Sulfonylureas Control Weeds on Bermudagrass

By Wendy Gelernter and Larry Stowell

The quest for uniform, high-quality fairways and roughs on a year-round basis is beset by problems from all sides — by questions about the risks and benefits of overseeding, decisions about turf variety performance and the unpredictable role of weather. But overshadowing all of these problems is the even more frustrating challenge of weed control on warm-season fairways.

Weeds are a constant problem, whether you overseed, select hybrid bermudagrass or an alternative as your warm-season base, experience winter kill or summer heat or suffer with droughts or floods, . Controlling them without hurting the desirable turf and without exceeding legal and environmental limits is a strain on budgets, not to mention superintendents' sanity.

Figure 1. This photo illustrates the problem in a nutshell. Difficult-to remove clumps of Poa annua and perennial ryegrass reduce turf quality and playability on warm-season fairways.

The problem

Herbicides such as pronamide (Kerb), simazine (Princep, Simazine) and glyphosate (Roundup) are currently the most common methods for weed removal, but these products have their drawbacks. For example, to avoid damage to warm-season turf, their application must be accurately timed. Because they move relatively easily in soil (especially after irrigation or rain), their application can result in damage to nearby bentgrass or other susceptible turf types.

The interval between application and overseeding can be three months or more, resulting in a loss of flexibility in situations where overseeding is called for.

Finally, uncontrollable variables such as high soil organic matter (the PACE database of soils from more than 200 fairways indicates that more than 50 percent of the fairways surveyed had organic matter content that would be considered high, or above 4 percent) can interfere with performance (Table 1).

What are sulfonylurea herbicides?

Sulfonylurea herbicides have been available in agricultural markets since the 1980s, but have only recently been introduced into the turf market. Compared with older herbicides which have broad spectrums of weed control, the sulfonylureas are much more specific. For example, products such as halosulfuron (Manage) provide excellent control of purple and yellow nutsedge – and not much else. Other sulfonylureas, such as Corsair, Manor, Monument, Revolver and TranXit, control specific cool-season grasses, as well as some broadleaf weeds. But luckily they have little or no toxicity to bermudagrass, whether it is dormant, greening up or actively growing.

Sulfonylurea herbicides used in turf are usually applied after weeds have emerged (postemergence) and are taken up by the foliage and in some cases by roots as well. These herbicides, which are generally less toxic to mammals and other nontarget organisms than older, broad-spectrum products, work by deactivating an enzyme known as acetolactate synthase (ALS). Without ALS, the plant's chloroplasts can longer produce the proteins it needs for day-to-day functioning.

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TABLE 1

Options for removal of perennial ryegrass and other weeds on bermudagrass fairways

Always check the registration status and recommendations for use of these products in your state prior to use.

Product (Active Ingredient)	Company	Target weeds	Overseed interval	Movement in soil	Comments
Corsair (chlorsulfuron)	Riverdale	Perennial rye, tall fescue, some broadleaf weeds	More than 60 days	Moderate	Inconsistent performance in high organic matter soils*; mediocre control of perennial rye clumps
Kerb (pronamide)	Dow	Perennial rye, *Poa annua*	90 days	high	Inconsistent performance in high organic matter soils*; damage to bermuda if applied before 50% green-up
Manor (metsulfuron)	Riverdale	Perennial rye; bahiagrass, foxtail, broadleaf weeds	60 days	moderate	Movement in soil increases at pHs greater than 6
Monument (trifloxysulfuron)	Syngenta	Perennial rye, Poa trivialis, Poa annua, sedges, kyllinga,	Less than 30 days	Moderate	Registration expected 2003
Princep, Simazine (simazine)	Agriliance, Drexel, Syngenta, UAP	*Poa annua*, crabgrass, broadleaves	4 – 6 months	High	Best on dormant bermudagrass; resistance a possibility with repeated use
Revolver (foramsulfuron)	Bayer	Perennial rye, *Poa annua, Poa trivialis*, goosegrass	10 – 14 days	Moderate	Registered February, 2003
Roundup (glyphosate)	Monsanto DuPont	Annual and perennial weeds, including ryegrass	10 – 14 days	Almost none	Removes clumps of rye & *poa* on non-overseeded fairways; Bermuda must be dormant to avoid damage
TranXit (rimsulfuron)	Griffin	Perennial rye, *Poa trivialis, Poa annua*	10 – 14 days	Moderate	

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Once treated, the plant also has difficulty producing energy through photosynthesis, its hormones become unbalanced and DNA synthesis and cell growth are disrupted.

The sulfonylureas work fast — plant growth is inhibited just a few hours after application. However, injury is usually not apparent until one or more weeks later, at which point the affected plants become yellowed, stunted and eventually die. Death of perennial ryegrass and

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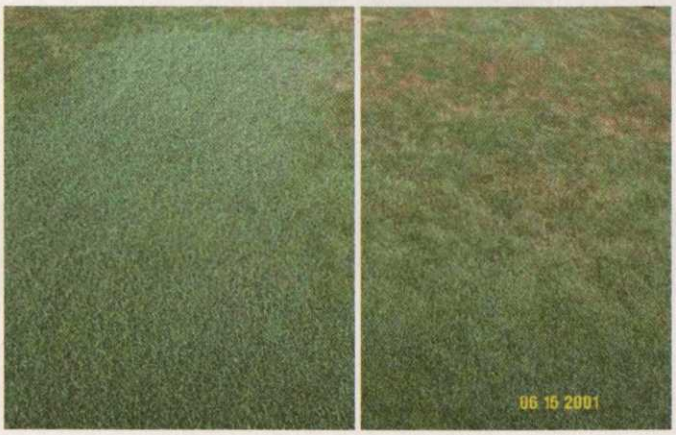

Figure 2. Superintendents can achieve improved springtime transition with sulfonylurea herbicides. One application of the experimental herbicide Revolver on May 7, 2001, resulted in accelerated transition to bermudagrass five weeks later (on June 15, 2001), in the plot on the left. In contrast, the plot on the right was not treated with any herbicides and displayed a splotchy, mixed stand of turf and bare ground. Other sulfonylurea herbicides such as Manor, Monument and TranXit produce similar results (trial and photo courtesy of Chris Olsen, Bayer Environmental Science)

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Poa trivialis occurs rapidly (one to two weeks) when temperatures are warm, but can occur much more slowly (three to six weeks) when springtime temperatures remain under 75 degrees F.

The relative safety of these products to bermudagrass, their ability to control perennial ryegrass, *Poa annua*, *Poa trivialis* and other weeds, and the short overseed intervals (Table 1) make these products attractive as weed-management tools on both overseeded and nonoverseeded bermudagrass fairways.

Use on fairways

The clumps of ryegrass and *Poa annua* that mar the uniformity of nonoverseeded fairways (Figure 1) are well controlled by many of the sulfonylurea products. With so many of these products suddenly available, selecting the most appropriate herbicide can be daunting. The distinctive host range of each product can help make selection easier (Table 1).

For example, if you are plagued with kyllinga or sedges as well as rye or *Poa*, the soon-to-be registered product Monument can serve several purposes at the same time. If hard to kill clumps of rye and *Poa* are your predominant concern, then Revolver or TranXit are good choices.

Unless weather conditions are perfect, springtime transitions on overseeded fairways can be slow and unattractive, resulting in patchy mixtures of turf, depletion of bermudagrass stands and areas of bare ground ripe for colonization by weeds. Several sulfonylurea herbicides have potential for improving springtime transitions through rapid removal of overseeded turf, which allows the bermudagrass to recover and recolonize fairways more rapidly, as illustrated in Figs. 2 and 3.

When the additional benefits of *Poa annua*, *Poa trivialis* and other weed control are considered, products such as Manor, Monument, Revolver and TranXit appear to have a bright future for use on overseeded bermudagrass fairways.

Can something be too good?

But wait. There are always a few caveats, especially with new products whose subtleties we are just beginning to understand.

Probably the most important concern with respect to overseeded fairways comes, strangely enough, because the sulfonylureas are too effective at what they do. In situations where there is too much ryegrass present at the time of application or where the bermudagrass base is weak, severe yellowing and/or bare ground may be present for six weeks or more after application (Fig. 4).

Although the bermudagrass transition may actually be improved under these conditions, the cost is high. Under these circumstances, benefits may not be obvious for several months or even until the following year, when the bermudagrass stand may be substantially improved due to rye removal the previous year. We will test this hypothesis during the 2002-2003 season.

Timing applications later in the spring or using multiple applications at lower rates may also address some of these problems.

Safety on other warm-season grasses

While the sulfonylureas appear to be quite safe for both hybrid and common bermudagrass cultivars, they can cause unacceptable damage to seashore paspalum and kikuyugrass. Safety for other turf types, such as zoysiagrass and St.

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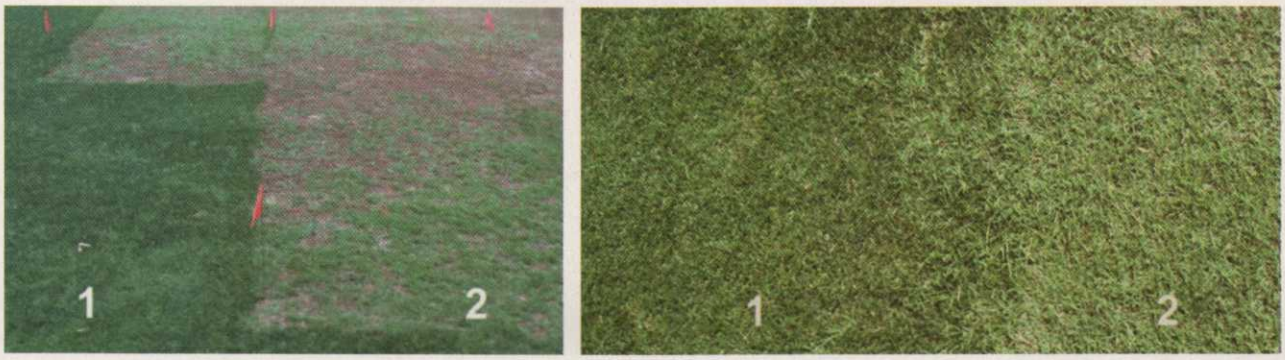

Figure 4. These photos show the risk of being too effective. When more than 20 percent of the turf is perennial ryegrass and/or the bermudagrass base is weak, application of sulfonylureas may cause undesirable results. In the photo to the left, 35 days after treatment with a sulfonulurea herbicide, the perennial rye is completely dead in treated plots (2), leaving bare ground in areas formerly occupied by ryegrass. The untreated plot (1) has 15 percent bermuda and 85 percent rye, while the treated plot (2) has 25 percent bermuda and no rye. Despite the undesirable appearance of the turf at 35 days after treatment, a full and uniform stand of bermudagrass was present in treated plots by 11 weeks after treatment (photo on right).

FIGURE 3

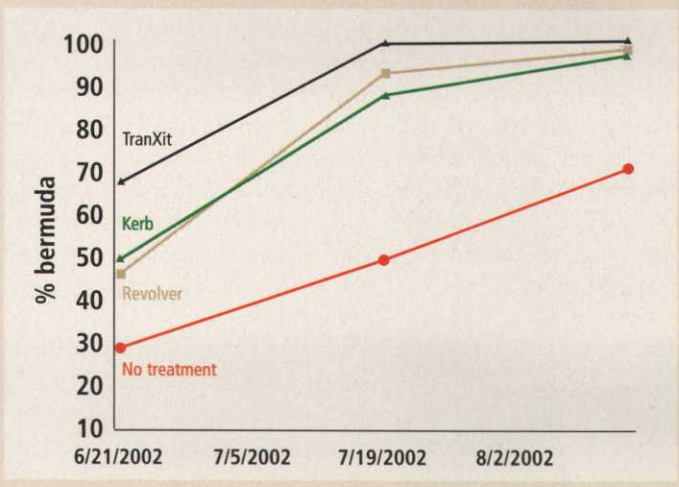

Figure 3. These herbicides improve springtime transitions through the removal of perennial ryegrass. When compared to areas that were not treated with herbicides, areas treated with Kerb, TranXit or Revolver all had higher and more rapid establishment of bermudagrass that was accomplished by removing perennial ryegrass and thus reducing competition. Products were applied on May 21, 2002 at Morgan Run Golf Resort in San Diego, where Dale Hahn is superintendent.

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Augustinegrass, is still being determined for many of these products. Always read product labels carefully to ensure that damage to desirable turf does not occur.

Bottom line

Sulfonylurea herbicides are effective new tools for removal of annual and perennial weeds from both overseeded and nonoverseeded bermudagrass fairways. Replicated field trials show that a single application of products such as Manor, Monument, Revolver and TranXit provides rapid and complete kill of perennial ryegrass, as well as good to excellent control of *Poa annua*, *Poa trivialis* and several other weeds.

Removal of difficult-to-control ryegrass and *Poa* clumps can be accomplished from nonoverseeded areas without causing damage to bermudagrass. On overseeded fairways and roughs, decreased competition from perennial ryegrass in the springtime can give bermudagrass a significant edge during the springtime transition, particularly after several annual treatments. However, to avoid long periods with yellowing turf, applications should be planned for times and locations where bermudagrass cover is more than 30 percent and average air temperatures are 65 degrees F or higher.

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