

# PRE-EMERGENCE WEED CONTROL

## COOL-SEASON GRASSES

Annual weed control requires a sound knowledge of the grasses and weeds in question, and discriminating cultural practices.

by Nick Christians, Ph.D., Iowa State University

**M**any of the annual weeds we encounter in cool-season turf species are actually warm-season grasses.

Unlike the cool-season turfgrasses that thrive in spring and fall, warm-season grasses such as crabgrass, goosegrass and foxtail thrive during the summer.

Warm-season annuals die early in the fall with the first cool weather. Cool-season grasses thrive in the fall and early spring. Fertilizer applications at this time will help thicken cool-season lawns and make them more resistant to annual weed encroachment in the late spring. Fertilizer applications during mid-June to mid-August to lawns with some annual grasses and broadleaf weeds don't encourage the lawn grasses but do benefit the warm-season weeds.

### High-phosphorus diet

The proper fertilizer can also help discourage annual weeds.

When the lawn is established, "starter" fertilizers high in phosphorus (P) are used, such as a 13-25-6 or a 10-20-10. Once the grass plant matures and forms an extensive root system, however, it is able to remove phos-

phorus from the surrounding soil; then fertilizers with analysis much lower in P are generally sufficient (i.e., 20-3-15 or 18-5-9).

### Application timing

Fertilizing mature lawns with high phosphorus fertilizers does little to benefit the turf, unless the area is shown by a soil test to be low in that element. Germinating annual weeds thrive on high P fertilizers just as do germinating perennial grass seedlings.

Although turf deficient in P may benefit from "winterizing" treatments, most lawns have sufficient phosphorus in the soil. So more will not improve the turf's winter survival; however, the resulting high P levels on the soil surface will help germinating weed seeds in the spring.

### Importance of mowing

Mowing itself can serve as a weed control. Many of the serious agricultural weeds are of no consequence in turf areas because they cannot tolerate continuous mowing. Excessively low mowing heights, however, will reduce the turf's competitive advantage and allow annual weeds to

become established regardless of whether herbicides are used, as observed at Iowa State University in late summer studies. (Kentucky bluegrass mowed below 1½ inch will often become infested with crabgrass, regardless of the presence of pre-emergence herbicides.)

A good dense stand of turf is one of the best weed controls, and mowing to meet the turf's requirements is one of the best ways to assure a dense stand.

### Cultural practices

Cultivation techniques such as core aeration can work both ways on weed infestation.

Compacted soils have a detrimental effect on the turf and often become infested with annual weeds. Using herbicides on compacted areas makes little sense, unless the compaction problem is dealt with first. Aeration reduces compaction and favors the turf, thereby helping to control weeds.

Improperly timed cultivation can potentially aid weed infestation. Any practice that opens the turf and brings annual weed seed to the surface during the peak weed germination period is likely to benefit the weeds more



than it does the turf.

Recent research has shown that spring aerification following pre-emergence herbicide application does not disrupt the barrier established by the herbicide as much as once believed. It makes good sense, though, to avoid this time if possible. Late summer to early fall is still the best time to aerify cool-season lawns.

### Irrigation strategies

A sound knowledge of grass species and weeds can also be used to design an irrigation strategy that will help prevent weeds.

In an established, well-rooted lawn it makes little sense to irrigate to keep the surface continuously moist during the germination of annual weeds. Some surface drying will generally have no detrimental effect on perennial lawn grasses, but will have an impact on newly-germinated weed seed that are struggling to survive.

Turf infested with fungal patch diseases may benefit from light, frequent watering before and during disease activity. Proper use and timing of light, frequent watering programs is recommended on lawns where patch diseases have been a problem. On lawns where patch diseases have not historically been a problem, deep, infrequent watering is still the best practice.

Proper irrigation at other times can also help prevent weed problems. Kentucky bluegrass lawns can survive extended drought periods by going into summer dormancy. But spurge and oxalis often infest these lawns in late summer resulting in callbacks and the need for more herbicides. Using irrigation water to keep the lawn growing can help insure against these weed problems.

Watering cool-season lawns during dry fall conditions can also be a sound management practice.

Dry autumns have been a problem in the Midwest during three of the last four years. This is one of the best times for cool-season grasses to become re-established in the absence of competing annual weeds. This time of year is particularly important on lawns damaged by summer drought.

Proper fall fertilization and watering can help make the lawn more resistant to weed infestation in the spring.

### Easy on perennials

Using cultural techniques can help prevent a weed problem. However, cultural controls are rarely 100 percent effective.

Insect and disease damage, adverse weather conditions, physical damage to the lawn, and a variety of other

factors can injure even the best managed turf and open it to weed establishment. For these situations, herbicides can prevent weed infestation if properly used.

Table 1 lists a variety of pre-emergence herbicides that can be used on cool-season lawns to help prevent annual weeds. The activity of these materials is such that they do little, if any, damage to the perennial grasses in the turf, but are deadly to the germinating annuals.

(For a detailed discussion of these herbicides, see, "Cool-season weed control poses special challenge," *Lawn Care Industry* magazine, Feb., 1990.)

Some of the materials in this group have unique characteristics.

Siduron, for instance, is the only material in the group that can control annual weeds selectively at the time of lawn establishment. This material is particularly useful for spring seedings.

Isoxaben is marketed under the trade name Gallery. It is particularly effective against knotweed, spurge, oxalis and other annual broadleaf weeds. Isoxaben has limited activity at labeled rates against annual grasses and will generally fit into the lawn care program as a supplement to standard pre-emergence herbicides. Where annual broadleaves have been a problem in the past, this material provides a new tool that can be used effectively if properly timed.

### Widening the window

Much of the research on annual weed

control in the 1980s was aimed at "widening the window" of application (Figure 1).

The pre-emergence herbicides in Table 1 will control annual weeds if applied before weed germination, but most provide little if any post-emergence activity on weeds that have already germinated. These materials are very useful in situations where they can be properly timed before weeds germinate.

### A breakthrough

In the early 1980s, MSMA (monosodium methanearsonate) and DSMA (disodium methanearsonate) were the only materials available for post-emergence control of summer annual weeds in turf. The weed control from these materials was quite inconsistent in much of the Northern region and often resulted in phytotoxicity to the turf. Pre-emergence applications were far preferable during this time, and these post-emergence materials were used only as a last resort.

Fenoxaprop-ethyl, marketed under the trade name Acclaim, was released in the mid-1980s. It was the first really effective post-emergence herbicide for controlling annual grasses in cool-season lawns.

This material broadens the window of application by allowing lawn care specialists to effectively treat germinated crabgrass in its early stages. Customers whose lawns could not be treated before crabgrass germination and customers who signed up for the service after the time of pre-emergence application no longer had to go

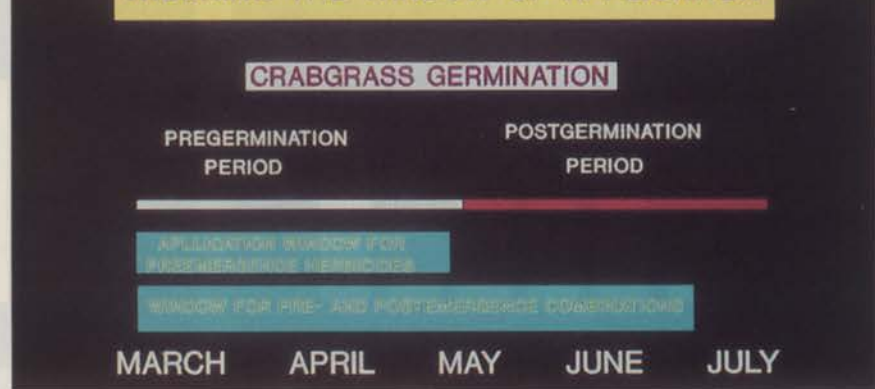
**TABLE 1**  
**Pre-emergence herbicides currently in use in cool-season turf**

COMMON NAME	TRADE NAME	COMMON NAME	TRADE NAME
DCPA	DACTHAL	OXADIAZON	RONSTAR
BENEFIN	BALAN	PENDIMETHALIN	PRE-M, WEED GRASS CONTROL
BENSULIDE	BETAMEC-4, PRE-SAN,	TRIFLURALIN/BENEFIN	TEAM
	BETASAN	SIDURON	TUPERSAN
ISOXABEN	GALLERY		

Source: The author

### FIGURE 1

## WIDENING THE WINDOW OF APPLICATION





through the entire season with a lawn filled with warm-season annuals.

Fenoxaprop-ethyl has had some limitations. It is incompatible with many broadleaf herbicides such as 2,4-D. It has no pre-emergence activity, and it is not very effective following drought stress of the target species. But it has still been widely used in the cool-season region. **LM**



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New pre-emergence herbicides are becoming available which "widen the window" of time for effective applications.

## New control products

**DIMENSION:** Dithiopyr is a new material that will be marketed on a limited basis in selected states in 1991 under the name Dimension. Research on this product has been under way at various state universities since the mid-1980s under the experimental name MON 15100.

Dithiopyr is a very effective pre-emergence herbicide that provides reasonably good post-emergence control of germinated crabgrass. The extent of the post-emergence activity varies with location, but I have found it to provide excellent post-emergence control in most years at the Iowa State University turfgrass research area.

Dithiopyr has two important advantages over older products:

- it can provide both pre- and post-emergence activity, and

- it does so at a lower rate of application than most herbicides. The recommended application rate will be 0.5 lbs. AI/acre as compared to 1.5 to as high as 10 lbs. AI/acre with earlier materials.

**QUINCLORAC:** Quinclorac, an experimental product that has been given the potential trade name Impact is another of the new products that may possibly widen the window of application.

This material provides excellent post-emergence control of crabgrass in its early stages and provides excellent control of some broadleaf weeds, particularly white clover. Quinclorac, with little pre-emergence activity, would have to be combined with a pre-emergence material if it is applied at a time when crabgrass is still germinating.

Quinclorac has been found in recent experimental work to provide very good activity in the granular form and may well find a place in the future.

### Similar problems during drought

Research at Iowa State University on both dithiopyr and

quinclorac indicate that these products are likely to experience problems controlling crabgrass that has been subjected to drought periods. Fenoxaprop-ethyl has similar problems.

Figures 2 and 3 show the results of post-emergence weed control studies following an extended drought period (Fig. 2) and following a period in which no drought stress was observed (Fig. 3). Crabgrass subjected to dry conditions before treatment was much harder to control than the crabgrass that experienced no drought conditions. More work will be needed to understand this reduced control, but this should be considered whenever post-emergence crabgrass control is needed.

### Changing standards

With the new tools being developed, the potential exists for a change in the standard lawn care program.

In the past, a standard program included a pre-emergence application in the first round, often followed by an additional application in the second round to assure complete control through the season. With the new post-emergence materials being developed, the possibility exists that the early pre-emergence application could be eliminated and replaced with a single application in the second round that would control annuals both before and after emergence.

The new products will have to prove themselves in the market place, but if this type of program can be used effectively, it could potentially reduce the amount of herbicides that the industry now applies to lawns and could reduce cost. These possibilities will be worth investigating in future seasons as new herbicides reach the market.

—Dr. Christians □

FIGURE 2

POSTEMERGENCE CRABGRASS CONTROL WITH DIMENSION AND IMPACT FOLLOWING DROUGHT CONDITIONS

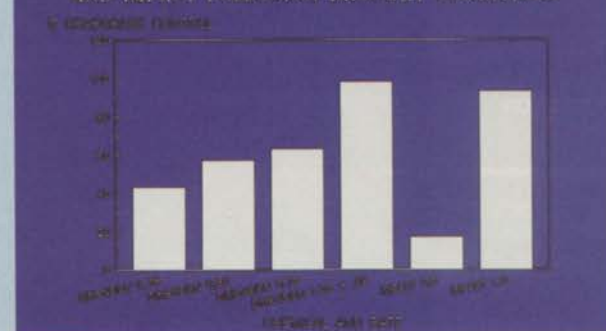


FIGURE 3

POSTEMERGENCE CRABGRASS CONTROL WITH DIMENSION AND IMPACT FOLLOWING WET CONDITIONS

