Preemergence herbicide use on athletic fields

SPRING IS A TIME FOR ATHLETIC FIELD MANAGERS to focus on control of summer annual weeds such as crabgrass (*Digitaria* spp.) and goosegrass (*Eleusine indica*). These species complete their life cycle in 1 year, germinating from seed in spring, growing throughout summer, and finally setting seed in fall. If left uncontrolled, both crabgrass and goosegrass can reduce the aesthetic and functional quality of warm- and cool-season athletic field turf.

Research conducted at the University of Tennessee Center for Athletic Field Safety (CAFS) in 2012 illustrated that high-use areas of fields comprised of predominately crabgrass lose approximately 10% cover after each traffic event compared to only 1% for those containing predominantly Tifway hybrid bermudagrass (*C. dactylon* x *C. transvaalensis*). These losses in cover were associated with increases in surface hardness (measured as Gmax), a property linked with head injury incidence.

An effective means for controlling summer annual weeds is the use of preemergence herbicides. A list of preemergence herbicides labeled for use on warm- and cool-season turfgrasses commonly found on athletic fields is presented in Table 1.

Table 1. List of active ingredients labeled for preemergence control of annual grassy weeds in warm- and cool-season turfgrasses commonly used on athletic fields.

KEYS TO SUCCESS

There are two keys to effectively controlling summer annual weeds with preemergence herbicides. First, be sure to apply these materials before weeds have emerged from soil (i.e., before they are visible). These herbicides do not prevent weed seed germination; rather they prevent germinated seedlings from developing into mature plants. Considering that the timeframe between germination and emergence can be quite short, it is often recommended that these herbicides be ap-

Active Ingredient	Trade Name†	Formulations‡,¶	Labeled Species
prodiamine	Barricade	FL, WG	Bermudagrass Seashore Paspalum Tall Fescue Kentucky Bluegrass Perennial Ryegrass
dithiopyr	Dimension	EW, WP	Bermudagrass Seashore Paspalum Tall Fescue Kentucky Bluegrass Perennial Ryegrass
prodiamine + sulfentrazone	Echelon	SC	Bermudagrass Seashore Paspalum Tall Fescue Kentucky Bluegrass Perennial Ryegrass
pendimethalin	Pendulum	FL, G, EC	Bermudagrass Seashore Paspalum Tall Fescue Kentucky Bluegrass Perennial Ryegrass
pendimethalin + dimethenamid-P	FreeHand	G	Bermudagrass Seashore Paspalum
oxadiazon	Ronstar	G, FL, WSP	Dormant Bermudagrass (FL, WSP only) Bermudagrass (G only) Seashore Paspalum (G only) Tall Fescue (G only) Kentucky Bluegrass (G only) Perennial Ryegrass (G only)
indaziflam	Specticle	WSP, FL	Bermudagrass

† Active ingredients may be available under multiple trade names. Mention of trade names or commercial products in this publication is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the University of Tennessee Institute of Agriculture. The omission of a particular trade name is not intended to reflect adversely, or to show bias against, any product or trade name not mentioned.

‡ FL = flowable; WG = water dispersible granular; EW = concentrated emulsion; WP = wettable powder; WSP = water soluble powder; SC = soluble concentrate; G = granular (not on fertilizer).

¶ Many preemergence herbicides are sold on granular fertilizer carriers. Be sure to follow label instructions to ensure that the correct rates of active ingredient and nutrients are supplied to turf when using these materials.

Table 1

plied once soil temperatures are favorable for crabgrass seed germination. Athletic field managers should make their first preemergence herbicide application as soon as soil temperatures (at approximately 2 inches) measure ≥ 55°F for a minimum of three days in spring.

Ornamental forsythia plants can be a helpful indicator of when this benchmark soil temperature has been reached. Forsythia plants produce distinctive yellow blooms at soil temperatures similar to those that facilitate crabgrass seed germination. Thus, the presence of yellow petals on forsythia plants serves as an indicator of when preemergence herbicides for summer annual weed control should be applied in spring. Athletic field managers should be sure to apply preemergence herbicides before forsythia plants have completed flowering.

A second key to effectively controlling weeds with preemergence herbicides is to water them into the soil after application. Most labels require that 0.25 to 0.50 inches of irrigation or rainfall be applied within 24 to 48 hours after application. These herbicides are absorbed by germinating seedlings in the soil profile so moving them into the rootzone is critical. Failure to irrigate after application can also lead to material being lost due to volatilization. On fields without irrigation, try to time preemergence herbicide applications around a period of rainfall.

SPLIT APPLICATIONS

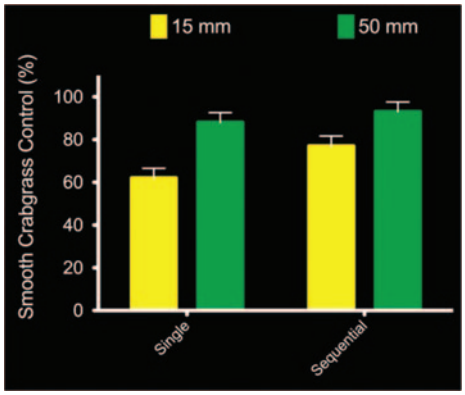
Split (also referred to as "sequential") application programs of preemergence herbicides tend to provide more consistent control of summer annual weeds throughout a growing season. These programs typically apply the total amount of active ingredient for the season in two applications spaced 8 to 10 weeks apart. A single herbicide application in spring for preemergence control of crabgrass will slowly be broken down by soil microbial activity over the course of a summer often leading to crabgrass breakthrough by fall. Split application programs delivering active ingredient two times throughout a season tend to provide a longer period of control. Additionally, split application programs will control species germinating later in the year than crabgrass (e.g., goosegrass, etc.).

MOWING HEIGHT

Research conducted at CAFS in 2012 evaluated the effects of mowing height on the efficacy of single and split applications of preemergence herbicides for crabgrass control. A total of six different herbicides were evaluated. At a 0.6 inch mowing height, split application regimes provided greater crabgrass control than single applications regardless of product. When mowing height was increased to 2 inches, no significant differences were detected between single and split application regimes regardless of product (Figure 1).

Five of the six herbicides tested provided greater crabgrass control when applied to turf maintained at 2 inches compared to 0.6 inches regardless of application regime. While this experiment will be repeated again in 2013, these preliminary results indicate that split application regimes provide better control than single applications at low (0.6 inch) heights of cut. Additionally, increasing mowing height can improve the efficacy of preemergence herbicides for crabgrass control. Increases to 2 inches may reduce the need for split application programs altogether; however, this height of cut may not be acceptable on all athletic fields.

Figure 1. Smooth crabgrass (*Digitaria ischaemum[*) control 5 months after initial preemergence herbicide treatment at CAFS in Knoxville in 2012. Means from the 0.6 inch (15 mm) and 2 inch (50 mm) heights of cut were pooled across six different herbicide chemistries.



CONCERNS OVER TRAFFIC TOLERANCE

It is well documented that many of the preemergence herbicides used to control annual grassy weeds can inhibit bermudagrass root growth. Reductions in root growth in the uppermost portion of the soil profile could potentially compromise bermudagrass traffic tolerance and recovery; thus, rendering the benefits of effective weed control moot.

Research was conducted at CAFS during 2009 and 2010 evaluating the effects of four preemergence herbicides on Tifway hybrid bermudagrass traffic tolerance and recovery. Over the course of the 2-year study, no differences in smooth crabgrass (*Digitaria ischaemum*) control were detected among herbicide treatments after being subjected to athletic field traffic in spring; control measured 95 to 99% by 5 months after treatment. Moreover, no differences in Tifway traffic tolerance or recovery were reported in either year.

We hypothesized that this response was due to Tifway recovering predominately from below ground rhizomes rather than stolons. Follow-up research was initiated in 2012 evaluating the effects of preemergence herbicide applications in spring on Tifway traffic tolerance in fall. After the first year of the study, no differences in fall traffic tolerance were detected due to herbicide treatment in spring. To date, these findings illustrate that use of preemergence herbicides to control weeds on bermudagrass athletic fields does not affect traffic tolerance or recovery.

Numerous preemergence herbicides are available for controlling annual grassy weeds on athletic fields. Always refer to the product label for specific information on proper use, tank-mixing compatibility and turfgrass tolerance. Mention of trade names or commercial products in this publication is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the University of Tennessee's Institute of Agriculture. For more information on turfgrass weed control, visit the University of Tennessee's turfgrass weed science website at www.tennesseeturfgrassweeds.org. ■

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