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tivated by either rainwater or irrigation after application. Figure 1 shows a map of expected dates after which crabgrass would germinate and there would be no more killing frosts. Pre-emergence herbicides must be applied before this date. Typically, they are applied two to three weeks earlier, when an indicator plant, such as forsythia in the northern United States (see figure 2) or dogwoods in South are in bloom.

Some of the products released during the 1990’s had claims that they could be applied the prior fall. However, subsequent university research showed that, because of pesticide degradation dynamics (more on this later), best control is achieved by waiting until forsythia bloom or soil temperatures reach around 50°F.

**Choices, choices, choices**

Pre-emergence herbicides vary greatly in their duration of effectiveness. Table 1 lists the products currently on the market. Products that contain either pendimethalin, prodiamine or dithiopyr usually give the longest control. The other materials on the chart also have advantages. Formulations that contain benfon or bensulide, for example, tend to be less expensive. The trade off is shorter duration of residual activity and slightly less effective control. Consult the label for specific usage recommendations.

There tends to not be a significant difference in crabgrass control whether the same active ingredient is applied as a liquid or as a granular formulation. Both require light irrigation for activation. One note of caution, however — pre-emergence herbicide formulated on an excessively large granule can be a problem because this may result in sporadic distribution of the herbicide around the particles. The granule does not need to be “greens grade” but it should not be excessively large either.

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**Rates and frequency**

To be effective, a pre-emergence herbicide barrier must last for about four months in the northern United States and up to seven months in the South. After application, these herbicides are subject to numerous processes that act to degrade the product. To discuss all of the processes that govern how long a pesticide will persist after application is beyond the scope of this article. However, one of the most important factors that governs the effectiveness of pre-emergence herbicides is microbial degradation, which is summarized briefly in Figure 3.

The amount of time it takes for 50% of a product to degrade in the soil is referred to as its half life. If, for example, a product’s half life is 50 days, then 50 days after application about 50% of the product will remain and 100 days after application about 25% of the product will remain. Once the level of product in the soil falls below a certain minimum concentration then crabgrass will be able to germinate through the herbicide barrier (See Figure 3). As long as you are within the label limits, you can increase the duration of effective control by increasing the initial application rate. In other words, if your pesticide has a half life of 50 days and you wish to get an additional 50 days of control, you would double the application rate.

**Split or not to split?**

In a split application you apply a portion of the pesticide initially followed by a subsequent application around six to 15 weeks later. This practice is widely followed in the South due to the extended season. However, research conducted in the 1990s suggests that with some products this can actually decrease control. The reason for this is that the initial application results in an increase in the soil microbial populations that degrade the pesticide. This increase in microbial activity then can result in subsequent applications of the pesticide being degraded more rapidly (See Figure 3). Many studies have showed that, at best, splitting the application of certain herbicides is not more effective than the single application and in some cases, can result in significantly less control of crabgrass. However, this is not the case with all pre-emergence herbicides.

Generally speaking, in the northern United States you should make one application and increase the duration of control by increasing the application rate. If you are in the South and you’re going to make split applications, wait 60 to 90 days (or according to label directions) before making the second application. Also, consult your state’s extension literature, because some products benefit from sequential applications and some do not.

Since the introduction of quinclorac in 2000 the industry has had a tool to reliably control crabgrass and other annual grass weeds. This is best accomplished with an immediate pre-emergence application followed by additional applications during the growing season. For more information on crabgrass management, consult your state’s extension literature. The key to a successful crabgrass management program is to monitor field conditions and make adjustments as needed.
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the use of pre-emergence herbicides becomes more important for the control of weeds such as dallisgrass and goosegrass. Pre-emergence herbicides can be very effective for controlling crabgrass, other annual grasses, and even some annual broadleaf weeds. Taking into consideration the proper product choice, application timing, and the effects of application rate and frequency will assist you in maximizing the potential control afforded by these products. LM

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What happens if MSMA bites the dust?

BY BERT MCCARTY

On August 9, 2006, the US Environmental Protection Agency (EPA) issued a ruling disallowing reregistration of the organic arsenical herbicide family. Important members of this family include MSMA, DSMA, and CMA (Table 1). The organic arsenical herbicides have been used in turf since the 1950s and are the backbone products for post-emergence grass weed control, especially in warm-season turfgrasses. These herbicides provide good broad-spectrum post-emergence weed control including crabgrass, goosegrass, sandspur, annual nutsedges and annual broadleaf weeds. With repeat applications, they eventually control perennial weeds such as dallisgrass, yellow nutsedge, bull (or thin) paspalum, johnsongrass, bromesedge, carpetgrass, crowfootgrass, St. Augustinegrass, centipedegrass, kyllinga species and various perennial broadleaf weeds.

These herbicide formulations are termed “organic arsenical” as carbon is attached to the basic molecule as a methyl (CH3) group. The EPA contends that through the process termed demethylation, the organic forms of arsenic from pesticides are degraded into the more toxic inorganic (or without the methyl group) form.

When the EPA cancels a product, a 60-day public response period is allowed for interested parties to voice their opinions or concerns about the pending action. For the organic arsenicals, due to overwhelming response, the EPA extended this deadline from October 2006 to January 19, 2007. Once the public response period expires, the EPA will consider these and issue a final ruling approximately 30 days later. The following Web site can be accessed to track the latest ruling or progress of this issue: http://www.epa.gov/feeding/drgstr/EPA-PEST/2006/August/Dav09fp12905.htm

Weed control without MSMA

What does this probable cancellation mean to lawn care operators who depend on the organic arsenicals? Unfortunately, post-emergence weed control is about to get more expensive and selective. For example, post-emergence dallisgrass control typically requires three to five MSMA applications (Figure 1). Three applications of MSMA cost $18 to $24 per acre and provide approximately 90% - 95% dallisgrass control. The next most effective material provides only about 65% suppression with two applications at a material cost of $293 per acre.

For post-emergence crabgrass control in bermudagrass and zoysiagrass, quinclorac (trade name Drive) will become the main product of choice. Fenoxaprop-ethyl (trade name Acclaim Extra) will still be available in cool-season grasses along with quinclorac. Drive is an extremely fast acting and effective herbicide, if good soil moisture is present (in other words, the weed is actively growing) and works best on immature plants. Also, in warm-season grasses, pre-emergence herbicides will
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