

competition between dandelion and two species of cool-season turfgrass (tall fescue and perennial ryegrass) infected or uninfected by fungal endophytes. When fall armyworms were present, endophyte-infected grasses were much stronger competitors against dandelions. Under these circumstances, endophyte-infected turfgrasses produced more tillers and had greater biomass than uninfected plants.

Conversely, dandelion plants had fewer leaves and lower biomass when competing against endophyte-infected plants. These studies indicate that because endophyte-enhanced turfgrasses are better able to defend themselves against foliage-feeding insects, they are also much more vigorous competitors against some of our most common weed species. Endophyte-enhanced grasses not only provide the direct benefit of lowering populations of insect pests, but they also provide an indirect benefit by resisting weed invasion.

### System-wide effects of endophytes

It's obvious that fungal endophytes can provide a range of benefits for turf. However, it is important to recognize that the benefits of insect resistance, competitiveness against weeds and broader range of adaptation are not completely independent of one another.

For instance, we have conducted controlled studies that demonstrate how resistance to insects also provides a competitive advantage against weeds. Since endophyte-infected grasses are not preferred by insect, they suffer much less damage and, as a result, are much stronger competitors against dandelions and other common weed species.

Likewise, since endophyte-infected plants are more efficient at acquiring nutrients from the soil, they are less likely to become overrun by weeds in times of drought or when nutrients are in short supply. This phenomenon of multiple, simultaneous and interacting benefits provides the basis on which a systems-oriented approach to turfgrass management is founded.

Realizing the benefits of endophyte-infected grasses does not always require complete renovation. Since only moderate proportions of endophyte-infected grasses are necessary to provide resistance against many insects, overseeding pre-existing stands is a simple and effective option.

Previous research at The Ohio State University indicates that overseeding stands of Ken-

tucky bluegrass with endophyte-infected perennial ryegrass at a rate of 1 pound or 2 pounds per 1,000 square feet (using a slicer-seeder) can significantly alter the composition of the turfgrass stand within a short period. Overseeding in the fall will provide resistance to billbugs, chinch bugs and sod webworms the next year. Over time, perennial ryegrass will outcompete the Kentucky bluegrass and will gradually take over the stand. As a result, both insects and weeds will be much less of a problem.

### Seed storage

As endophyte is present in the seed, it is very important to store the seed in a cool and dry place. Temperatures exceeding 37 degrees Celsius for one to two weeks can eliminate the endophyte from the seed while the seed may still be viable. Therefore, the seed should not be stored in the garage because it may get too hot in the summer.

It's also important to use fresh seed that has been stored under cool conditions. A grow-out test can also be performed to confirm endophyte viability in the seed.

Use of endophyte-containing grasses offers a real, sustainable solution to turfgrass pest management. Endophyte-containing grass will have mitigating effects on pest problems including weeds, insects, diseases and plant-parasitic nematodes. Thus, it provides a turf system that is more resistant to pest invasion and establishment.

Our ability to boost alkaloid (toxin) levels in endophyte-containing plants by simple cultural practices such as reduced mowing frequency, increased mowing height, increased nitrate nitrogen and phosphorus (coupled with reduced irrigation frequency) opens doors to obtain enhanced benefits from planting the endophyte-containing grass cultivars. The resulting lesser use of chemical pesticides and surfactants would also favor colonization and establishment of natural enemies, parasites, predators and pathogens of pests.

The use of endophyte-containing grasses in turf systems is practical as endophyte-containing grasses can be easily incorporated into pest management systems by overseeding in the existing courses or by establishing new courses containing mixtures of endophyte-enhanced and endophyte-free grasses.

*Grewal is an associate professor of entomology at the Ohio State University. Richmond is a post-doctoral research associate in Grewal's laboratory.*



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# Sulfonylurea Herbicides: How Do Different Turfgrasses Tolerate Them?

By Jason Ferrell, Tim Murphy, Clint Waltz and Fred Yelverton

**S**ulfonylurea (SU) herbicides have been commonly used for postemergent weed control in agronomic crops since the mid-1980s. This chemical family has been extensively developed and is currently the most populous group of related herbicides. The reason for this great proliferation has been the high selectivity of these herbicides to a range of plant species.

Selectivity is most often because of differential plant metabolism between species; rapid metabolism translates into plant tolerance while slow metabolism results in plant injury or death. With small changes in molecular structure, the speed of metabolism is altered and large differences in herbicide selectivity have occurred. Over time, the basic SU structure has been manipulated and herbicides have been developed that are noninjurious to many desirable plant species.

The SU family of herbicides is now being rapidly introduced into the turfgrass market. Managers now have more weed-control options than ever before. However, with the introduction of new herbicides can come a relatively steep learning curve. For example, some SUs require watering after application, while others do not. Similarly, some SUs recommend the use of surfactants and others do not.

SUs should never be applied within seven days of organophosphate insecticides to avoid excessive herbicide injury.

Most importantly, turfgrass tolerance can vary widely between seemingly similar herbicides. For example, halosulfuron (Manage) can be safely applied for sedge (*Cyperus* spp.) control in both cool- and warm-season turfgrasses. Conversely, trifloxysulfuron (Monument) adequately controls sedges, but will cause significant injury to, or loss of, some cool-season turfgrasses. Therefore, the simple mistake of confusing two SU herbicides can have severe consequences.

Although turfgrass managers have several new SUs for weed control, the speed at which

these herbicides are coming to market can make it difficult to recall which herbicide is most useful for a given situation. The intention of this article is to produce a quick reference to detail turfgrass tolerance (Table 1) and weed control (Table 2) for all sulfonylurea herbicides that are currently used or being developed for use in turfgrass weed control.

## Chlorsulfuron (Corsair)

**General:** Selective control of tall fescue, ryegrass, wild garlic, Virginia buttonweed and other grass and broadleaf weed species.

**Tolerant turfgrasses:** Chlorsulfuron can be applied postemergence to all turfgrass species except tall fescue and ryegrass. St. Augustinegrass, centipedegrass and zoysiagrass may show discoloration after chlorsulfuron application.

**Use pattern:** Chlorsulfuron may be used as a transition aid for removing overseeded perennial ryegrass. Clump tall fescue and ryegrass may also be removed from tolerant turfgrasses (particularly Kentucky bluegrass) with this herbicide. Chlorsulfuron may be applied as broadcast applications on golf courses, but only as spot treatments on home lawns. Chlorsulfuron cannot be applied to golf tees or greens.

**Application rate:** Chlorsulfuron may be applied at rates from 1 ounce to 5.33 ounces per acre, depending upon weed species. Annual ryegrass can be controlled with 1 ounce per acre while clump-type tall fescue may require two applications of the 5.33 ounces per acre rate. A non-ionic surfactant should be added to the spray solution at a rate of .7 to 1 quart per 100 gallons.

**Weeds controlled:** Previous research has shown that chlorsulfuron provides more than 90 percent control of ryegrass and wild mustard. Other weeds such as white clover, wild violet and Virginia buttonweed are suppressed by chlorsulfuron (less than 70 percent control). Repeat applications or the addition of auxin-like herbicides (2,4-D, dicamba, etc.) may be used to improve the control of these particularly troublesome weeds. Specific rates to control other weeds are shown on the product label.

**TABLE 1**

**Tolerance of warm- and cool-season grasses to sulfonylurea herbicides**

	St. Augustinegrass	Bermudagrass	Centipedegrass	Zoysiagrass	Perennial Ryegrass	Bentgrass	Tall Fescue	Kentucky Bluegrass
Chlorsulfuron	I	T	I	I	S	I <sup>2</sup>	S <sup>1</sup>	T
Flazasulfuron	S-I	T <sup>3</sup>	I-T	T	S	S	S	S
Foramsulfuron	I	T	S	T	S	S	S	S
Halosulfuron	T	T	T	T	T	T	T	T
Metsulfuron	T	T	I-T	T	S	S	S	I
Rimsulfuron	S-I	T	I	I-T	S	S	S	S
Sulfosulfuron	S-I	T	I-T	I-T	S-I	I-T	S	I
Trifloxysulfuron	S	T	S	T	S	S	S	S

T=tolerant, I=intermediate tolerance, S=sensitive; <sup>1</sup>Fine Fescue is tolerant to chlorsulfuron applications.; <sup>2</sup>Bentgrass must be mowed at a height more than .5 inches.; <sup>3</sup>Many bermudagrasses have high tolerance to flazasulfuron, but Floradwarf has shown low to moderate tolerance.

**Flazasulfuron (Katana) – (Registration pending)**

**General:** Flazasulfuron is currently being developed by ISK Biosciences for the control of tall fescue, annual and perennial ryegrass, broadleaf weeds, and sedges in bermudagrass and zoysiagrass.

**Tolerant turfgrasses:** Bermudagrass and zoysiagrass are tolerant to flazasulfuron. Centipedegrass also possesses tolerance, but commonly shows growth regulation and off color after application. Tall fescue, perennial ryegrass, Kentucky bluegrass and St. Augustinegrass are intolerant to flazasulfuron.

**Overseeding restriction:** Perennial ryegrass can be overseeded 2 weeks to 12 weeks after application depending upon rate.

**Use pattern:** If registered, flazasulfuron will be used for the control of seedling crabgrass, sedges, certain broadleaf weeds, annual bluegrass and other weedy cool-season grasses, and as a spring transition aid in overseeded bermudagrass.

**Application rate:** Flazasulfuron has undergone extensive testing in the field by universities at a range of rates. Exact rates are not known at this time as this product is still in development, but will likely be in the 1.5 ounces per acre to 3 ounces per acre range.

**Weeds controlled:** Flazasulfuron provides near 100 percent control of annual and perennial ryegrass, tall fescue, white clover and common chickweed. Control of crabgrass with flazasulfuron has been observed to range between 50 percent to 95 percent, depending upon size at time of application. For best control, crabgrass should be treated at the seedling growth stage. Good control of var-

ious sedge species has also been noted. The addition of MSMA and 2,4-D can improve control of sedges and dichondra, respectively. Since flazasulfuron is currently under the final stages of development and registration, it is not known which herbicides will be recommended for tank-mixing with flazasulfuron.

**Foramsulfuron (Revolver)**

**General:** Control of weedy cool-season grasses and goosegrass in bermudagrass and Meyer zoysiagrass.

**Tolerant turfgrasses:** Several bermudagrass cultivars (such as Tifway, TifSport, Tifdwarf, Vamont, Common and others) and Meyer zoysiagrass have shown good tolerance to foramsulfuron. Centipedegrass and all cool-season grasses, such as fescues, ryegrasses, bentgrasses and bluegrasses, are intolerant to this herbicide.

**Use pattern:** Foramsulfuron will be used to control *Poa*, goosegrass, ryegrass and bentgrass in tolerant warm-season turfgrasses, including bermudagrass greens. This herbicide is also effective for the removal of clump fescue and ryegrass. Foramsulfuron is also labeled for use as a spring transition aid in overseeded bermudagrass. Foramsulfuron is not labeled for use on residential lawns.

**Overseeding restriction:** Ryegrass can be overseeded in treated areas two weeks after application.

**Application:** Foramsulfuron is the first liquid SU and is used at rates of 4.4 fluid ounces per acre to 26.2 fluid ounces per acre. No surfactant is

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**QUICK TIP**

Ongoing research continues to confirm that the use of Roundup Ready Creeping Bentgrass can significantly reduce weed, disease and insect controls, as well as the use of water and labor required to co-manage bentgrass and invasive *Poa annua* on golf courses. For more information and to learn what you can do to support this new technology, visit [www.scottsproseed.com](http://www.scottsproseed.com).

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required. Multiple applications may be required to control goosegrass or large volunteer ryegrass. Herbicidal activity is greatest if rainfall or irrigation does not occur within two hours of treatment. Foramsulfuron can be tracked and damage susceptible cool-season turfgrasses if spray droplets are not allowed to dry before traffic is permitted. Additionally, tracking can occur from morning dew the day after treatment. Irrigation the morning after foramsulfuron application and leaving a 15-foot buffer area around creeping bentgrass areas are recommended procedures that will prevent tracking problems.

**Weeds controlled:** Foramsulfuron provides excellent control (more than 90 percent) of many troublesome cool-season grass species such as *Poa annua*, ryegrass and clump fescue. Additionally it is quite effective for the post-emergent control of goosegrass.

### Halosulfuron (Manage)

**General:** Control of yellow and purple nutsedge, and suppression of *Kyllinga* spp.

**Tolerant turfgrasses:** All cool- and warm-season grasses are tolerant to halosulfuron applications.

**Use pattern:** Halosulfuron is used predominantly for the control of sedges (*Cyperus*). Treatments are most effective when the sedge plants are between the three and eight leaf stages. Repeat applications, six to 10 weeks apart, are often required to control dense infestations. However, no more than four applications (total of 5.33 ounces per acre) are recommended per acre per season.

Halosulfuron may be applied to turfgrasses that are well established, with the exception of putting greens. However, sprigging, seeding or sodding into treated areas should be delayed for four weeks after halosulfuron applications.

**Overseeding restriction:** Overseeding with ryegrass or bermudagrass can be conducted two weeks after application.

**Application rate:** Halosulfuron is applied at .66 ounces per acre to 1.33 ounces per acre. A non-ionic surfactant should be added to reach a concentration of 1 quart to 2 quarts per 100 gallons of water. Halosulfuron is rainfast after three hours, but best results have been observed when no rainfall or irrigation occurs within four hours of application.

**Weeds controlled:** Control of green *kyllinga*, yellow

and purple nutsedge with halosulfuron can vary between 80 percent and 100 percent, depending on weed size and age at the time of application. For this reason, repeat applications occurring six to 10 weeks after the initial application may be necessary to increase control. Purple nutsedge is generally considered to be more sensitive to halosulfuron than yellow nutsedge.

### Metsulfuron (Manor)

**General use:** Control of Pensacola bahiagrass, ryegrass and numerous broadleaf weed species in turfgrass.

**Tolerant turfgrasses:** Kentucky bluegrass, fine fescue, bermudagrass, St. Augustinegrass, zoysiagrass and centipedegrass are labeled for metsulfuron applications.

**Use pattern:** Metsulfuron may be applied to tolerant turfgrasses, including golf course fairways, tees, aprons and roughs, that are more than 1 year old. However, applications made to tolerant cool-season turfgrass species when air temperatures are in excess of 85 degrees Fahrenheit may increase injury.

**Overseeding restriction:** Winter overseeding must be postponed for two months after application.

**Application rate:** Metsulfuron is applied from .125 to 1 ounces per acre in combination with a nonionic surfactant at 1 quart per 100 gallons of water. For fine fescue, Kentucky bluegrass and centipedegrass metsulfuron is used at rates of .25 to .5 ounces per acre. Chlorosis and stunting commonly occur following application to centipedegrass. St. Augustinegrass, bermudagrass and zoysiagrass can tolerate metsulfuron application rates up to 1 ounce per acre. Some chlorosis and stunting may occur after application, and injury is worsened when the turfgrass is stressed from drought, cold temperatures or poor fertility. Metsulfuron is an excellent alternative to phenoxy herbicides for broadleaf weed control in St. Augustinegrass.

**Weeds controlled:** Metsulfuron will provide more than 90 percent control of ryegrass, common chickweed, white clover, dandelion and wild garlic. To control henbit and Pensacola bahiagrass at levels more than 70 percent to 80 percent, repeat applications at four-to-six-week intervals are generally required.

### Rimsulfuron (Tranxit)

**General use:** Control of annual bluegrass in  
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Increase the turf's physiological fitness, its cell strength and its root development before stress occurs. For prestress conditioning and root development, apply a sea-plant-based biostimulant such as CPR or PanaSea Plus as soon as spraying starts.

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\*under typical task and driving conditions



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advance of overseeding bermudagrass and in non-overseeded warm-season turfgrasses. Rimsulfuron may also be used as a spring transition aid in overseeded bermudagrass.

**Tolerant turfgrasses:** Bermudagrass (fairway and putting green cultivars), zoysiagrass and centipedegrass.

**Use pattern:** Rimsulfuron may be applied on sod farms, professional sports fields and golf courses (fairways, greens and tees). However, slight yellowing and growth regulating effects have been observed for up to seven days when rimsulfuron is applied to Tifway bermudagrass. Rimsulfuron is not labeled for use on residential lawns.

Rimsulfuron is absorbed by both plant roots and foliage. Therefore, irrigation one hour after application will move the herbicide into the soil and further increase herbicidal effectiveness. Relying on natural rainfall to incorporate the herbicide is unreliable. When applying irrigation, care must be used to prevent surface runoff as rimsulfuron can move laterally with water in some situations. Short, frequent irrigation cycles are most effective to incorporate rimsulfuron without producing runoff.

Extreme caution must be exercised when applying rimsulfuron near or on slopes that drain onto, cool-season grasses. Spray drift, tracking or runoff water may cause excessive damage to creeping bentgrass greens or overseeded areas. Although tracking and runoff seldom result in death of bentgrass, off color and growth reduction can persist for 14 days or longer depending on weather and fertility.

**Overseeding restriction:** Overseeding with cool-season turfgrasses should be delayed for 10 days to 14 days after herbicide application.

**Application rate:** Rimsulfuron may be applied at .5 ounces to 2 ounces per acre with a non-ionic surfactant at 1 quart per 100 gallons of water. Applications of .5 to 1 ounce per acre may be applied to bermudagrass putting greens for overseeding removal; 1 ounce to 2 ounces per acre can be applied to other bermudagrass areas. Repeat applications, occurring three weeks apart, are commonly required for complete removal of *Poa trivialis*. For control of *Poa annua* in bermudagrass putting greens prior to overseeding, the 1 to 2 ounces per acre rate may be used without the addition of surfactant.

**Weeds controlled:** Rimsulfuron provides better than 90 percent control of several grass species,

including ryegrass, fescue, *Poa annua* and broadleaf species such as common chickweed and spotted spurge. For large infestations of *Poa trivialis*, repeat applications are often more effective than a single application at a higher rate.

### **Sulfosulfuron (Battalion) – (Registration pending)**

**General:** Sulfosulfuron is currently being developed by Monsanto for sedge and annual bluegrass control in certain warm- and cool-season turfgrasses.

**Tolerant turfgrasses:** Bermudagrass has been shown to be highly tolerant to sulfosulfuron. Although zoysiagrass, centipedegrass, ryegrass and creeping bentgrass are also tolerant, discoloration and growth regulation commonly occur after application. Tall fescue and St. Augustinegrass are not tolerant to sulfosulfuron.

**Overseeding restriction:** The time interval from application time to overseeding is rate and turfgrass-species dependent and being investigated at this time.

**Use pattern:** Sulfosulfuron has demonstrated excellent control of various members of the sedge family when applied during the summer months.

**Application rate:** Sulfosulfuron at rates of .67 ounce to 1.33 ounces per acre have shown excellent control of sedges. Various rate ranges are being evaluated for use in creeping bentgrass and for spring transition of overseeded bermudagrass.

**Weeds controlled:** In turfgrasses, sulfosulfuron has primarily demonstrated activity for sedge control and as a spring transition aid in overseeded bermudagrass. This herbicide is also being evaluated for *Poa trivialis* removal in creeping bentgrass fairways.

### **Trifloxysulfuron (Monument)**

**General use:** Trifloxysulfuron will be used for broadleaf weed, sedge and annual bluegrass control in bermudagrass and zoysiagrass.

**Tolerant turfgrasses:** Bermudagrass and zoysiagrass are tolerant to trifloxysulfuron. However, a reduction in leaf elongation and suppression of seedheads has been observed in bermudagrass and zoysiagrass species. Other turfgrass species have not shown acceptable tolerance to trifloxysulfuron.

**Overseeding restriction:** Overseeding should be delayed for six weeks after herbicide application.

**Use pattern:** Trifloxysulfuron may be applied on

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#### **QUICK TIP**

During spring transition, take into consideration the speed at which Revolver herbicide works in controlling ryegrass. Because it works so rapidly, this product should be used as a late transition aid. Since underlying bermudagrass should be actively growing before Revolver is applied, proper timing is critical for successful use.

**TABLE 2**

**Weed control with sulfonylurea herbicides.**

	chlor-sulfuron	flaza-sulfuron	foram-sulfuron	halo-sulfuron	met-sulfuron	rim-sulfuron	sulfo-sulfuron	trifloxy-sulfuron
<b>GRASS WEEDS</b>								
bluegrass, annual	P	P-G	E	P	P	E	P-F	G-E
crabgrass	P	F-E	P	P	P	P	P	P-F
fescue, clump	F-G	E	E	P	P-F	E	F-G	E
goosegrass	P	P	G-E	P	P	P	P	P
ryegrass, clump		E	E	P	F	E		E
ryegrass, Italian	E	E	E	P	F-G	E		E
<b>BROADLEAF WEEDS</b>								
buttonweed, Va.	P-F	G		P	F			G
chickweed, common	G	E		P	E	G-E		G
clover, white	F	E		P	E			
corn speedwell		P	E	P	G	P	P	E
dandelion	F-G	G-E			E			G-E
dichondra		P		P	P			G-E
henbit	G	G	G	G	G	G	G	G
knotweed, prostrate	G-E	F	P	P	G-E	P	P	P
plantain, buckhorn	F-G	P			G-E			
spotted spurge		F-G		P	E	G-E		G-E
wild violet	F	G		P				
<b>OTHER WEEDS</b>								
kyllinga spp.		G-E	E	G	P	G-E	E	G-E
nutsedge, purple		G-E		G-E	P	F	E	G-E
nutsedge, yellow		P-F		G	P	F	G-E	G-E
wild garlic	F	P		P	G-E			

E = >90%  
 F = 70-80%  
 G = 80-90%  
 P = <70%

A blank space indicates that weed response is not known.

These data were compiled from the annual weed science research reports of Shawn Askew at Virginia Tech, John Boyd at the University of Arkansas, Bert McCarty at Clemson University, Tim Murphy at the University of Georgia, Brian Unruh and Barry Brecke at the University of Florida.

golf courses, sod farms and other nonresidential sites. Do not apply trifloxysulfuron to putting greens. On newly established turfgrasses, trifloxysulfuron applications should be delayed until 100 percent ground cover, and a 2-inch root depth is achieved.

Trifloxysulfuron may be applied to control *Poa annua* and sedges, or as a transition aid for removing overseeded ryegrass. Bermudagrass and zoysiagrass can be sprigged or seeded four weeks after herbicide application. Trifloxysulfuron is currently not recommended for use on residential lawns.

**Application rate:** Trifloxysulfuron may be applied between .1 and .56 ounces per acre with 1 quart or 2 quarts per 100 gallons of water with a nonionic surfactant. Application rates between .1 and .3 ounces per acre are used when removing overseeded ryegrass and *Poa*

*trivialis*; the lower use rate allows for slower transition. Delayed bermudagrass green-up has been observed when applications were made during dormancy. For *Poa annua* and sedge control, the .3 ounces to .56 ounces per-acre application rates are recommended.

Repeat applications are often needed, four to six weeks after application, for control of particularly troublesome weeds such as sedges and tall fescue. However, a total of 1.7 ounces per acre should not be exceeded within one year. Trifloxysulfuron is rainfast within three hours of application.

**Weeds controlled:** Greater than 90 percent control has been observed of ryegrass, fescue, corn speedwell, Virginia buttonweed and sedges. Repeat applications after four to six weeks may be necessary depending on environmental con-

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 ditions and weed size at time of application. Trifloxysulfuron will also provide some suppression of crabgrass, dallisgrass and bahiagrass. MSMA may be added to trifloxysulfuron in order to improve control of these particular grasses.

### Summary

Sulfonylurea herbicides are and will continue to be highly useful herbicides in turfgrasses. Although no single herbicide has been developed to control all troublesome weeds such as sedges, *Poa annua*, clump tall fescue and rogue perennial ryegrass, proper selection of the appropriate SU herbicide will enable turfgrass managers to effectively control these weeds.

Additionally, many SU herbicides can be used as a spring transition aid to remove perennial ryegrass and *Poa trivialis* from bermudagrass overseeded the previous fall. The SU herbicides offer turfgrass managers new solutions to many difficult weed management problems, and rota-

All of the SU herbicides have the same mechanism-of-action. They inhibit the ALS enzyme.

tional alternatives to presently used herbicides. However, a word of caution is needed.

All of the SU herbicides have the same mechanism-of-action — they inhibit the ALS enzyme (acetolactate synthase) which is involved in the production of three essential amino acids. Certain weed species have naturally occurring biotypes that are resistant to ALS-inhibiting inhibitors such as the sulfonylurea urea herbicides.

Continued use of SU herbicides over a period of years, while not rotating to herbicides with a different mechanisms of action, can lead to the development of SU-resistant weeds. This has occurred in agronomic crops and in roadside turfgrasses where SU herbicides were not properly rotated.

SUs are highly useful and effective herbicides. But it is imperative that SUs be used in rotation with other herbicides to prevent the development of SU-resistant weeds. This is highly effective and exciting herbicide family, but, do not forget a basic principle of weed management: rotate the use of herbicides with different mechanisms of action to prevent the buildup of herbicide-resistant weed

populations. If we follow this principle, turfgrass managers will have effective postemergence herbicides to control numerous problem weeds in turfgrasses for many years to come.

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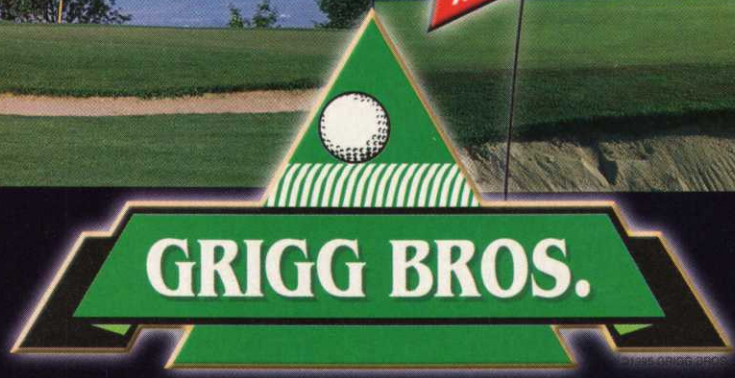
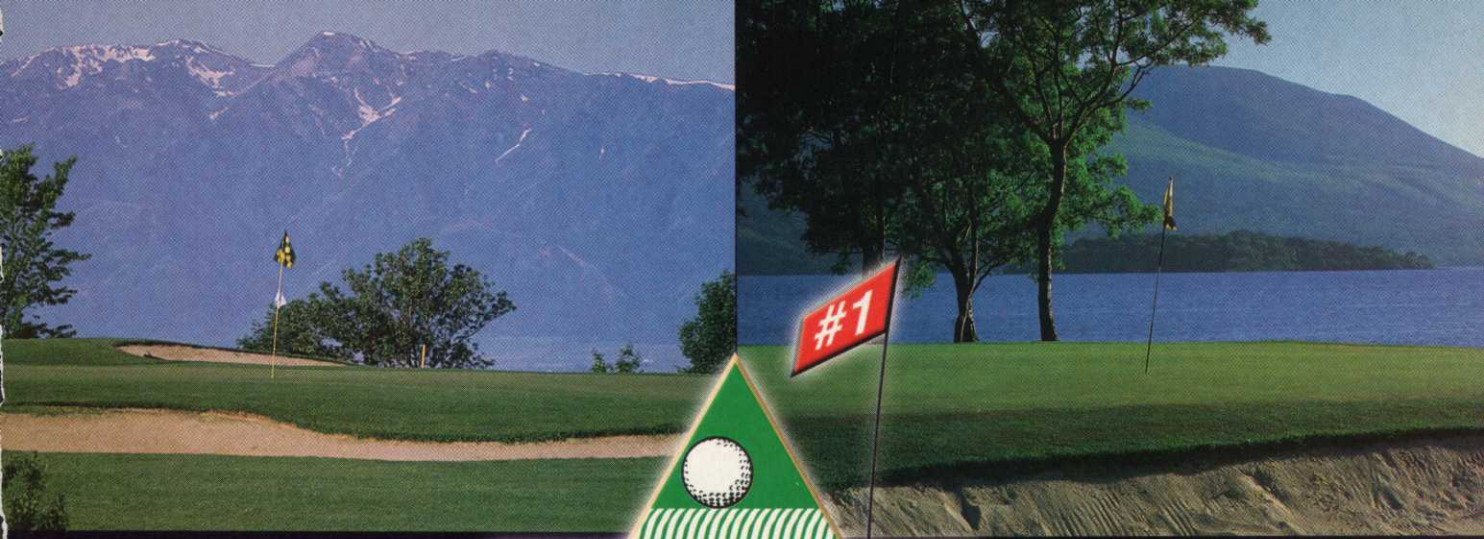
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# Making the

It was a good choice to move into the house on the course.  
And I'm glad I gave it some thought

BY JIM BLACK

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*Editor's note: About a year ago, Jim Black, former superintendent of Twin Shields Golf Course in Dunkirk, Md., had the opportunity to move into a house on the course for a year. Black, who was superintendent at the course for eight years, sought the advice of his peers on what to do.*

WE HUMANS HAVE A GIFT that other animals don't. Animals act purely on instinct. They don't think for the most part; they just act.

We, on the other hand, have the gift of conscious thought. We get to think before we act. Lucky us. A situation is put before us and sometimes, instead of just acting or reacting or being proactive, we think and think ... and think. We choose, decide, contemplate, weigh our options and then maybe, *finally*, we act.

Last year I had a situation put before me that I had to sit and give some serious thought to: Should I move into the house on the course or not? The offer was made, and it was time to decide.

Round and round it went in my head — should I or shouldn't I? Most all of my friends said, "Go for it! What are you waiting for?"

But I had my doubts. I had to think about it. Questions swirled in my head.

Would I be on call 24/7?

Would a golf car boy be knocking on my door at 3 p.m. on a Sunday asking me to help change a flat?

Would the club owner expect me to work 14-hour days since I was already here?

The assumption machine was officially switched on. Unfortunately, it seems that when

you're caught in the assumption trap, you tend to lean toward the worst-case scenario.

Sure, I knew there would be positives of living on the course — no commute, an opportunity for quiet time on the course, financial pluses regarding rent and utilities, and more time on my hands to actually play golf.

But I sought the advice of my fellow superintendents to help me make a decision. Who better to get advice from than from people who have lived it?

## Words from the wise

Larry Livingston, certified superintendent of Camp Creek Golf Club in Panama City Beach, Fla., reflected on his days of living on the course at River Hills Country Club in Valrico, Fla.

"When we moved to River Hills, I asked my wife where she wanted to live," Livingston said. "She said she would like to live in the development of River Hills, on one of the lots that bordered the course. I said, 'No way! I'm not going to get up on a morning that I'm off, look out a window and see something wrong on the course and worry about it all day.' But she won the battle, and we ended up building a house on the course."

*Continued on page 102*