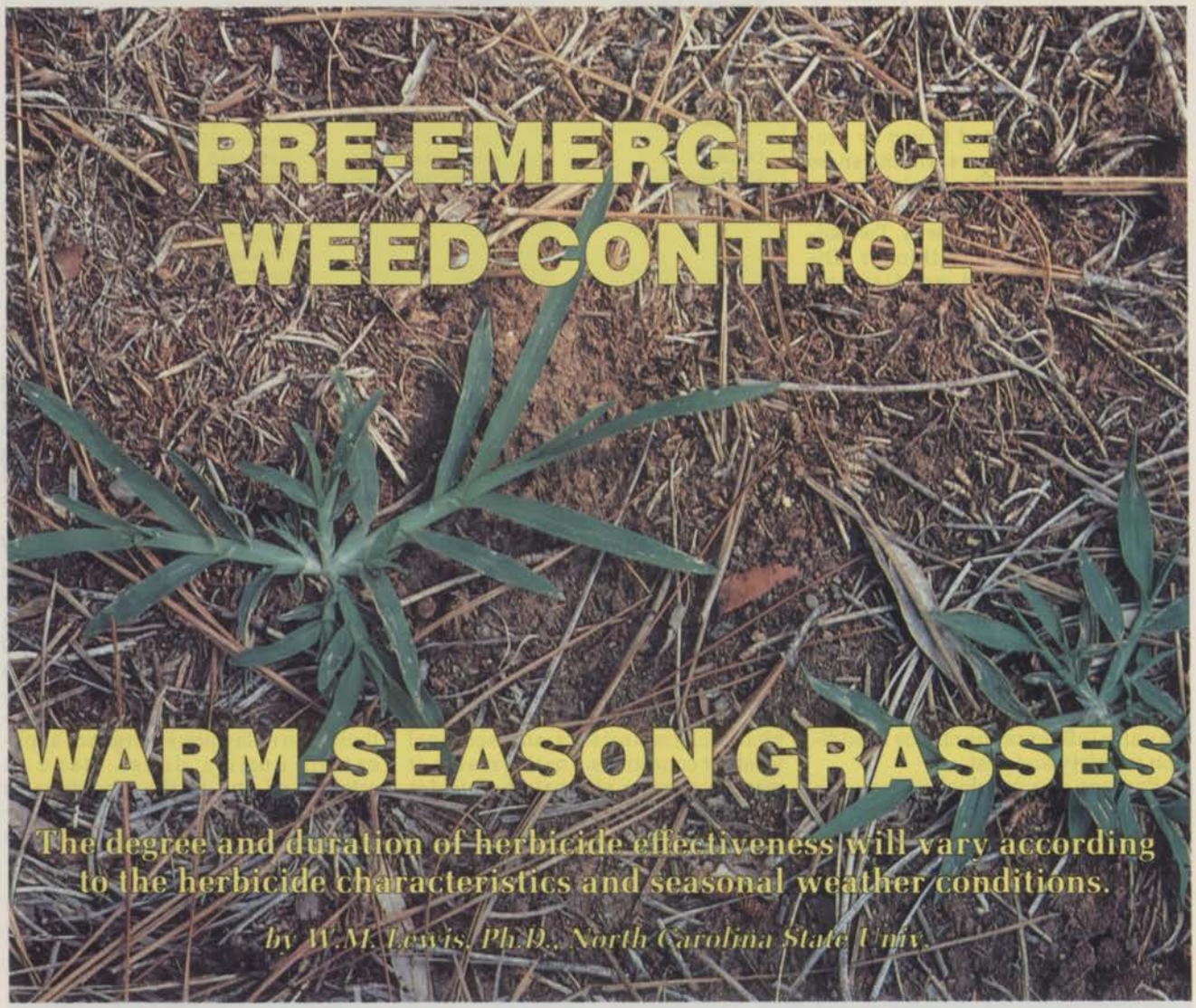

PRE-EMERGENCE WEED CONTROL

WARM-SEASON GRASSES

The degree and duration of herbicide effectiveness will vary according to the herbicide characteristics and seasonal weather conditions.

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Goosegrass and smooth crabgrass (shown above) are two of the most common weeds found in warm-season turfgrasses. Specific management practices lead to aesthetically appealing turfgrasses.

The first step in a weed management program is to produce a healthy vigorous turf, one competitive with weeds. This may be done by matching proper warm-season turfgrass species or cultivars with their intended use—whether a home lawn, athletic field, commercial landscape or golf course fairway.

Grass selection may also be related to its intended level of management (amount and frequency of fertilization, needed irrigation and mowing height and frequency).

Insect and disease problems should also be reduced.

Once these practices have been put into action, the turf manager is ready to consider the need for pre-emergence herbicides.

Frequently, the need should be determined by observations made on the site the previous season. Applying pre-emergence herbicides year after year without any consideration to the existing weed problems is not good management. Carefully selecting specific management practices leads to an aesthetically appealing and serviceable warm-season turfgrass.

Available herbicides

Pre-emergence herbicides are the

backbone of a weed management program. They are primarily used for the control of smooth and large crabgrass and goosegrass, though many will control certain other summer annual weedy grasses. Also, they provide pre-emergence control of annual bluegrass when applied in the fall.

A number of herbicides or herbicide combinations are registered for pre-emergence use in established warm-season turfgrasses (Table 1). This listing contains examples of common and trade names of pre-emergence products.

Many herbicides are also formulated on fertilizer carriers. Certain herbicides are limited to use by professional turf managers which can be determined by reading the label.

Oxadiazon (Ronstar) is not registered for use on home lawns. Two additional herbicides, dithiopyr (Dimension 1EC) and prodiamine (Barricade 65 WDG) may be registered for use in the 1991 season.

The emphasis is on application to established turfgrass because none of the herbicides are registered for application at time of sprigging, sodding or seeding warm-season turfgrasses. There is one exception, however: siduron may be used when sprigging zoysiagrass.

Herbicide selection

When selecting a herbicide, first consider turfgrass tolerance (Table 2) and the grassy weeds present on the site. Then consider the effectiveness of the herbicides on those weeds (Table 3). The method or ease of application may also influence the choice in addition to safety and cost.

Perhaps one overlooked factor is the tolerance of trees and ornamentals in the landscape. Most labels list tolerant ornamental species. This opens up another possibility of selecting a single herbicide for pre-emergence grassy weed control in the turf as well as the ornamental plant beds.

With the exception of atrazine, simazine and oxadiazon, the effects of the pre-emergence herbicides are associated with inhibiting root growth in the germinating weed seeds. Root inhibition has also been observed in desired turfgrasses; for example, in the growth of new roots along the stolons of bermudagrass and centipedegrass.

The degree and duration of the effects will vary according to the herbicide characteristics and seasonal weather conditions. For this reason, it may be wise to alternate herbicides from year to year or—maybe even more important—to be very cautious in determining the need for a pre-emergence herbicide in any year.

In heavily-trafficked areas having thin open stands, a pre-emergence herbicide may interfere with the stand filling in and the stolons rooting properly. Post-emergence control would be the best approach for this situation.

Frequent light applications of MSMA may be used in bermudagrass in an effort to control recently germinated crabgrass and goosegrass. In centipedegrass, sethoxydim (Poast) applied as a post-emergence provides control to crabgrass and goosegrass. The other alternative in these situations is to delay pre-emergence application until a dense stand is established and in the meantime to concentrate on starting the proper management practices to encourage that dense stand.

Table 1.

Examples of Common and Trade Names of Pre-emergence Herbicides for Warm-Season Turfgrasses

Common Name	Company	Trade Name and Formulation
Atrazine	Ciba-Geigy	AAtrex 80W, 4L, 90DG
	Security	Purge II 2L
Benefin	Dow/Elanco	Balan 2.5G, 60DF
	Lesco	2.5 Benefin Granular
Benefin + oryzalin	Dow/Elanco	XL 2G
Benefin + trifluralin	Dow/Elanco	Team 2G
Bensulide	ICI	Betasan 4E LF, 3.6G, 7G, 12.5G
	Lesco	Lescosan 4E, 7G
	PBI/Gordon	Bensumex 4LF
Bensulide + oxadiazon	Scotts	Goosegrass/Crabgrass Control 6.5G
DCPA	Fermenta	Dacthal 75W, 6F
Napropamide	ICI	Devrinol 50WP, 2G, 5G
	Lesco	Devrionol 5G Ornamental
Oryzalin	Dow/Elanco	Surflan 4AS
Oxadiazon	Rhone-Poulenc	Ronstar 2G, 50WP
Pendimethalin	Lesco	Pre-M 60 DG
	Scotts	Halts 1.71G
		Southern Weedgrass Control 2.45G
		Turf Weedgrass Control 1.71G
		Weedgrass Control 60WDG
Simazine	Ciba-Geigy	Princep 80W, 4L, 90DG, 4G

Table 2.

Tolerance of Established Warm-Season Turfgrasses to Pre-emergence Herbicides for Control of Annual Weedy Grasses

Herbicide	Bahiagrass	Bermudagrass	Centipedegrass	St. Augustinegrass	Zoysiagrass
Atrazine	NR	T	T	T	T
Benefin	T	T	T	T	T
Benefin + oryzalin	T	T	T	T	T
Benefin + trifluralin	T	T	T	T	T
Bensulide	T	T	T	T	T
Bensulide + oxadiazon	NR	T	NR	NR	T
DCPA	T	T	T	T	T
Napropamide	T	T	T	T	NR
Oryzalin	T	T	T	T	T
Oxadiazon	NR	T	NR	T	T
Pendimethalin	T	T	T	T	T
Siduron	NR	NR	NR	NR	T
Simazine	NR	T	T	T	T

T = tolerant when used properly according to the label; NR = not registered for use on this turfgrass.

Application timing

Pre-emergence herbicides are best applied at least two weeks before expected weed seed germination. In areas where there is a crabgrass history, pre-emergence herbicides are applied in the spring when soil temperatures approach 53°F. Goosegrass germination is usually two weeks later than crabgrass.

Crabgrass and goosegrass germinate first in thin open stands of warm-season turfgrasses. Germination is delayed and/or reduced in dense stands, which is another reason for considering all cultural practices as part of a total weed management program. Moving from the southern to the northern portion of the warm-season zone, crabgrass may germinate from late January to early April.

Frequently, application timing is correlated with a biological indicator. For example, in North Carolina, pre-emergence crabgrass herbicides should be applied by the time dogwoods are in full bloom.

Research at North Carolina State University has shown that split applications generally out-perform a single pre-emergence application. An example of a split rate may be 1.5 pounds in early spring and 1.5 pounds eight weeks later, if the usual single spring application rate is 3 pounds active per acre. Split applications of benefin + trifluralin, oryzalin and pendamethalin have given acceptable goosegrass control.

Some turf managers apply one pre-emergence herbicide early in the spring and a second herbicide eight weeks later in an attempt to increase safety to the turf. We have not observed any adverse effects on ryegrass mixtures overseeded in bermudagrass in September or October following a March-to-May pre-emergence herbicide application, though we have observed a reduction in stand density of fall overseeded ryegrass from spring applications of oryzalin and benefin + oryzalin.

Our tests have also shown that applications can begin six to eight weeks before expected crabgrass germination with favorable control, because under cool soil temperatures little if any herbicide degradation occurs during this period. This would not hold true farther south in the warm-season turfgrass area. In fact, in some areas crabgrass can germinate year-round under favorable conditions.

Applications of herbicides for pre-emergence control of annual bluegrass and certain winter annual broadleaf weeds may be from late August to early November, depending on geographical location. Annual bluegrass germination is influenced by adequate moisture and cool temperatures. Time of emergence can be quite variable from year to year.

TABLE 3.

Annual Grassy Weed Control Ratings for Pre-emergence Herbicides

Herbicide	Crabgrass	Goosegrass	Annual Bluegrass
Atrazine	P	P	E
Benefin	G	F	G
Benefin + oryzalin	G	F-G	G
Benefin + trifluralin	G	F	G
Bensulide	G	P	G
Bensulide + oxadiazon	G	G	G
DCPA	G	F	G
Napropamide	G	G	G
Oryzalin	G-E	G	G
Oxadiazon	G	G	G
Pendimethalin	G-E	F-G	G
Siduron	G	F	NR
Simazine	P	P	E

Weed control effectiveness: E = excellent (90-100%), G = good (80-90%). F = fair (70-80%), P = poor (<70%), NR = not registered.

Herbicide effectiveness

Herbicide characteristics, weeds to be controlled, and weather conditions influence the effectiveness and longevity of pre-emergence herbicides. The persistence of herbicides in the soil differs. Benefin does not persist as long as oryzalin or pendimethalin, for example. Split or repeat herbicide applications help to maintain threshold levels for season-long grassy weed control.

Pre-emergence herbicides are best applied at least two weeks before expected weed seed germination.

As indicated in Table 3, with the exception of atrazine and simazine, pre-emergence herbicides provide good to excellent control of crabgrass. However, the ability to control goosegrass varies. For effective goosegrass control, a herbicide rated "good" should be applied. Single applications of oxadiazon and bensulide + oxadiazon have provided favorable goosegrass control in North Carolina tests.

If a pre-emergence herbicide is to be effective, it must be applied prior to weed seed germination. Applications following weed emergence will fail. If applied too early, the herbicide may dissipate or degrade before weed seed germination.

Pre-emergence applications need rainfall or irrigation to move them off the turf foliage into the upper soil layers where the weed seeds germinate. If at least one-half inch of rain doesn't fall within a week following application, irrigation is advisable. On the other hand, excessive seasonal rainfall usually reduces the length of effective control.

Mowings of warm-season turfgrasses should be delayed until the herbicide has been washed off the turfgrass foliage, especially if grass clippings are to be removed.

It has been a common belief that cultivation following pre-emergence appications disrupts the herbicide barrier in the soil and then stimulates weed germination. However, according to test results, coreing (aerification) following pre-emergence herbicide application does not affect herbicide performance, providing the soil cores are returned.

Metolachlor (Pennant 7.8E) has been registered for pre-emergence yellow nutsedge control on golf fairways, sod farms and commercial lawns, but not on residential turf. It may be applied to bahiagrass, bermudagrass, centipedegrass and St. Augustinegrass.

Choosing the appropriate pre-emergence herbicide requires knowing the tolerance of the warm-season turfgrass to the herbicide.This must be matched with the weeds. **LM**

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