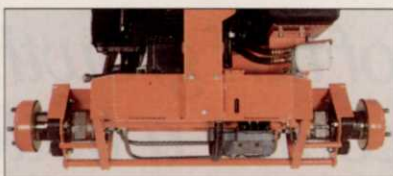


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Circle No. 163 on Reader Inquiry Card

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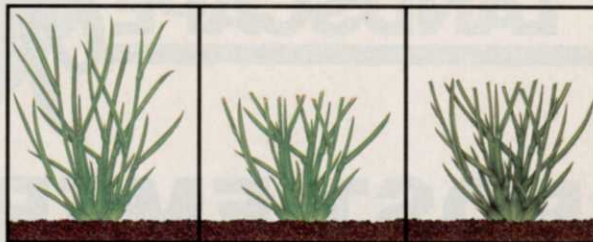
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Scott Niven
Superintendent, Stanwich Club
Greenwich, Conn.

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"Cutless helped us convert from 80% Poa annua to over 95% bentgrass within five years. But I'm just as impressed with how Cutless creates a much thicker turf. It makes the grass as tough as nails, helps the ball sit up higher for our golfers."

"Cutless helped us convert from 80% Poa annua to over 95% bentgrass within five years. But I'm just as impressed with how Cutless creates a much thicker turf. It makes the grass as tough as nails, helps the ball sit up higher for our golfers."

Find out more about giving your course more playability with Cutless. See your Elanco distributor. Or for a free brochure, call toll-free: **1-800-352-6776**.

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Circle No. 114 on Reader Inquiry Card

POST-EMERGENCE WEED CONTROL IN WARM-SEASON TURFGRASSES

There are many ways to control unwanted plants. Just be sure you know what you're treating and don't promise more than can be delivered.

by Bert McCarty, Ph.D., University of Florida, Gainesville

Weeds can be defined simply as unwanted plants or plants growing out of place. Therefore, beauty is in the eye of the beholder, meaning that some people simply want ground cover with any green plants—weeds and all.

Others desire a uniform turf stand with no weeds or additional undesira-

ble characteristics, such as damage from insects, diseases, or other pests. For these, weed control is rapidly becoming better defined as "weed management."

Weed control methods

Several means of weed control are available. Incorporating as many as

possible by turf managers will increase their effectiveness.

Encourage healthy turf growth and be prepared to hand-pull weeds from an area.

If only a few weeds are present, especially in newly-established areas, hand removal is the safest alternative. Obviously, this is practical only on a



Treat weeds before they begin to tiller or produce seedheads. Otherwise multiple applications of herbicide spaced 7 to 10 days apart are necessary for control.



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Circle No. 271 on Reader Inquiry Card

Table 1.

Warm-season turfgrass tolerance to post-emergence herbicides.

Herbicide	Bahia-grass	Bermuda-grass	Carpet-grass	Centipede-grass	St. Augustine-grass	Zoysia-grass
<i>Postemergence</i>						
asulam	D ¹	S-I ²	D ³	D	S-I	NR
atrazine	I	S-I(D)	I	S-I	S-I	I
bentazon	S	S	I	S	S	S
2,4-D	S	S	I	I	I	S
2,4-D + dicamba	S	S	I	I	I	S
2,4-D + dichlorprop	S	S	I	I	I	S
2,4-D + MCPP	S	S	I	I	I	S
2,4-D + MCPP + dicamba	S	S	I	I	I	S
2,4-D + MCPP + dichlorprop	S	S	I	I	I	S
dicamba	S	S	I	I	I	S
DSMA, MSMA	D	S	D	D	D	I
imazaquin	D	S	I	S	S	S
MCPA + MCPP + dichlorprop	S	S	I	I	I	I
MCPP	S	S	I	I	I	S
metribuzin	D	S-I	D	D	D	NR
pronamide	NR	S	NR	NR	NR	NR
sethoxydim	D	D	D	S	D	D

¹S = Safe at labeled rates; I = Intermediate safety, use at reduced rates; D = Damaging, do not use; NR = Not Registered for use on this turfgrass.
²Asulam is labeled for 'Tifway (419) bermudagrass and St. Augustinegrass.
³Carpetgrass tolerance to herbicides has not fully been explored.

Table 2.

Common and trade name examples, manufacturers and uses of post-emergence herbicides in warm-season turfgrasses.

Common Name	Manufacturer	Trade Name(s)	Uses
asulam	Rhone-Poulenc	Asulox 3.34 lb/gal	Grass weed control in St. Augustinegrass.
atrazine	Ciba-Geigy · others	Aatrex · others	Pre and early Post-emergence broadleaf and grass weed control.
bentazon	BASF	Basagran 4 lb/gal	Nutsedge (yellow) control.
2,4-D	Dow/Elanco Fermenta Rhone-Poulenc · others		
dicamba · 2,4-D	Sandoz Lesco · others	Banvel 720, Weedmaster Eight-One Selective · others	Broadleaf weed control.
dicamba	Sandoz · others	Banvel 4 lb/gal · others	Broadleaf Weed Control. Usually mixed with 2,4-D and other broadleaf herbicides for wider weed control spectrum.
dichlorprop · 2,4-D	Rhone-Poulenc	Weedone DPC	Broadleaf weed control.
DSMA	Fermenta · others	DSMA Liquid · others	Grass weed control in bermuda and zoysiagrasses.
glyphosate	Monsanto	Roundup 4 lb/gal	Non-selective, systemic weed/brush control.
imazaquin	American Cyanamid	Image 1.5 lb/gal	Nutsedge (purple) and selective broadleaf weed control in southern turf except bahiagrass.

small area with only a few weeds present, but may be appropriate for some homeowners.

Mowing at the proper height and frequency will suppress many weeds, especially annual broadleaves. Mowing prior to weed seedhead formation will also reduce soil seed reserves.

Other good housekeeping practices, such as washing mowers after cutting weed-infested areas and maintaining hard-to-mow areas such

as fence lines, will help prevent introduction of new seeds. Always incorporate and follow a mowing schedule as suggested by your local extension service.

Smothering weeds

The use of non-living material to exclude light (smothering) is effective in certain areas such as flower beds, foot paths, or nurseries where turf is not grown. Materials used include straw,

sawdust, hay, wood chips and plastic.

Care must be taken to prevent mowing accidents that can arise when these materials move into a maintained turf area.

Recently, several mat-type products impregnated with herbicides to extend the time of weed suppression have been introduced. Contact with these by living plant parts will not allow further growth; therefore, care must be taken to prevent root injury to desirable trees, shrubs, and ornamentals that may be exposed to these.

Herbicides defined

A herbicide is simply any chemical that injures or kills a plant. For herbicides to be effective, the following decision making sequence is suggested:

Identification. This is the backbone of any herbicide weed control program. Identification begins with classifying the weed type. Are they broadleaves or dicotyledonous plants? Broadleaves have two seed cotyledons (young leaves) at emergence and have net-like veins in their true leaves. They also often have colorful flowers. Examples include clover, spurge, lespedeza, plantain, henbit, parsley, beggarweed, matchweed and many others.

Grasses, or monocotyledonous plants, have only one seed cotyledon present when seedlings emerge from the soil. Grasses also have hollow, rounded stems with nodes (joints), and parallel veins in their true leaves. Examples include crabgrass, goosegrass, dallisgrass, thin paspalum and annual bluegrass.


Sedges and rushes generally favor a moist habitat and have either stems that are triangular-shaped and solid (sedges), or round and solid (rushes).

Weeds complete their life cycles in either one growing season (annuals), two growing seasons (biennials), or three or more years (perennials).

Annuals that complete their life cycles from spring to fall are generally referred to as summer annuals, and those that complete their life cycles from fall to spring are winter annuals (summer annual grasses, as a class, are generally the most troublesome in turf).

Herbicide selection. Deciding if and which herbicide(s) to use can be confusing. There is, however, a checklist to help make this decision.

After identifying the weed, read the chemical label thoroughly to decide which turf species tolerate exposure to those particular products (Tables 1 and 2 list most common-use turf herbicides, trade name examples, and turfgrass tolerance).



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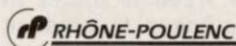


Table 2. (cont.)

Common and trade name examples, manufacturers and uses of post-emergence herbicides in warm-season turfgrasses.

Common name	manufacturer	trade name(s)	uses
MCPA	Rhone-Poulenc	Weedar MCPA 4 lb/gal + others	Broadleaf weed control. Usually mixed with other herbicides for wider spectrum of weed control.
MCPA + MCPP + 2,4-DP	Riverdale	Weedestroy Triamine II	Broadleaf weed control.
MCPP	Fermenta Lesco PBI/Gordon Rhone-Poulenc	MCPP Lescopec 2.5 lb/gal Meccomec 4 lb/gal Weedone MCPP Turf Herbicide	Broadleaf weed control. Usually mixed with other herbicides for wider spectrum of weed control.
MCPP + chlorflurenol	Ortho	Weed-B-Gon for Southern Lawns	Selective broadleaf weed control.
MCPP + 2,4-D + dicamba	PBI/Gordon Lesco Sierra + others	Trimex Southern Three-Way Selective Trex-San + others	Wide spectrum broadleaf weed control.
metribusin	Mobay	Sencor 4L, 50W, 75DF	Mixed with MSMA/DSMA for goosegrass control in bermudagrass.
MSMA	Fermenta Helena	Bueno 6 lb/gal MSMA 6 lb/gal	Grass weed control in bermuda and zoysiagrasses.
paraquat	ICI Americas	Gramoxone	Non-selective, contact weed control.
pronamide	Rohm & Haas	Kerb 50WP	<i>Poa annua</i> control in bermudagrass.
sethoxydim	BASF	Poast 1.5 lb/gal	Grass weed control in centipedegrass.
simazine	Ciba Geigy + others	Princep 4 lb/gal, 80WP + others	Pre and early Post-emergence grass and broadleaf weed control.
triclopyr + 2,4-D	Dow/Elanco	Turflon-D	Broadleaf weed control.
triclopyr + clopyralid	Dow/Elanco	Confront 3 lb/gal	Broadleaf weed control.

Source: Dr. McCarty

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Next, look at one of the numerous publications available that list the susceptibility of the weeds to the herbicide in question.

Reread the label to learn everything possible about a product. Information includes: site of uptake (foliar, root, or both); length of effectiveness; effects of UV light; effects of water pH on the product; whether it can be tank-mixed with fertilizer, insecticides or other herbicides; whether a surfactant is needed, etc.

Other information on the label includes safety precautions, effects on surrounding (non-target) plants, overseeding or replanting waiting periods, and environmental influences (such as rainfall) on control.

Manufacturers invest millions of dollars and many years of research and development on each product, and the label reflects their findings. Always read and follow these before use.

Herbicide application. Proper application is the last link in the chain of successful herbicide use. Misapplication and/or the use of wrong materials are the main reasons for most weed control failures.

Equipment calibration and proper coverage are two important factors in correct application procedures. For those using tractor-mounted or pull-behind sprayers with a boom of constant width, equipped with nozzles

that produce a constant flow rate at a given pressure, moving over open terrain, calibration is fairly straight forward. However, LCOs often use a handgun. In using this method, one is sure of only one variable—the volume of water being applied, assuming the pump and regulator are constant.

One suggestion for handgun use is that you calibrate every applicator separately. Individuals do not walk or use the same swing pattern (motion) exactly alike. Other suggestions: ● limit overlap;

● emphasize the importance of maintaining consistent walking speed and overlap each day;

● check regularly that the nozzle output, pump pressure, and engine speed are similar as when calibration was performed;

● and don't mow treatment areas for two to four days before or after application. This delay will allow time for herbicide penetration and translocation throughout the weeds before mowing.

Post-emergence herbicides

Post-emergence herbicides are generally effective only for weeds that have emerged (are visible). Post-emergence herbicide effectiveness is reduced when the weed is under drought stress, has begun to produce seedheads, or is mowed before the applied chemical has had time to work.

Post-emergence herbicides should never be applied when temperatures are hot (>85°F), unless some degree of turf discoloration is acceptable.

Many turf managers wait until weeds become mature before applying post-emergence herbicides. By waiting this late, multiple applications (2 to 3) spaced 7 to 10 days apart are necessary for control, though this increases the probability of damaging the turf.

Generally, the younger the weed, the easier it will be controlled. Try to treat weeds when they are at the 2 to 3 leaf growth stage (Figure 1). Don't wait until it begins to tiller or produce seedheads (Figure 2). Waiting this late will usually result in reduced control.

Broadleaf weed control

Most broadleaf weeds are controlled with atrazine and/or various combinations of 2,4-D, MCPP, MCPA, dicamba, or triclopyr. It is suggested for young broadleaf weed control in St. Augustine, centipede, and zoysiagrasses that atrazine be used.

For weeds that escape control, follow-up with a treatment consisting of dicamba and 2,4-D.

For best control, the weeds should be actively growing and not under moisture stress. Control may be reduced if weeds are not actively growing due to less herbicide uptake and translocation by the plants.

For the more difficult-to-control broadleaf weeds, two applications of 2,4-D, dicamba, MCPP and/or triclopyr, spaced 7 to 10 days apart, are required. However, repeat applications also increase the chance of damage to the turfgrass. In these cases, using one-half the normal herbicide rate will reduce turf injury.

It is suggested that one-half the normal rates of 2,4-D and/or MCPP never be exceeded on St. Augustinegrass.

Grass weed control

Atrazine applied early as a post-emergent will provide fair control of many annual grass weeds and also provide good to excellent control of broadleaf weeds.

For older weeds in bermudagrass and zoysiagrass, repeat applications of DSMA/MSMA are necessary.

On centipedegrass, Poast will provide good to excellent control of most annual grass weeds. In St. Augustinegrass, Asulox provides fair to good control of some annual grasses.

Repeat applications are usually necessary but this increases the risk of turf injury, especially if the turf is treated when temperatures are hot or under moisture stress.

continued on page 50

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Don't underestimate proper agronomic practices

The first and most important strategy in weed management begins with proper agronomic practices, which encourage a dense, growing turf.

A healthy, dense turf serves several important roles in weed management. The first is that turf shades the soil so sunlight can not reach the soil surface. Sunlight reaching the soil will warm the surface quicker, resulting in earlier spring seed germination.

Second, many weed seeds require a certain quantity and quality of sunlight for optimum germination. Therefore, dense turf minimizes sunlight penetration to the seed. Dense turf also minimizes the physical space available for weeds to become established.

When turf is not present, Mother Nature quickly fills bare ground with plants in an attempt to minimize soil erosion. A race begins between her and the turf manager as to who can fill the weakened turf areas first.

Steps for proper turf management involve the following:

Turf managers must decide which turf variety is best adapted for a particular area or use. For example, bermudagrass has very poor shade tolerance. Therefore, it will become too thin after being planted under these conditions. This thinning allows the opportunistic weeds to become established.

Proper turf cultural practices such as fertilizing, watering, and mowing. These practices are necessary to encourage healthy growth. For example, if a turf area is over-watered or fertilized, or mowed too low or too infrequently, it is usually weakened (thinned) and weed encroachment results.

Traffic control. Areas constantly damaged or compacted by traffic usually result in thin turf, allowing weeds to become established. Goosegrass, annual bluegrass and certain sedges are examples of weeds that tend to thrive in compacted or continuously wet soils.

Other pest control. Turf weakened by other pests such as insects, diseases, and nematodes often cannot recover quick enough to out-compete weed encroachment. Soil disturbances, such as mole cricket tunneling, also expose additional weed seeds, and therefore add another avenue for establishment.

—Dr. McCarty □

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Currently there are no selective weed controls available for bahiagrass used in the landscape.

Nutsedge control

Nutsedges, as a class, are very difficult to control, especially in wet areas. Many sedges produce numerous tubers, rhizomes and/or seed which provide reproductive means long after the mother plant has died.

Atrazine will provide fair to good control of several annual-type sedges if treated when the weeds are just emerging. Yellow nutsedge is best controlled with Basagran while purple nutsedge is best controlled with Image.

Repeat applications will be necessary for complete control and treatment for several consecutive years may be necessary for long-term control.

Record-keeping

Environmental stresses (heat, drought, cold, shade) can have an effect on the amount of material absorbed by the plant and its effectiveness. It is suggested that the environmental conditions at the time of application be recorded, in the event failure occurs, or to more accurately evaluate effectiveness.

These variables include air and soil temperatures, relative humidity, wind speed and direction and leaf and soil moisture.

Other discussions between you and your client should include explaining the strengths and weaknesses of herbicides being considered and which (if any) weeds you do not feel will be controlled.

No one herbicide can control all weeds, so it must be decided if more than one material should be used.

Outline your strategy (program) to your client. Explain when and how treatments will be made, what can be expected (percentage of control) from these, how long it takes for weed mortality, and who is responsible for proper cultural practices (i.e., watering, mowing, fertilizing, etc.) following treatment.

Finally, do not promise more than can be delivered. Every operation has its limitations, and promises that exceed these usually result in repeated callbacks and cancellations.

Remember, weed control begins with proper turf management, and without this, herbicides are only a temporary fix.

LM



Post-emergence herbicides are generally effective only for weeds that have emerged, and are less effective when the weed is under heat or drought stress.

Dr. McCarty is assistant professor and turf and weed specialist at the University of Florida in Gainesville.