

MODERN WEED CONTROL STRATEGIES

Many managers of golf and sports turf today are asking themselves if they are acting responsibly in the way they use chemicals. They are weighing risks versus benefits each time they go to their distributor to buy products which allow them to meet increasingly higher turf standards. They are sensitive to concerns regarding exposure, the fate of chemicals once applied, and the amount they apply. Overall, they are seeking ways to do their part in protecting their employees and the environment.

For years, universities have been teaching turf students that weed control is a science. Professors have urged their classes to carefully plan control rather than react to weed invasion. By identifying specific weeds first, they can determine the most effective control strategy.

Effectiveness is a major issue today because it enables turf managers to use the least amount of herbicide in the fewest number of applications. The selection of herbicide(s), timing of applications, and close attention to rates can have a great influence on how much chemical needs to be used in one season or in future seasons.

A survey conducted by Rhone-Poulenc revealed that a "typical weed" will produce more than 24,000 seeds, ranging from a few hundred seeds for leafy spurge to 40,000 for crabgrass. By allowing weeds to become established and produce seed, the amount of control necessary grows by leaps and bounds. Fighting weeds after they produce seed is too little too late.

Weed seed can also remain dormant in the soil for years. Maintenance practices such as aeration and verticutting bring dormant seed to the surface, where it receives the moisture and warmth needed to germinate. These escapes must be controlled at the appropriate time to reduce the bank of viable weed seed in the germination zone. Negligence during one year may take up to ten years to correct. What may be an acceptable level of control one year may turn into an unacceptable level the next.

It's often stated that the best defense against weeds is a healthy, dense stand of turf. Resprigging warm-season turf and overseeding cool-season turf are needed in many sports facilities to maintain density. Resodding is an option for both types of grasses. Timing herbicide applications or selecting herbicides and rates which don't affect establishment of new turf is a much larger issue for golf courses and athletic fields than it is for commercial or residential turf.

Vegetative spread of weeds can be more persistent and difficult to deal with than growth from seed, states Dr. William Daniel, professor emeritus of Purdue University. He notes the aggressiveness of stolons

and rhizomes of plants such as quackgrass, bermudagrass, kikuyugrass and bentgrass. The tubers of nutsedge are notorious, he says, for their proliferation and long dormancy.

Golf course superintendents and sports turf managers for the most part have a grasp on the types of weeds causing problems. As a result, they can be more selective about control measures. They also discover fairly quickly what herbicides work better than others and what rates are most effective. By relaying this information to chemical suppliers and extension turf specialists they are a major influence on product development.

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Goosegrass can affect ball bounce and roll as well as disrupt the appearance of turf.

Weed Control Strategies

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One message being sent to manufacturers is that granular formulations of herbicides are favored over liquid forms. "Granular products are perceived as being safer and more controllable," states Dave Maurer with DowElanco. "Less equipment is needed to apply dry products. No mixing is involved. If your spreader is calibrated properly and you follow label directions, there is little room for error."

If a product is effective in dry form, then it is easy to go to combinations with fertilizers, Maurer adds. "The fertilizer has to match the timing for the herbicide," points out Roger Story from DowElanco. "The formulation of the fertilizer must fit the time of year."

"Fertilizers are some of the best carriers for herbicides," remarks Paul Grosh with Lebanon Chemical. "There is a definite trend toward combinations of fertilizers and herbicides. We have developed fertilizers with analyses that fit the timing of spring or fall applications of preemergent herbicide. These combination products have to be registered with the EPA like any herbicide."

One thing to check with granular herbicides or fertilizer/herbicide combinations is whether they should be applied to wet or dry foliage. "You may have to target the application for a certain time of day to meet these requirements," says Vince Kageyama with O.M. Scott & Sons.

Some herbicides must be applied as liquids because of their mode of action. Some emulsifiable concentrate and wettable powder formulations can be mixed with liquid fertilizers for spraying. This requires more knowledge of products and mixing than dry applications. It also necessitates investment in spraying equipment. However, many golf courses and some large sports complexes have this type of equipment and trained personnel under supervision from certified staff.

"There is a great economic and performance benefit in being able to spray a mixture of chemicals at the same time," advises Dr. Paul Sartoretto, technical director of W.A. Cleary Chemical Corp. "Once the art has been mastered, the chemical operator will never go back to the old-fashioned notion that chemicals must be sprayed one at a time." The key to mixing is compatibility among the products in the tank.

Lesco, Inc., has developed a closed system for adding chemicals to spray tanks.

The system reduces the exposure of the applicator to the chemical. All herbicide suppliers stress that applicators of any form of herbicide should read and understand the label as well as the Material Safety Data Sheet for each product they use. It is the responsibility of facility managers to inform employees of the dangers of handling or applying pesticides. Severe penalties can result from noncompliance.

To make compliance simpler, a number of sports facilities are trying to limit the number of pesticide applications they make during the growing season. Combination granular products or spraying herbicides with other chemicals can cut applications in half. In the case of preemergence herbicides, longer residual means fewer applications. However, some turf managers are finding split applications at half rate allow them more flexibility in case renovation is needed.

Combining different herbicides is another way to cut down on applications as well as broadening the spectrum of weeds controlled. Older products are being assisted with newer chemistry brought over from agriculture. In some cases, adding a second or third herbicide enables the applicator to achieve control while at the same time lowering the rate of one or more of the components.

These developments are an invitation for turf managers to take a fresh look at their weed control strategy. Below are some of the new twists available to control weeds safely and effectively in today's chemical-sensitive world.

Broadleaf Weed Control - Control of broadleaf weeds in turf has long centered around postemergent applications of selective herbicides. The phenoxy (2,4-D, 2,4-DP, MCPP, and MCPA) have dominated this market since the '50s. Each phenoxy has certain strengths and weaknesses, which has led many formulators to combine a number of them to broaden their spectrum of control.

"There are all kinds of different combinations and formulations of phenoxy," explains Sean Casey, marketing manager of Riverdale Chemical Co. "The combination products are effective on a wider range of weeds than any of the phenoxy by themselves. Manufacturers are providing combinations that are more targeted than before."

The spectrum of these herbicides can be enlarged further by the addition of dicamba. Combinations of dicamba plus two phenoxy are quite common and effective.

Recently, 2,4-D has become the target of certain critics. Researchers have also found that enzymes in some weeds can detoxify certain phenoxy, says Maurer from DowElanco.

Dr. Joseph Neal at Cornell has been investigating alternatives to 2,4-D. Included among them are clopyralid, chlorflurenol, dicamba, and triclopyr. The advantage of dicamba is its safety on both cool- and warm-season turfgrasses. Neal found that a combination of triclopyr and clopyralid is a promising alternative to phenoxy when applied to Kentucky bluegrass, tall fescue, and perennial ryegrass. Clopyralid is also highly effective on clover and other legumes.

One of the biggest steps forward in broadleaf weed control is the development of better preemergence herbicides. "Preemergence herbicides in the past have been most effective on grassy weeds with some control of broadleaves," explains DowElanco's Story. "Isoxabin is the first preemergence product that is strong against broadleaf weeds. When applied in the fall, it can prevent germination of many problem spring broadleaves. That helps reduce the number of applications of postemergence herbicides the following season."

Isoxabin treatment can follow seeding or overseeding once the new turf reaches the three-leaf stage, Story says. The current formulation of the product is a dry flowable for spraying. The amount of active ingredient applied compared to alternative postemergence herbicides is considerably less, he adds.

Grassy Weeds and Sedges - While selective postemergence herbicides have dominated broadleaf weed control, preemergence herbicides have been the main weapon against grassy weeds. Finding significant differences between desirable grasses and undesirable ones is a delicate process. Postemergent products are able to select between one plant and another based on such differences. Only recently have chemists had luck finding and utilizing these differences.

Preemergence herbicides are nonselective for the most part. They create a chemical barrier at the soil surface which prevents the emergence of the seedling. This barrier lasts for weeks or months depending upon rates and the product used. The established grasses continue to grow without competition from new plants. However, the materials will prevent the emergence of turf seed applied until they

break down.

The number of preemergence herbicides is relative large. They were developed mainly for their effectiveness against crabgrass and goosegrass. One group called the dinitroanilins includes benefin, oryzalin, pendimethalin, and trifluralin. These disrupt cell division within the emerging seedling. Bensulide, DCPA, oxadiazon, and siduron have different types of chemistry and modes of action. Preemergence herbicides are frequently combined to provide broader spectrum control or increased safety on certain types of turfgrasses.

Furthermore, all but one preemergence herbicide, oxadiazon, can stunt the growth of roots of sod or sprigs. Tests at North Carolina State University have shown that some preemergence herbicides may injure the short root systems of drought-stressed or very young turf, especially in compacted soils. The root pruning impact of some preemergence herbicides can be reduced by lowering rates or using combinations of herbicides which are effective at lower rates. Half rates of herbicide can also be applied in split applications to give the turf manager the option of reseeding sooner than he could if used at the full rate.

The other option is cultural, to address the problems of compaction and soil moisture before these herbicides are applied. Nutrient deficiencies should also be corrected. Quite often, preemergence herbicides are combined with fertilizers.

If maintenance practices or surface damage disrupt the chemical barrier, some weed plants may escape. Then the turf manager must rely on selective postemergence products. Some of the phenoxys combined with dicamba, or a few of the arsenicals, control crabgrass and goosegrass, but two or more applications may be required.

Fenoxaprop is a relatively new product effective on young grassy weeds in cool-season turf and zoysiagrass. It controls weeds that are missed by preemergence herbicides for a month or longer depending upon the rate. It is most effective when applied to emerged crabgrass, goosegrass, foxtail, or fall panicum before the two-leaf stage, says Frank Dierdorf of Hoechst. "It is not translocated by tillers and has no soil activity," he states. "The area can be reseeded within a month without negative effects. New sod can also be treated."

The emulsifiable concentrate can be tank mixed with preemergence herbicides to catch escapes if weed germination started before the area could be sprayed. It may improve the control of crabgrass and

later-germinating goosegrass in one application instead of two. "Athletic field managers and golf course superintendents choose fenoxaprop if they have a grassy weed problem and need the ability to overseed in the spring," adds Dierdorf.

A few new products selectively remove grasses from others. Scott's metsulfuron methyl is registered for controlling bahiagrass, foxtail, and some broadleaf weeds in bermudagrass. Chlorsulfuron from Lesco can eradicate tall fescue in bermudagrass. Nor-Am's ethofumesate can remove annual bluegrass from bermudagrass or bentgrass fairways. Pronamide from Rohm & Haas can selectively eliminate annual bluegrass from bermudagrass fairways or fields. Metribuzin by Mobay can be used as a selective preemergence herbicide for goosegrass in bermudagrass fairways, roughs, or fields.

Grassy weed control is not the toughest challenge of superintendents and sports turf managers, the sedges are. Yellow and purple nutsedge spread from bulbs buried below the surface. Multiple treatments with MSMA can knock back nutsedge after it has emerged. Imazaquin from American Cyanamid provides better postemergence control of nutsedge in bermudagrass, zo-

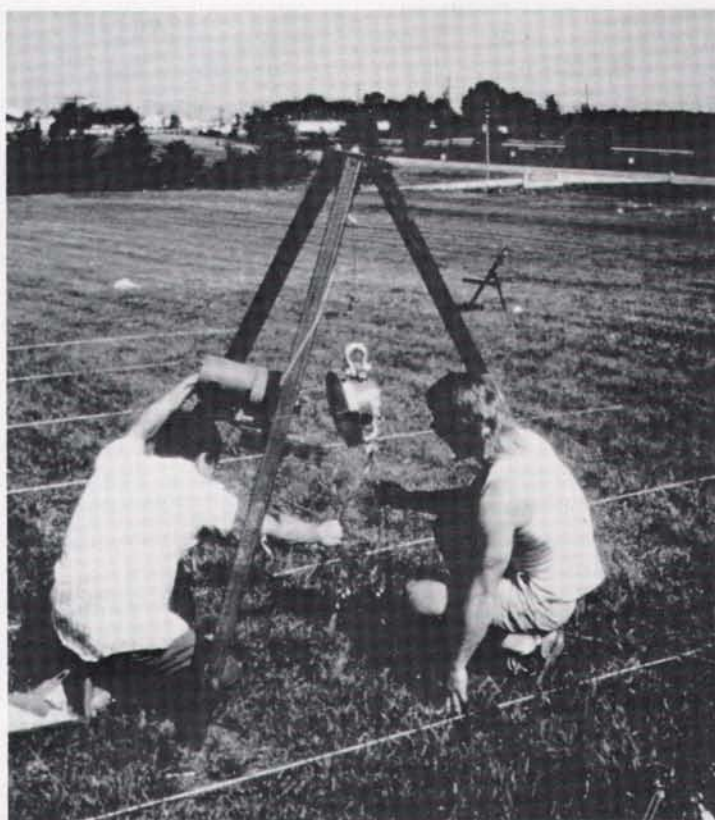
sia, St. Augustine, and bahia. Basagran by BASF offers similar control in cool- and warm-season grasses.

Preemergence of yellow nutsedge control is now possible with metolachlor by Ciba Geigy. Ethofumesate by Nor-Am has been used to suppress the spread of nutsedge.

Effectiveness is a big issue in weed control. In many cases it allows the turf manager to achieve control while applying less material. Rather than accept lower turf standards, he can keep his facility competitive and reduce his use and exposure to chemicals. Price is the trade-off. Specialized materials are more expensive.

Another benefit is that since you are using less product, you have less to store. "Superintendents and sports turf managers are buying just what they need today," reveals Grosh from Lebanon Chemical. "We are basically storing it for them until they need it."

The trends in weed control indicate that superintendents and sports turf managers are acting responsibly. They are sensitive to environmental concerns and the exposure of themselves and their staff to chemicals. Manufacturers, distributors, and extension specialists are helping them maintain safe, high-quality turf by balancing the benefits and risks. ☺



Device measures the sod rooting strength of turf treated with preemergence herbicides.