

SU Herbicides Control Weeds, Poa in Advance of Overseeding Program

By Sowmya (Shoumo) Mitra

Several sulfonylurea herbicides (SU) are being introduced into the turf market for selective control of broadleaf weeds; difficult-to-control grasses like annual bluegrass (*Poa annua*), clumpy ryegrass (*Lolium perenne*), creeping bentgrass (*Agrostis palustris* Huds.); and sedges like yellow nutsedge (*Cyperus esculentus*), purple nutsedge (*Cyperus rotundus*), green kyllinga (*Kyllinga brevifolia*) and false green kyllinga (*Kyllinga gracillima*).

The SU herbicides provide superintendents with tools to control weeds before overseeding warm-season turfgrasses and controlling cool-season turfgrasses during spring transition.

Some SU herbicides, such as Manage (halosulfuron), can be used to selectively control sedges in cool-season turfgrasses while some, such as Monument (trifloxysulfuron), can control sedges in only warm-season turfgrasses

(Murphy et al., 2004). Trifloxysulfuron (Monument) has been reported to control various sedges and should be applied as a late-spring transition aid in removing perennial ryegrass since it controls perennial ryegrass rapidly (Yelverton, 2004).

SU herbicides tend to move laterally, so application of SU's in saturated soils should be avoided. To reduce lateral movement, a short irrigation (0.25 inch or 0.6 centimeter) can be applied after herbicide application (Yelverton, 2004). Hydrolysis of SU herbicides, which leads to degradation of the parent herbicide molecule, is favored under acidic soil pH conditions compared to neutral and basic soil pH conditions (Sarmah et al, 2000).

SU herbicides have been used in agricultural crops for more than 25 years, and numerous weed species have been reported to have developed

resistance to these acetolactate synthase (ALS) inhibiting herbicides (SU's and imidazolinone). Annual ryegrass (*Lolium rigidum*) has been reported to be resistant to ALS-inhibiting herbicides, which might involve two mechanisms: increased metabolism of the herbicides and/or an herbicide-insensitive ALS enzyme (Christopher et al., 1992). Hence, care should be taken in rotating SU herbicides with other herbicides with different modes of action.

Poa control before overseeding

Poa annua infestation in an overseeded stand of perennial ryegrass is a major problem for superintendents. Introduction of various sulfonylurea herbicides has given superintendents new tools in managing *Poa annua*.



Single application and sequential applications of Monument 75 WG, applied at 7.06 g/acre and 9.33 g/acre, were very effective in controlling annual bluegrass on GN-1 bermudagrass maintained under fairway management conditions. The photograph was taken 50 days after treatment, and the plots in the back are the untreated plants, with a dense stand of annual bluegrass.

The best strategy to control *Poa* is to apply sulfonyleurea herbicides before overseeding, but care should be taken not to apply the herbicides too close to overseeding. Monument, Revolver, TranXit, and Certainty are very effective in controlling annual bluegrass. Since sulfonyleurea herbicides are systemic in nature, the absorption, translocation and inhibition of the ALS enzyme takes at least 14 days to provide optimum control of *Poa*.

Monument application at 7.06 grams (g)/acre (0.24 ounces (oz)/acre) can control over 90 percent of the *Poa annua* population within 28 days after application. In our experiments, a lower rate of application of Monument (7.06 g/acre) was as effective as a higher rate of application (9.33 g/acre) for controlling *Poa*.

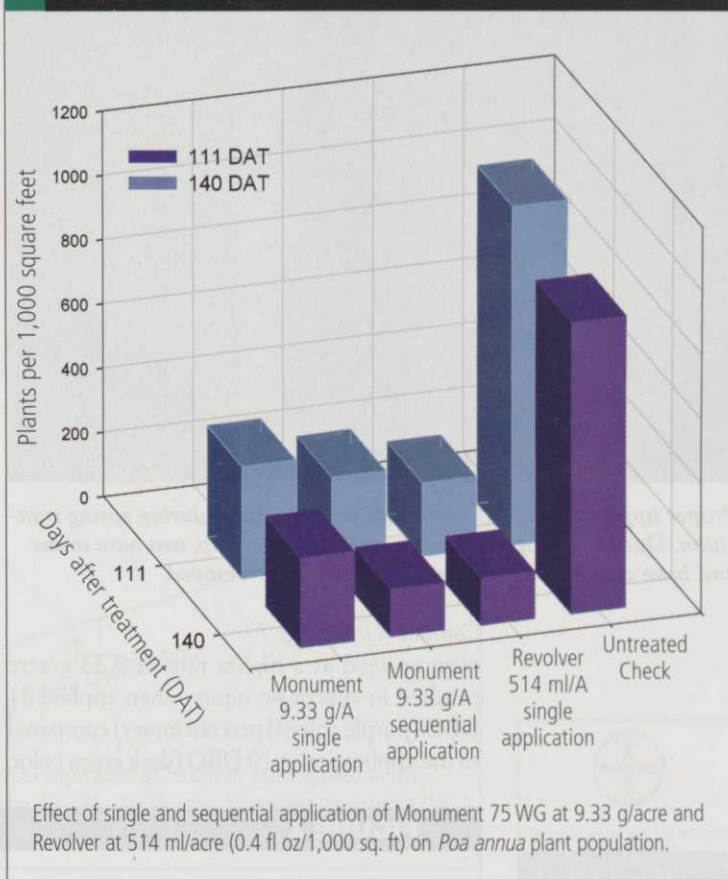
Revolver applied at 6 milliliter (ml) per 1,000 square feet (0.2 fluid [fl] ounces/1,000 square feet) controlled over 90 percent of *Poa* within 28 days after treatment (DAT). Optimum control was achieved between 30 DAT and 60 DAT. Efficacy of a single application of Revolver reduced after 90 DAT. Sequential application of sulfonyleurea herbicides are more effective in controlling *Poa* compared to a single application. Sequential application of Revolver within four weeks to six weeks after the first application would increase the efficacy of Revolver in controlling *Poa* over a longer period.

Certainty is also effective in controlling *Poa* when applied at 75 g/acre rate. In our experiments optimum control was achieved between 21 and 45 DAT with a single application of Certainty. The efficacy of a single application of Certainty reduced after 75 DAT. Sequential applications increased the window for *Poa* control. *Poa* plants are very aggressive and are prolific seedhead producers so they start to produce new plants as soon as the efficacy of sulfonyleurea herbicides reduces. Hence, sequential applications are needed to achieve long-term control of *Poa* population.

Monument application at 9.33 g/acre controlled *Poa* effectively and the optimum level of control was achieved between 30 DAT and 70 DAT. The efficacy of a single application of Monument reduced after 80 DAT. An experiment was conducted on dormant bermudagrass to evaluate the efficacy of *Poa* control with two different rates of Monument (7.03 g/acre and 9.33 g/acre).

Poa annua plants were counted in a 25-square-foot grid and then extrapolated to the number of plants in 1,000 square feet. Sequen-

FIGURE 1



tial applications of Monument at 9.33 g/acre and Revolver at 514 ml/acre (17.4 fl oz/acre or 0.4 fl oz/1,000 square feet) were very effective in controlling *Poa annua* until 140 DAT (Figure 1).

Ryegrass injury

SU herbicides are wonderful tools in controlling weeds before overseeding bermudagrass tees and fairways, but the biggest problem with these products is the chances of injury to ryegrasses. Hence, the application timing of the SU herbicides is very important.

In our experiments, minimum injury to perennial ryegrass was observed with 9.33 g/acre rate of Monument when applied 21 days before overseeding (DBO) compared to the application made 10 DBO (Figure 2). The extent of injury was not very severe (approximately 12 percent injury). The ryegrass was stunted and showed some yellowing after eight weeks after overseeding (WAO).

The percentage of ryegrass injury is plotted as a contour diagram with colors. Monument

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Proper application of SU herbicides is very critical during spring transition. Due to improper coverage and spray overlap, two bare areas had been created where the ryegrass has been removed.

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even applied at a higher rate of 9.33 g/acre resulted in almost no injury when applied 21 DBO (purple color, 0 percent injury) compared to the application at 10 DBO (dark green color,

6 percent injury) when observed two WAO.

Monument applied closer to the overseeding date (10 DBO) resulted in higher amount of injury which is depicted by the orange color (12 percent injury) compared to the application made at 14 DBO (light green color, 8 percent injury) or the application made at 21 DBO (dark green color, 6 percent injury) at 12 WAO. Stunting and chlorosis of ryegrass was observed later on after eight WAO. The reason for a delayed response could be due to desorption of the herbicide molecule into the soil solution slowly over a long period of time.

The experiment was conducted on a clay loam soil. Bermudagrass (GN-1 and Tifway) were maintained under fairway management conditions (mowed at 0.5 inches) with low nitrogen fertility (4 pounds [lbs] of nitrogen [N]/1,000 square feet per year).

The herbicide adsorbed strongly on the fine textured soil after application and was not present in the soil solution. Slowly over a period of time the herbicide desorbed from the solid surface and dissolved in the soil solution. The ryegrass plants then picked up the herbicide and



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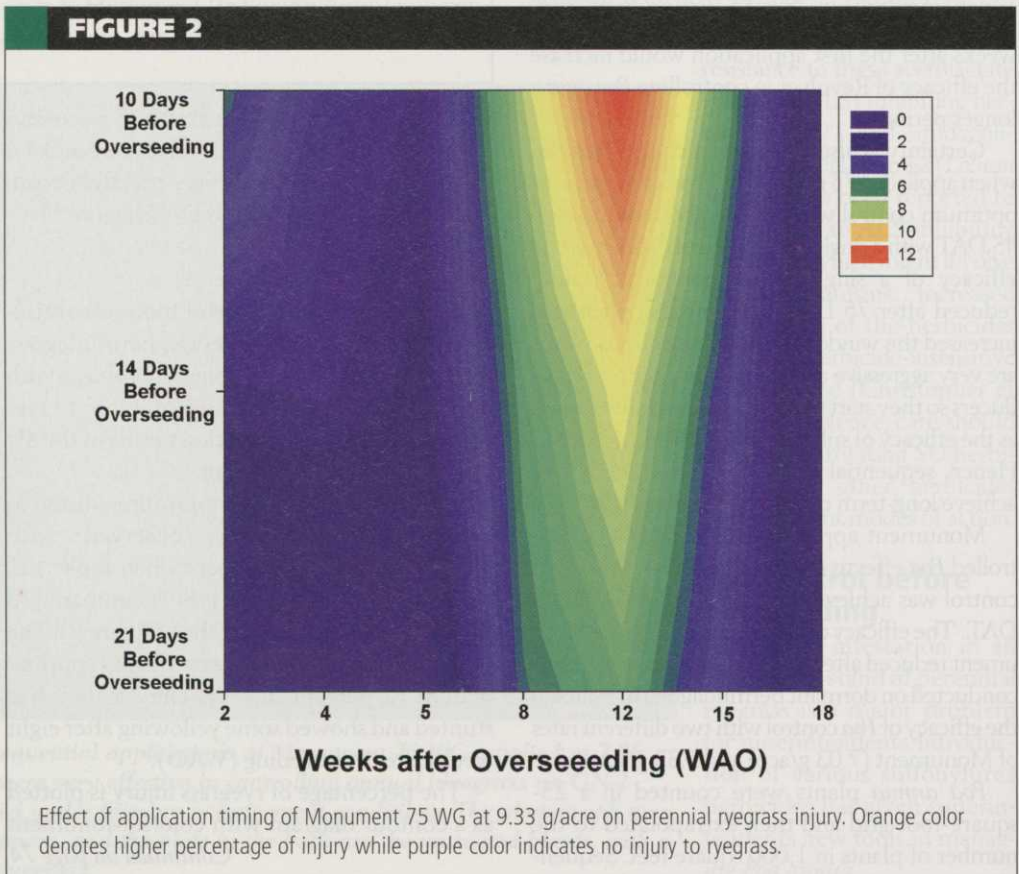
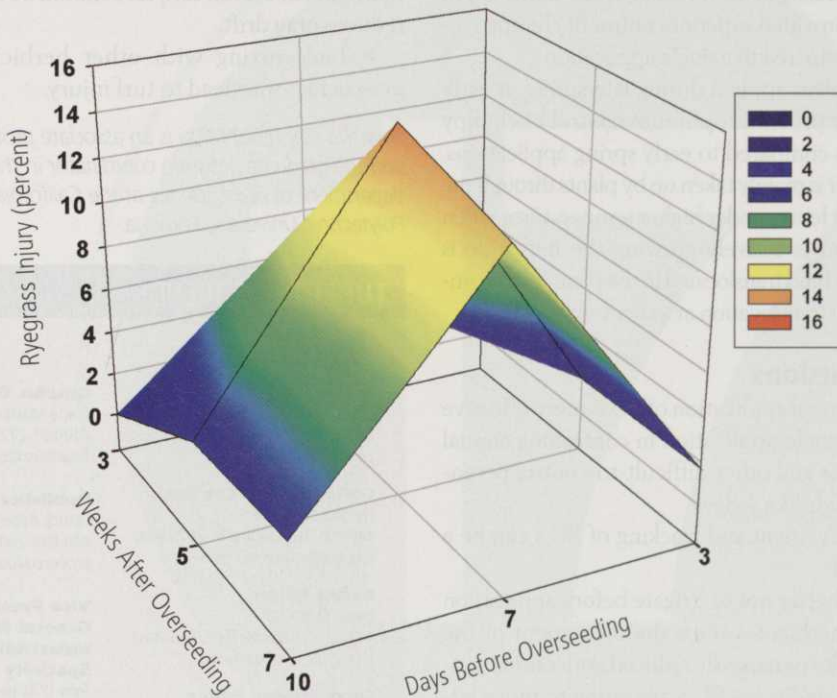


FIGURE 3



Perennial ryegrass injury as observed with Certainty 75 WDG application at 36 g/acre when applied to the bermudagrass 10, seven and three days before overseeding. Orange color denotes 16 percent injury while the purple color indicates 0 percent injury to perennial ryegrass.

some yellowing was observed.

Maximum ryegrass injury (about 12 percent injury, three WAO) with Certainty applied at 36 g/acre rate was observed in our experiments when the herbicide was applied seven days before overseeding (Figure 3).

No injury to ryegrass was observed when Certainty was applied at 27 g/acre 10 DBO. Application of glyphosate (Roundup Pro) at 6 oz/acre (0.4 lites [L]/hectare [ha]) on dormant bermudagrass applied three DBO controlled over 90 percent of annual bluegrass and injured only 6 percent of the perennial ryegrass three WAO.

The stand of perennial ryegrass recovered from the injury by seven WAO. When glyphosate (6 oz/acre) was tank-mixed with 140 g/acre of Certainty and applied three DBO, it resulted in 48 percent injury of ryegrass three WAO, which increased to over 70 percent injury to ryegrass by seven WAO.

TranXit (rimsulfuron) at 54g/acre applied seven days before overseeding resulted in over 45 percent injury of perennial ryegrass three weeks after overseeding.

The injury increased to 60 percent at five WAO, and even at seven WAO 50 percent of the perennial ryegrass stand was lost. TranXit was very effective in controlling annual bluegrass within three WAO. In order to minimize injury to ryegrass, TranXit has to be applied 10 or 14 days before overseeding and probably lower rates can be used.

Clumpy ryegrass control

When perennial ryegrass survives the summer or when it escapes the overseeded area, this turf species can become clumpy and is unsightly (Yelverton, 2003). Clumpy ryegrass is more difficult to control than an overseeded stand of dense perennial ryegrass. Kerb (pronamide) is not effective in controlling clumpy ryegrass but some of the SU herbicides have been reported to be effective (Yelverton, 2003).

In our experiments, Revolver (foramsulfuron) applied at 0.4 fl oz (11.8 ml) per 1,000 sq ft was very effective on controlling clumpy ryegrass five weeks after application. A sequential application

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Put *Poa* in its place this fall! Progress herbicide eliminates *Poa annua* in perennial ryegrass, Kentucky bluegrass, creeping bentgrass and turf-type tall fescue. Since rates and number of applications vary with the tolerance of the desirable turfgrass, superintendents should gain experience with Progress by testing selected areas before application. Remember: Turf at its optimum level of fertility better tolerates Progress, allowing desirable grass to fill in when *Poa* is controlled

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at four weeks to six weeks after the initial application provided superior control of clumpy ryegrass compared to a single application.

Revolver applied during late spring or early summer provided optimum control of clumpy ryegrass compared to early spring applications. Revolver is mainly taken up by plants through the foliage. Hence, under higher temperatures when the plant is actively growing the herbicide is absorbed and translocated in the plant faster compared to translocation at lower temperatures.

Conclusions

- Sequential application of SU is more effective than a single application in controlling annual bluegrass and other difficult-to-control perennial weeds like sedges.

- Movement and tracking of SU's can be a concern.

It is better not to irrigate before application of SU herbicides since the movement of the herbicides is markedly reduced under unsaturated soil conditions. SU's are prone to move laterally under saturated soil conditions.

- SU herbicides adsorb on the soil more under acidic soil conditions and desorb to the soil solution under basic soil conditions. Hence, basic soils are prone to cause phytotoxicity or injury to plants more than acidic soils.

- Herbicide resistance to SU herbicides has been observed in field crops so golf course superintendents should rotate SU's with other herbicides with a different mode of action.

- SU herbicides should be applied at least 10 days to 14 days before overseeding to reduce injury to ryegrass.

- Optimum control of weeds is observed when SU herbicides are applied to actively growing weeds.

- Since most of the SU herbicides are very toxic to cool-season turf, care should be taken to reduce spray drift.

- Tank-mixing with other herbicides or insecticides may lead to turf injury.

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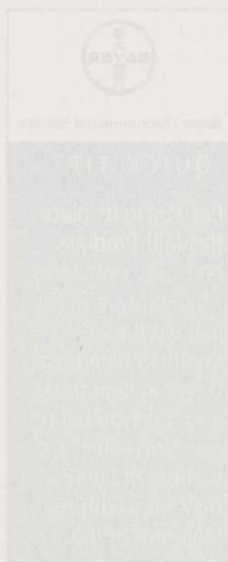
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Proper application of Revolver is essential. Due to improper application, turf damage had been reported when



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