennial ryegrass and is also the slowest acting of all the available products. Many superintendents like the fact that it controls perennial ryegrass slowly because the activity is so gradual that there is seldom the appearance of dying turf. Other superintendents (or superintendents in other situations) prefer very rapid control.

All of the products that remove perennial ryegrass (metsulfuron, rimsulfuron, pronamide and foramsulfuron) are effective; only the speed of control differs. Ranking the products from slowest to fastest according to the speed with which they control perennial ryegrass shows that pronamide is slower than metsulfuron, which is slower than foramsulfuron, which is about equal to rimsulfuron. This speed of control is apparent in the photographs.

The speed at which foramsulfuron controls perennial ryegrass provides insight into how it should be used. Because foramsulfuron controls perennial ryegrass very rapidly, this product should be used as a late transition aid. To state it another way, the underlying bermudagrass must be actively growing before foramsulfuron should be used. If foramsulfuron is used too early (before the bermudagrass is actively growing), then the perennial ryegrass will die before the bermudagrass is able to fill in the voids from the perennial ryegrass, and the resulting overall turf quality will be poor.

### 'Clumpy' perennial ryegrass

When perennial ryegrass survives the summer, or when it escapes the overseeded area, this turf species can become clumpy and is unsightly. In addition, when perennial ryegrass becomes clumpy, it is more difficult to control than perennial ryegrass growing in a dense stand; it is one of the more problematic weeds for golf courses that overseed. In fact, pronamide is not effective for the control of clumpy perennial ryegrass, but foramsulfuron and metsulfuron have been shown to control it effectively.

### *Poa trivialis*

Foramsulfuron has also been shown to effectively control *Poa trivialis* overseeded into bermudagrass on a putting green. In research conducted by Bert McCarty, Ph.D., at Clemson University, even the lowest rate (0.1 ounce/1,000 square feet) was effective in removing *P. trivialis* from bermudagrass.

## POA TRIVIALIS CONTROL

Treatment	Rate (ounce/1,000 square feet)	% control of <i>Poa trivialis</i>	
		4 WAT	6 WAT
Foramsulfuron	0.1	24	90
Foramsulfuron	0.2	67	95
Foramsulfuron	0.4	83	95

WAT = weeks after treatment.

Removal of *P. trivialis* from an overseeded Tifeagle putting green, Clemson University. Applications were made April 29, 2002.



Although both foramsulfuron (Revolver) and metsulfuron (Manor) are effective in removing perennial ryegrass, foramsulfuron acts more quickly. Three weeks after treatment, the perennial ryegrass in the plots treated with Revolver at 0.6 ounce per 1,000 square feet (left) looked dead, whereas perennial ryegrass in plots treated with Manor at 0.01 ounce per 1,000 square feet (right) did not.



Pronamide (Kerb) is the slowest acting of the herbicides that control perennial ryegrass. Three weeks after treatment, the appearance of the test plot at left, which was treated with Kerb at 0.5 pounds a.i./acre, is not much different from that of the untreated plot on the right.

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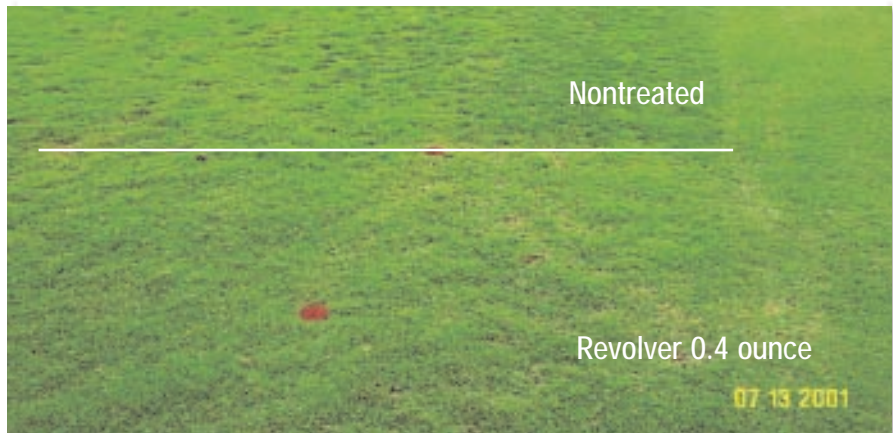
## Poa annua

In nonoverseeded bermudagrass, foramsulfuron can also be used to control annual bluegrass (*P. annua*). Annual bluegrass control in nonoverseeded bermudagrass can be difficult in areas where bermudagrass does not go completely dormant. Where bermudagrass does go completely dormant, glyphosate (Roundup, etc.) can be used for annual bluegrass control, but it cannot be used in areas that fail to go dormant. Therefore, foramsulfuron can be an effective management tool for golf course superintendents who cannot use glyphosate.

Foramsulfuron removed annual bluegrass effectively, but it took approximately 10 weeks to get complete control. Foramsulfuron was as effective as glyphosate in removing annual bluegrass from bermudagrass.

## Summary

In summary, foramsulfuron will be an additional tool for the management of certain weeds for turfgrass managers with bermudagrass and zoysia. It is highly toxic to cool-season turfgrass species and, therefore, will be an effective tool for removing overseeded cool-season turfgrass species from bermudagrass. A common question that will arise is the safety of foramsulfuron around creeping bentgrass putting greens or other desir-



Applied at 0.4 ounce/1,000 square feet, Revolver controlled clumpy perennial ryegrass effectively (foreground). The untreated area is in the background of the photo.

able cool-season grasses. Foramsulfuron is a sulfonyleurea, and most members of the herbicide family will move laterally given favorable conditions for movement (for instance, significant rainfall soon after herbicide application when soil conditions are already saturated). Therefore, do not apply foramsulfuron up-slope of desirable cool-season turf.

Foramsulfuron will also be useful in removing annual bluegrass from nonoverseeded bermudagrass or zoysiagrass. It can also effectively control goosegrass, but repeat applications are usually necessary. Additional research and use by superintendents will help identify additional weeds controlled by foramsulfuron.

## Acknowledgments

This research was funded in part by the North Carolina Turfgrass Foundation.

## References

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## CONTROL OF CLUMPY PERENNIAL RYEGRASS

Treatment	Rate		% control clumpy perennial ryegrass		
	(ounce/1,000 square feet)	(ounces/acre)	2 WAT	4 WAT	8 WAT
Foramsulfuron	0.4	18	0	83	95
Metsulfuron	0.02	1.0	0	74	93

WAT = weeks after treatment.

Effects of foramsulfuron and metsulfuron on control of clumpy perennial ryegrass, Sandhills Research Station, Jackson Springs, N.C., 2001. Applications were made July 13, 2001. A nonionic surfactant at 0.25 percent volume/volume was added to metsulfuron.

## POA ANNUA CONTROL

Treatment	Rate		% perennial ryegrass control		
	(ounce/1,000 square feet)	(ounces/acre)	3 WAT	6 WAT	10 WAT
Foramsulfuron	0.4	18	0	38	60
Glyphosate	0.37	16	0	69	89

WAT = weeks after treatment.

Control of annual bluegrass (*Poa annua*) in nonoverseeded bermudagrass, Quail Ridge GC, Sanford, N.C., 2001. Applications were made on Dec. 18, 2001; annual bluegrass was in the zero- to two-tiller stage.