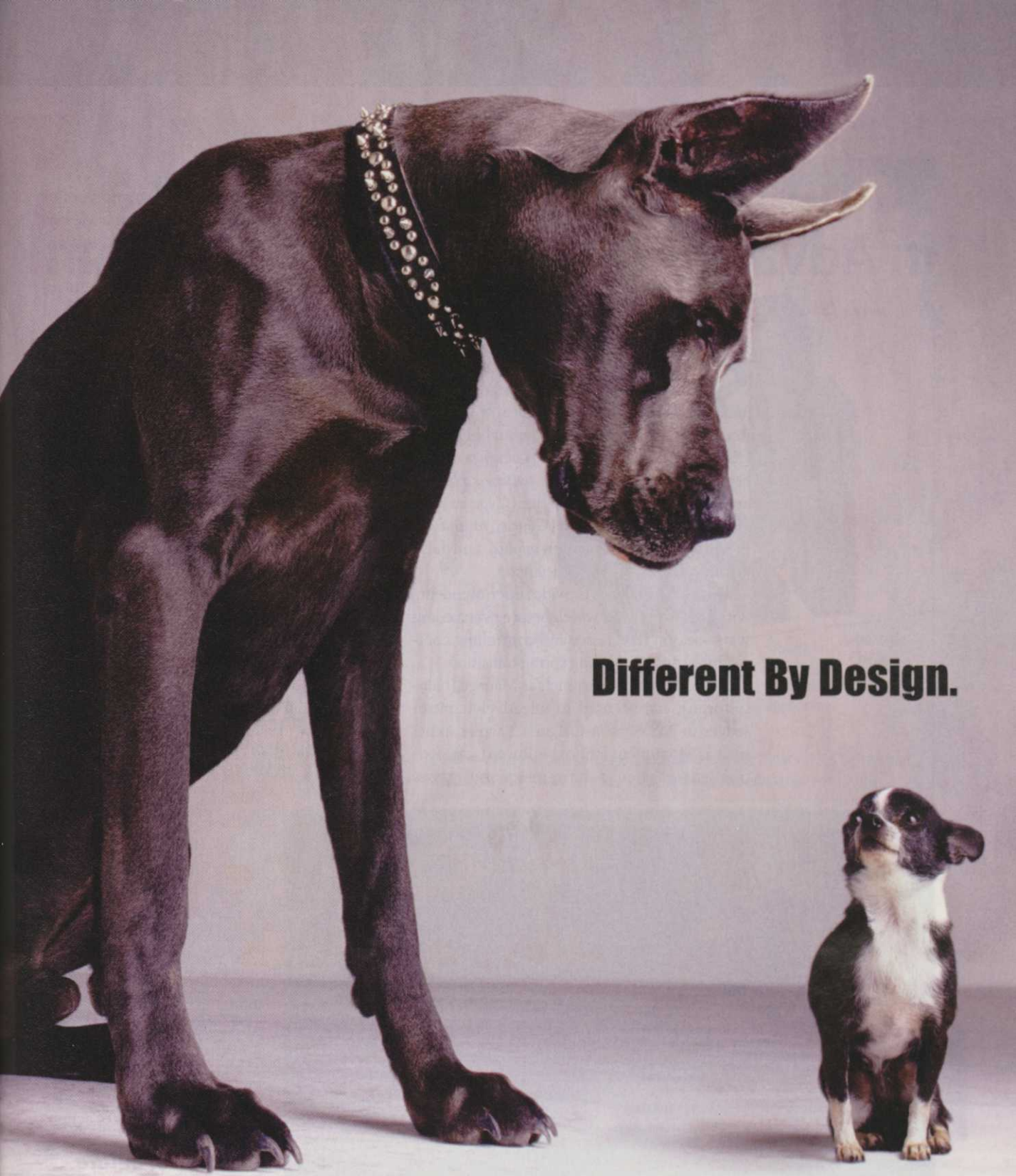

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SU Herbicides Control Weeds, Poa in Advance of Overseeding Program

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 (*Cyprus 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.

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.

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*.

The best strategy to control *Poa* is to apply sulfonylurea 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 sulfonylurea 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*.

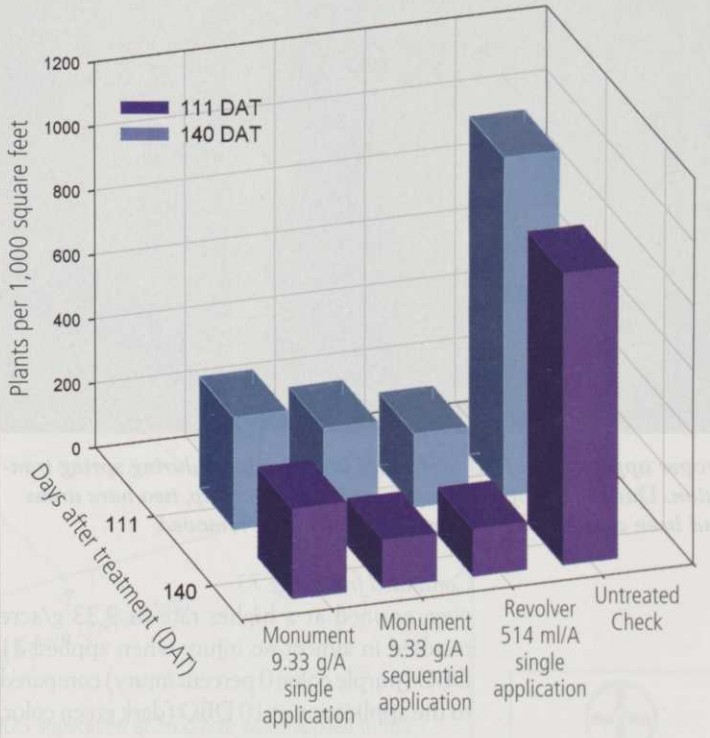
Revolver applied at 6 milliliter (ml) per 1,000 square feet (0.2 fluid [fl] ounces/1,000 square feet) controlled over 90 percent of *Poa* within 28 days after treatment (DAT). Optimum control was achieved between 30 DAT and 60 DAT. Efficacy of a single application of Revolver reduced after 90 DAT. Sequential application of sulfonylurea 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 sulfonylurea 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. Sequential 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).

FIGURE 1



Effect of single and sequential application of Monument 75 WG at 9.33 g/acre and Revolver at 514 ml/acre (0.4 fl oz/1,000 sq. ft) on *Poa annua* plant population.

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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To see additional charts with this story, please visit:

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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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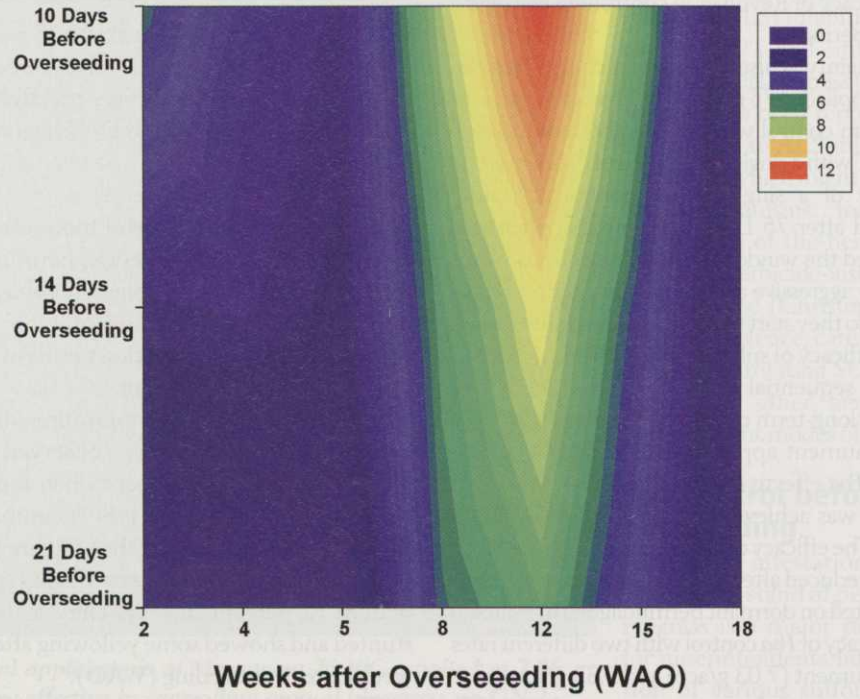
even applied at a higher rate of 9.33 g/acre resulted in almost no injury when applied 21 DBO (purple color, 0 percent injury) compared to the application at 10 DBO (dark green color, 6 percent injury) when observed two WAO.

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).

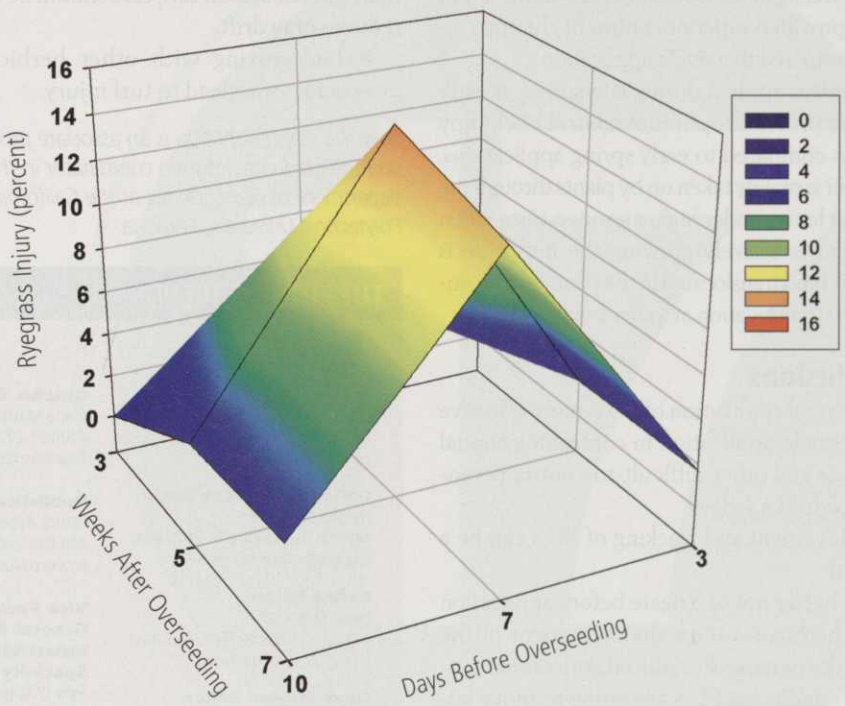
The herbicide adsorbed strongly on the fine textured soil after application and was not present in the soil solution. Slowly over a period of time the herbicide desorbed from the solid surface and dissolved in the soil solution. The ryegrass plants then picked up the herbicide and

FIGURE 2



Effect of application timing of Monument 75 WG at 9.33 g/acre on perennial ryegrass injury. Orange color denotes higher percentage of injury while purple color indicates no injury to ryegrass.

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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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.

Sowmya (Shoumo) Mitra is an associate professor and the graduate program coordinator in the department of plant science at the California State Polytechnic University, Pomona.

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SOLUTIONS FOR A GROWING INDUSTRY
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Less Is More

Improved fungicide features new formulation that enhances effectiveness of active ingredient against turf disease

BY PETER BLAIS

The Issue

Because of increased EPA regulations, pesticide users must scale back their use of some products and their active ingredients.

The Solution

New products that enhance the effectiveness of the active ingredient without using more of it but providing better penetration of it.

The recent introduction of Cleary Chemical's 3336 Plus fungicide, an improved version of traditional Cleary 3336 that has long been an effective treatment against numerous turf diseases ranging from dollar spot to brown patch, comes at a fortunate time for superintendents and Cleary.

According to Cleary officials, the company began developing 3336 Plus in 2001, two years before the Environmental Protection Agency (EPA) completed a Re-registration Eligibility Decision (RED) leading to the federal agency's recent order for users to scale back use of the product's active ingredient, thiophanate-methyl.

The new flowable takes advantage of Cleary's patent-pending Cleartec Activation Technology (CAT), a formulation change that enhances the effectiveness of the active ingredient in traditional Cleary 3336.

"We are getting better performance with less active material," said Director of New Business Don Breeze, noting the company would have developed and launched 3336 Plus with or without EPA's late-2004 order to reduce thiophanate-methyl use. "The government has mandated through the re-registration process that we use less thiophanate-methyl. With this new product, the superintendent still maintains many of the tools that were available [before the EPA decision]."

Thiophanate-methyl is the last remaining compound EPA allows for golf course use in the mode-of-action group called enzimidazoles, chemicals that are particularly adept at fighting such diseases as dollar spot, brown patch, anthracnose, summer patch, gray leaf spot and pink snow mold, explains Cleary's Director of Product Development Richard Fletcher.

Traditional 3336, on the market since April 1970, is a popular part of many golf course fungicide rotations. Looking to differentiate 3336 Plus, Cleary introduced CAT into the 3336 material and renamed the product 3336 Plus.

"We have a strong brand in the 3336 name," Breeze said. "That's one of the reasons we did not change 3336 Plus to a new name."

CAT is a formulation change to Cleary 3336 that allows the use of less active ingredient while providing better penetration of the chemical into both the fungus and plant. The result is that 3336 Plus remains effective up to 50 percent longer against turf diseases than traditional Cleary 3336 while releasing less thiophanate-methyl into the environment, Breeze and Fletcher say.

"The reduced amount of thiophanate-methyl in 3336 Plus allows the superintendent to spray twice as often with this product, and still meet the [revised] EPA guidelines regarding maximum use, when compared to the revised EPA label for 3336 and or generic thiophanate methyl-based products," Breeze says.

Cleary 3336 Plus, currently available on a limited basis, will have a full-blown launch this fall and be widely available in 2006. The product will likely sell at a slight premium compared to traditional Cleary 3336 or generic thiophanate-methyl-based products because of the limited amount initially available.

"But since it will last longer, the cost per day of control will ultimately save

PHOTO BY: LANE TREDWAY

the golf course superintendent money," Fletcher says.

Eric Carlson, the superintendent the last 11 years at Lake Mohawk Golf Club in Sparta, N.J., used the new product last August on his bentgrass/*Poa annua* fairways to primarily control dollar spot.

"It worked real well," he says. "I got four weeks of control. If you use the same rates and get an extra week, that could be a whole application saved over the course of the year. I intend to make it part of my fungicide rotation."

Joe Livingston, certified superintendent of River Crest Country Club in Fort Worth, Texas, has used traditional 3336 in the past as the foundation of his summer disease-control program to manage pythium, brown patch and a variety of summer bentgrass diseases on his greens.

"I switched to 3336 Plus this year because of the added efficacy of the product," he says. "Limiting the amount of active ingredient is definitely a good thing. The 3336 Plus allows me to lower the application rate a bit and get the same disease control. It's easy to use, mixes well and the lower rate is very helpful."

Lee Simms, superintendent of Great Hope Country Club in Westover, Md., says he tried the new product on three bentgrass fairways during the summer of 2004. Historically, the course has been lucky to get 14 to 21 days of coverage from its dollar spot-control fungicides.

"With the 3336 Plus we were getting close to 28 days," he says. "It lengthened our dollar spot control by at least a full week. ... We were looking for some brown patch control and 3336 Plus gave us good control on that, too."

Clovernook Country Club superintendent Bob Shetter noted that 3336 Plus provided effective control of various turf diseases at his Cincinnati course, but for a shorter period. Shetter reported 16 days of brown patch control on fairways and three weeks on tees this July.

The course labored under above-average temperature conditions during that mid-summer stretch, leading Shetter to believe he might be better off using the new formulation as a late-season or early-season spray when temperatures and humidity levels are slightly lower.

"If it had been a typical summer, I would have likely gotten the coverage time they expected," he says. ■

Peter Blais is a freelance writer from Monmouth, Maine.

Leaders

PEOPLE ON THE MOVE

Williamsburg Environmental Group named **Gregory J. Hofstetter** senior golf manager. He had been a superintendent in the Mid-Atlantic Region before joining LESCO as a senior agronomist. He later joined with Meadowbrook Golf/IGM as the director of golf course maintenance and vice president of golf operations.

Brad Adams will direct all sales and marketing activities for the landscape and golf markets of Irrometer Co. in Southern California and Southern Nevada. He had been a regional sales representative for High Tech Irrigation.

Forsgate Country Club promoted assistant superintendent **Tom Saunders** to superintendent following the retirement of veteran Bob Ribbans. Saunders had worked side-by-side with Ribbans for 18 years and now supervises a staff of 35.

Ewing Irrigation, Golf and Industrial appointed **Michael Biggs** to its golf sales team. He is responsible for providing sales, service and support for golf industry professionals in the greater Los Angeles area. Biggs had served as an irrigation construction superintendent for Landscapes Unlimited. Ewing also appointed **Bob Elliott** as the manager of its first Tennessee facility, in Nashville. He brings 27 years of industry experience to the job.

KemperSports Management appointed **J.P. Lunn** as general manager of Whiskey Creek Golf Club. He will oversee facility operations at the Mid-Atlantic destination.

Shawnee Inn named greenskeeper **Steve Taggart** as director of golf for the entire resort. Taggart, 35, joined Shawnee on Oct. 2, 1995, just in time for a flood that devastated the course and closed the inn for 10 weeks.


Adams | Hughes | Mercuri | Jackson | Bell

LESCO named **Chuck Denny** its senior vice president of store operations and sales. He had spent the last 25 years working in sales and store management roles for a variety of organizations, including Target, Office Max, Linens N' Things and Big Lots.

Beau Rivage Resort & Casino hired **Matthew Hughes** as director of grounds for its new Fallen Oak Golf Course. Hughes is overseeing the construction phase of the golf course and facilities associated with the property.

Steve Mercuri was named Target's account representative for the turf and landscape market in Southern California. Mercuri had worked for Accusoils and was an assistant superintendent for Stow Acres Country Club in Stow, Mass.

PBI/Gordon Corp. hired two new territory sales representatives. **Bill Affinito** had been the golf course manager at Miacomet Golf Course in Nantucket, Mass., the past five years. And **Sean Kearney** had worked in the lawncare market at ChemLawn as well as for many of PBI/Gordon's customers, including LESCO, UHS and Wilbur-Ellis.

BASF Corp. hired **Steve Jackson** as its professional turf and ornamentals regional sales manager for its Southern market area. Before joining BASF, Jackson was the director of turf business for Harrell's Inc.

Matthew Brecht joined the Syngenta Professional Products turf and ornamental team as a sales representative and will represent the company at FarmLinks.

Syngenta also named **Andree-Anne Couillard** its new global technical manager for professional products turf.

LESCO hired **Michael Poole** as its vice president of real estate and store planning. His retail career has been in real estate and store opening roles for several organizations.

Mike Ruizzo was named national account manager for the Chipco Professional Products group of Bayer Environmental Science. Ruizzo is responsible for several national accounts in the golf, lawn care and formulator business segments. He joins national account manager **Rich Burns** in handling specific national accounts for Bayer Environmental Science. **Bryan Gooch** will assume Ruizzo's previous position as business manager for imidacloprid and CNI chemistry.

William C. Wisdom, the group vice president of BASF's agricultural products regional business unit in North America, retired last month. **Markus Heldt**, the group vice president of agricultural products, regional business unit in Latin America, will succeed him.

Smith Turf and Irrigation vice-president **Bob Bell** will receive the Distinguished Service Award at the Carolinas Golf Course Superintendents Association annual conference. He is only the fifth recipient in the past seven years. The other four were all career golf course superintendents.

Bernhard and Co. announced two staff additions: **David Walker** as internal sales manager and **Gina Putnam** as marketing and communications manager.