



Spreaders should be carefully calibrated and tested before being used to apply preemergence herbicides. Skips, misses or overapplication should be avoided.

Scheduling Preemergence Weed Control

All a turf novice has to say to a sports turf manager to make him wince is, "My lawn looks great and I don't do all the things you say you need to do for good turf." This statement is especially aggravating when it comes from a person who has some control over your budget, such as the physical plant director, coach, greens chairman or park superintendent.

In one instant all your years of training and experience are on the line. You have to respond quickly with an equally terse statement, "If your lawn had to tolerate what my sports turf does, you would understand why I need to do much more to provide a uniform, playable and safe surface."

Few areas of sports turf management differ from typical lawn maintenance as much as preemergence weed control. The constant abuse and injury inflicted by sports on turf actually invites annual and perennial weeds to become established. Those tears and craters in the turf made by gol-

fers, football players and soccer players we call divots are perfect seedbeds for annual weeds. In fact, these weeds are often the only surviving plants on some low-maintenance athletic fields.

Nevertheless, a large number of athletic facilities still do not take advantage of preemergence weed control. Because managers of these facilities don't see the weeds before they are controlled, they don't understand their importance, says Dr. Wayne Bingham, professor of weed science at Virginia Polytechnic Institute, Blacksburg, VA.

The intense weed pressure on sports turf makes preemergence herbicides, those herbicides that prevent germinating annual grassy and broadleaf weeds from invading desirable turf, a critical part of a sports turf maintenance program. The superintendent or sports turf manager needs to utilize these products to their maximum advantage during peak germination periods of the major weeds. At the same time, he has to follow

the directions on the label carefully so that all the herbicide is exhausted before overseeding, reseeding, sodding or sprigging takes place. The mode of action for these materials is just as effective on germinating desirable turfgrasses as it is on undesirable weeds.

Perhaps most important is making preemergence herbicides fit your maintenance schedule. Since these materials last from several weeks to several months, a turf manager who must renovate his football fields in early summer needs to watch timing of spring applications more carefully than a golf course superintendent who overseeds his tees and fairways in the fall. Furthermore, target weeds such as crabgrass and goosegrass germinate at different times in different regions of the country. A football field manager in the Sunbelt has more leeway than his peers in the North.

In fact, sports turf managers who have been waiting until spring to reseed or sod, might consider rescheduling this work to the fall so they can take advantage of spring applications of preemergence herbicides. Spring sports, especially soccer, also make fall the best time to reseed. By spring the seed has become established and the sod has rooted. Rather than disturbing the soil by seeding or sprigging in the spring when annual weed germination is at its peak, the herbicide can be applied safely to established turf. By preventing these weeds from invading the turf in the spring, the amount of time spent on controlling established weeds during the summer with postemergence herbicides can be reduced.

Weed pressure never lets up on sports turf. While preemergence herbicides have taken some of the pressure off postemergence herbicides, they have not replaced them. The best results are obtained by using them in conjunction with each other. Using preemergence herbicides is more complicated than using postemergence herbicides, but once the turf manager has mastered both, he has much greater control over weeds that damage the uniformity of turf, its playability, safety and appearance.

"There has to be a certain amount of knowledge to use preemergence herbicides properly," points out Dr. Bill Knoop, turfgrass specialist with the Texas Agricultural Extension Service in Dallas. "Unfortunately, this knowledge is not always available at all sports facilities." Knoop has developed a comprehensive turf maintenance program and schedule for athletic fields in his area to help close the knowledge gap.

A second hurdle to clear for some facilities, explains Knoop, is the cost of preemergence herbicides compared to some of the standard postemergence products. When the budget is tight, the cost difference seems to get a lot of attention. Knoop works closely with suppliers and high school grounds managers in his area to demonstrate the difference some turf maintenance practices can make. By providing the turf

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Large spreaders can treat a field or an entire park quickly and uniformly.

Herbicide manufacturers have discovered that by combining different preemergence herbicides they can lengthen their residual activity and increase the number of weeds they control.

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managers with the knowledge and demonstrating good maintenance practices to school administrators, a number of area schools have found the money to improve their weed control programs.

Golf course superintendents have been using preemergence herbicides for nearly 50 years, starting with lead arsenate in the 1920s. The first products had very narrow tolerances between controlling weed seedlings and harming turfgrasses. Superintendents came to accept a certain amount of temporary turf discoloration when using these products as long as crabgrass was brought under control.

Phenyl mercury acetate (PMA) was the second major preemergence herbicide used for turf beginning in the '30s. Its use spread from the golf course to home lawns until the late '50s when chlordane, an insecticide used by superintendents to control turf insects, was recognized for its control of crabgrass when applied early in the spring.

After World War II and the Korean War, suburban housing began to boom. The importance of a weed-free lawn grew. "Crabgrass became part of conversation at cock-

tail parties in the suburbs," recalls Jack Welch with ICI Americas. Welch has sold herbicides for more than 25 years. In the late '50s, O.M. Scott & Sons began offering a preemergence product called Halts on a wide-spread basis. It contained chlordane as the active ingredient.

The expanding housing market not only increased the market for residential turf products, it had a similar effect on the professional market as more golf courses, parks and schools were constructed. Chemical companies started developing products for both turf markets in the '60s largely by adapting agricultural products.

Two preemergence products developed during this period were DCPA (Dacthal) from Diamond Shamrock (now Fermenta) and bensulide (Betasan) from Stauffer Chemical (now ICI Americas). When applied to turf before spring temperatures averaged 55 degrees F., these herbicides controlled more than 80 percent of germinating crabgrass for nearly two months with minimal discoloration. They were a big step forward in both safety and effectiveness.

During the next decade two more preemergence herbicides were introduced, siduron (Tupersan) from DuPont and benefin

(Balan) from Elanco. Siduron's unique properties enable it to be applied shortly after seeding or overseeding turfgrass. Balan was the first of a new family of preemergence herbicides called dinitroanilines, which provide control at a lower cost. Elanco has the rights to all DNAs except one.

As turf managers gained control over crabgrass, they started concentrating on other annual weeds. These included the grasses—foxtail, goosegrass and annual bluegrass (a fall germinator) as well as the broadleaf weeds—spotted spurge, prostrate spurge, oxalis, knotweed, henbit (fall) and chickweed (fall). To maintain a chemical barrier in the soil during the peak germination periods for these other weeds, turf managers realized that two applications were frequently necessary. Goosegrass starts to germinate as much as four weeks after crabgrass and can continue to germinate in some areas through the summer and into fall.

Split applications are designed to replace the herbicide broken down in the soil after a period of 30 to 60 days. Typically the first application is at full rate and the second is either half or three-quarter rate. By making a second application, control can be extended to four months or longer and the later germinating weeds, such as goosegrass, are controlled more effectively. The down side to split applications is the time and cost of making the second application. If the second application must take place when the crews are busy on other tasks, it may also prove inconvenient.

Rhone Poulenc took a slightly different tack to achieve longer control when it introduced oxadiazon (Ronstar) in the '80s. At the recommended rate, one application of oxadiazon will last approximately 120 days. This provides an alternative to split applications. However, this length of control provided at the full rate is not always desirable, especially for turf managers overseeding during late summer or fall. Check the label for lower rates and shorter control periods for oxadiazon.

Elanco has taken a third route to improving preemergence weed control by developing products to improve the conditions of particular regions of the country. The company introduced oryzalin (Surflan), a DNA previously registered for weed control in ornamentals, for warm-season turfgrass weed control in the South. Oryzalin provides improved goosegrass control in bermudagrass.

The latest preemergence herbicide for turfgrass is pendimethalin developed by American Cyanamid. This DNA-type herbicide is moderately priced and provides good control of both crabgrass and goosegrass. Lesco markets a sprayable formulation of pendimethalin while Scotts markets a dry applied formulation combined with fertilizer.

Most recently, herbicide manufacturers have discovered that by combining different preemergence herbicides they can lengthen their residual activity and increase the number of weeds they control. This al-

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lows the rates of the individual components to actually be reduced without sacrificing control levels. An additional benefit is the lower rates reduce the likelihood of the herbicides injuring the desirable turf. "There is a definite synergism when herbicides are combined with other herbicides or fertilizer," states Bill Tavener, sales manager of Pacific Sod. "The herbicides seem to perform better even at lower rates."

Examples of combination preemergence herbicides are Team, XL, Scotts Goosegrass/Crabgrass Control and Regal-Star. Elanco has combined trifluralin (Treflan)

and benefin (Balan) in a product targeted for northern weed control called Team. It also has combinatorial (Surflan) with benefin (Balan) to make a southern product called XL. Bensulide (Betasan) and oxadiazon (Ronstar) are being combined by Scotts to make Goosegrass/Crabgrass Control. RegalStar is a combination of benefin, oxadiazon and Nitroform slow-release fertilizer marketed by Regal Chemical. The Andersons has a fertilizer combined with Team (trifluralin with benefin) and Dursban insecticide.

In all instances, success with preemergence herbicides requires a thorough understanding of the label. The label clearly

explains the particular weeds the product is designed to control. It will also warn you if the herbicide has the potential to damage certain turfgrasses. Perhaps most important, it will say whether or not split applications are advised and what the length of the control period is at certain rates. This lets you know how soon you can reseed, overseed or sod following application.

If you have a question that is not really answered by the label, don't hesitate to call your local chemical distributor, the manufacturer or extension turf specialist. They will be able to give you precise information on timing, rates and split applications. If you aren't sure which weed or weeds are invading your turf, ask them to identify them for you.

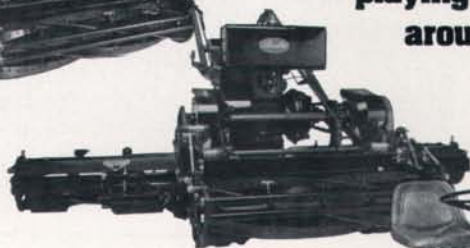
There can be significant differences between preemergence weed control on cool-season and warm-season grasses. To explain some of these we interviewed manufacturers and extension personnel in various locations throughout the country for their recommendations.

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"Repeat treatments have done away with some of the variability in control."

Dr. B. J. Johnson, professor of agronomy, University of Georgia, Athens, GA, is an expert on weed control in warm-season turf. He points out that the biggest concern of southern turf managers is timing preemergence applications so that they won't harm perennial ryegrass or tall fescue overseeded into bermudagrass in the fall. All preemergence herbicides work by inhibiting the growth of roots and shoots of seedlings. Spring and summer applications must be timed so that all herbicide residue is exhausted before overseeding begins. This makes timing of a second application critical and can dictate the use of shorter acting products. Some products can last in the soil for more than three months.

Johnson recommends that all applications of preemergence herbicides in his area should be made by mid-March. This is the time when temperatures average above 55 degrees F. and crabgrass begins to germinate. However, he warns that timing can vary from year to year.

The longer germination period in the South frequently requires two applications. Generally, the second treatment is made 60 days after the first. "Repeat treatments have done away with some of the variability in control experienced in the past," he adds.

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Goosegrass has become a major problem throughout the South. Johnson has been impressed lately with the goosegrass control of pendimethalin, combinations of oxadiazon with bensulfide or benefin, and the combination of benefin and oryzalin.

Johnson reveals that preemergence herbicides can also play a role in spring transition from overseeded ryegrass back to bermudagrass. Pendimethalin and oryzalin appear to phase out the ryegrass in the spring when the bermudagrass is coming out of dormancy. This procedure is not recommended for bermudagrass greens since

preemergence herbicides can inhibit the transition of the bermudagrass.

Spring renovation of bermudagrass fields and fairways by pegging or sprigging can be hampered by preemergence herbicides. Root-absorbed herbicides can harm the establishment of the sprigs. However, treatment is needed since the sprigging process can open up the turf to crabgrass and goosegrass establishment. Applying oxadiazon following sprigging has shown effective weed control without harm to the sprigs.

With the growing conversion of bermudagrass greens to bentgrass in the South, bermudagrass has become an important weed in bentgrass greens. Applications of

siduron to bentgrass greens has shown promise in suppressing the encroachment of bermudagrass. Growth regulators are also being tested for this purpose.

Goosegrass invading either bermudagrass or bentgrass greens can be the worst problem a superintendent can face. This is the specific reason Scotts developed its combination product. Only certain preemergence herbicides can be used on greens. Check the label and with your extension agent before selecting products for goosegrass control on greens.


John King, associate professor of agronomy at the University of Arkansas, Fayetteville, AR, thinks oxadiazon applications after sprigging can be a major help to athletic fields with busy spring schedules. "Spring wear and tear of fields opens them up to goosegrass," King states. "The herbicide barrier in treated fields can also be chewed up by spring play. You don't want to do anything that can hinder the recovery of overseeded ryegrass or tall fescue until soccer season ends in May."

In May, King says that treatments with postemergence herbicides with MSMA, glyphosate (Roundup) or metribuzen (Sencor) can knock out weeds that germinated in bermudagrass between winter and the end of the spring season. A very light rate (1/2 pound/a.i./acre) of glyphosate will also knock out any overseeded ryegrass, he states. Broadleaf weeds can be removed with an application of Trimec (PBI Gordon) Weedone DPC (Rhone Poulenc), Three-Way (Lesco), Triamine (Riverdale), Turflon-D (Dow) or similar postemergence herbicide combination.

Once these weeds are eliminated, the sports turf manager can then apply preemergence herbicide for control of weeds germinating in the summer. Glyphosate has a label in Texas for summer use on bermudagrass to remove hard-to-control weeds such as dallisgrass, johnsongrass and crabgrass.

King is a proponent of leaving weeds alone in the spring if they make up a high percentage of the surface. "At some point, weeds are a blessing." For sports fields with small budgets and busy spring schedules, he likes the idea of overseeding common bermudagrass fields in the fall with tall fescue because it requires less fertilizer and water than ryegrass. Irrigation is necessary, however, to water-in preemergence herbicides immediately after application and to assure successful germination of the fescue in the fall.

Preemergence control of annual grassy weeds in cool-season turf can be complemented with an application of fenoxaprop-ethyl (Acclaim) from Hoechst-Roussel Agri-Vet Company, says Dr. Robert Shearman, professor of horticulture, University of Nebraska, Lincoln, NE. The postemergence product selectively removes crabgrass, goosegrass, foxtail and other grassy weeds that are missed by spring treatments of preemergence herbicides. Applications made when these weeds are in the three-leaf stage



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Annual bluegrass is growing in areas missed when preemergence herbicides were applied in Texas. Photo courtesy: Bill Knoop.

(June to July) after spring sports season have ended will remove crabgrass and goosegrass missed by preemergence products. It enables the sports turf manager to overseed in the spring and to delay grassy weed control until the spring season is over. Since the herbicide is not a residual, reseeding and overseeding can take place a short time after application. Fenoxaprop can be tank mixed with preemergence herbicides for the second split application to improve summer control.

Split applications are helpful in the North when the turf contains both annual grassy weeds and annual broadleaf weeds, explains Shearman. Single treatments that may control crabgrass may not control oxalis, spotted spurge and prostrate spurge since they germinate later. Fall applications may be necessary for control of annual bluegrass, chickweed or knotweed. However, fall is also the primary time for reseeding cool-season turf, including bentgrass, ryegrass, tall fescue and Kentucky bluegrass. Some success has been achieved in removing annual bluegrass from overseeded ryegrass turf in the South with ethofumesate (Prograss) from Nor-Am.

While the length of control of siduron is relatively short compared to other preemergents, it is safe to apply on newly seeded turf. Turf managers can still provide weed control after reseeding in either the spring or fall with siduron.

Shearman cautions that high rates of preemergence herbicides can decrease wear tolerance, slow recovery and decrease root and rhizome development. He recommends that sports turf managers maintain sufficient levels of potassium for wear stress and phosphorus for root and rhizome development. He also urges sports turf managers to exercise caution when applying preemergence herbicides near ornamentals or plant beds.

Once you have identified the primary weeds that you need to control with preemergence herbicides and have pinpointed their primary germination period for your area, the next step is to apply them properly. Turf should not be wet when dry products are applied to avoid any possible leaf burn. Sprayable herbicides should be mixed with a spray pattern indicator to avoid skips and misses. A uniform barrier of a sufficient rate of herbicide must be created in the top inch or two of soil. Both products should be watered-in quickly following application to rinse the active ingredient off the foliage and down to the soil.

The same guidelines should be followed for split applications, although the rate is typically one half to three quarters of the original rate. The idea is to restore a threshold rate and to replace the portion of the herbicide that has been broken down by soil microorganisms.

Sports turf managers have to decide for themselves whether important cultivation practices such as verticutting and aerifying are too important to delay until after preemergence herbicides have done their job, says Milt Kogiyama, pesticide specialist for Scotts. "Technically, anything that disturbs the herbicide barrier will reduce control," states Kogiyama. "But, if you have a major

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tournament or series of games, aerifying afterward to relieve compaction and restore drainage and soil gas exchange may be more important than preemergence weed control. You can reapply the herbicide after aerifying, but you really don't lose that much control with normal cultural practices. Oxadiazon seems to hold up better to soil disturbance than some of the other preemergence products."

David Ball, product manager for Elanco, says combinations of preemergence herbicides with fertilizer from major formulators such as Regal, Lebanon, The Andersons, Lesco, Gordon and Scotts, have made preemergence weed control more affordable for many sports turf managers. "These formulators have helped educate the turf manager to the benefits of preemergence herbicides. With their help we have been able to develop products which fit regional as well as national turfgrass markets." Elanco has a new preemergence turf herbicide with improved broadleaf weed control called isoxaben in the process of registration for introduction in 1989. "It is the first premergents that was developed specifically for broadleaf weed control, instead of grassy weed control," states Ball.

Safety is the goal of Rhone Poulenc with oxadiazon, says Dan Stahl, marketing manager. "We look for products with a high margin of safety and low toxicity potential



A walking boom sprayer and indicator dye can provide an extra level of certainty during pre-emergence herbicide applications.

to desirable turf," he states. Oxadiazon is very insoluble in water and stays at the soil surface. "If a turf manager accidentally applies too much Ronstar by using an improperly calibrated spreader, he can use activated charcoal to fix his mistake. Also, since it stays at the surface, it does not get absorbed by the roots of sprigs.

"You don't have to be an expert with spray equipment to use premergents," says Welch with ICI. "There are effective products in

both liquid and dry-applied forms. Golf courses and stadiums tend to use spray equipment, but there is no reason to buy this equipment if you have a spreader that can be calibrated."

Sports turf under heavy use is ripe for invasion by annual weeds. Preemergence herbicides were invented specifically for this reason. A sports turf manager needs to use every tool available to him to keep his fields safe and playable.

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