

Controlling crabgrass in cool-season turf

Crabgrass is the dominant weed in cool-season turf. If you can't eradicate it, at least learn how to master this persistent pest.

By ZAC REICHER, Ph.D.

Whether you manage lawns or sports turf, crabgrass is a major weed concern. It germinates in the spring; thrives during the heat of summer forming tillers and growing to a foot or more in diameter; sets seed in the late summer and dies with fall's cool temperatures. It's a prolific seed producer, with a single plant producing thousands of seeds in one season. Because of this, crabgrass can never be eradicated from a turf site and can only be managed to minimize populations.

Baby your turf

Crabgrass control begins with good cultural practices. Thicker and healthier turf is more competitive with crabgrass and results in less crabgrass infestation. The easiest method to control crabgrass is mowing often and mowing on the upper edge of the preferred range of mowing heights. For instance, mowing Kentucky bluegrass lawns at three inches will limit crabgrass pressure, regardless if herbicides are used. However, all of the herbicides in the world will not

prevent a crabgrass infestation on a Kentucky bluegrass lawn mowed at one inch.

Irrigating deep and infrequently also favors turf. As an annual, crabgrass forms shallow roots that compete



Post-emergence herbicides are most effective on young crabgrass that has not tillered.

for water in the soil profile. Turf is deeper rooted than crabgrass. If you keep the turf on the dry side and water only to prevent water stress, you will give the desirable grasses an advantage over crabgrass.

Proper fertilization encourages turf density and further minimizes crabgrass infestation. The majority of the annual fertilizer should be applied to cool-season turf in the fall. Make two applications in the fall, one in September and one after the turf has ceased growing. The first application will encourage recovery from summer stress through lateral growth and increased tillering. Include some slow-release fertilizer to feed the plant over the following four to six weeks.

Apply the late-fall application after growth has slowed but while the plant is green and actively photosynthesizing. This may be mid- to late-October in the northern states or mid- to late-November in the southern states with cool-season grasses. The fertilizer should be a source that is quickly available, such as urea. It's important for the nitrogen to be taken up by the plant before winter. This late-fall application maintains deeper green color well into fall, speeds spring green-up and improves spring density.

Other building blocks in a turfgrass program include traffic management and aeration to minimize compaction, increasing drainage and airflow to keep turf as dry as possible and minimizing damage from insects and diseases to prevent a thin turf prone to crabgrass infestation. However, even with our best intentions to maintain a thick turf stand, some areas are still prone to crabgrass infestation and we must use herbicides.

Pre-emergence herbicides

It is important to apply pre-emergence herbicides accurately and evenly across a turf site. Since pre-emergence herbicides are immobile in the soil, a uniform application ensures that the germinating crabgrass

plants will come into contact with the herbicide. Using a pre-emergence herbicide on a large fertilizer granule might make applications easier, but it may not provide a dense enough pattern to ensure consistent application.

Some labels state that the product should be applied two weeks prior to the expected germination period for crabgrass (who can guess the exact germination period for crabgrass each spring?). Some say to apply pre-emergence herbicide when minimum soil temperatures reach 50°F for five consecutive days. However, soil temperatures in West Lafayette, IN, often reach 50°F during early March, only to fall back into the 40s for many more weeks. Others will say to apply pre-emergence herbicides when forsythia is in bloom. Again, it is very common to see the forsythia blooming just before the last March snowstorm.

Timing of pre-emergence herbicides was more important years ago when the herbicides did not have the duration of control like today's products.

Today's pre-emergence herbicides, applied in March, will provide season-long crabgrass control. In fact, our research has shown that November and December applications of pre-emergence herbicides will provide season-long control on most turf areas when used at the high recommended rate.

On areas with extremely high crabgrass pressure, a December application should be followed by a sequential application in the early summer to ensure control, or possibly a spot treatment with a post-emergence herbicide, if needed.



Crabgrass is the most common weed on commercial properties, home lawns, sports turf and most other turf settings.

Late fall and early spring applications work to control crabgrass because microbial degradation is the main factor in breakdown of pre-emergence herbicides. Soil microbes become more active once soil temperatures reach 55°F. Since soil temperatures are at or near 32°F throughout the winter, minimal degradation of herbicide occurs until the soil temperatures warm up in April.

Sequential applications

If you manage areas with extremely high crabgrass pressure or with the possibility of goosegrass, you might consider a sequential application of pre-emergence herbicides. An application in late fall or early spring will provide acceptable control into early summer, but a second application will boost the activity of the herbicide in the soil to extend control throughout the growing season.

Most labels will recommend 2/3 to 3/4 of the high label rate in the first application, followed by a second application of 1/3 to 1/4 of the total label rate in late May

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or early June. Use the same active ingredient in the sequential application as you applied in the first application.

Research at Purdue suggests that using sequential applications of an active ingredient different than the initial application provides less effective control. It appears that concentrations of different herbicides are not additive in the soil. Instead of boosting the concentration of the initial herbicide in the soil with a second application, you merely add a second herbicide at a concentration that may not give season-long control.

This strategy is important when you are trying to reduce the rate of herbicide used in both the initial and sequential application. As you may suspect, it may not be as important if you are willing to use high

One Tough Crabgrass

- ▶ One crabgrass plant can produce 10,000 seeds per year
- ▶ 12% germination produces 1200 seedlings
- ▶ 10% survival of seedlings leaves 120 crabgrass plants
- ▶ Assuming commercially acceptable 90% crabgrass control, 12 plants survive until seed set when the cycle begins all over

label rates for different herbicides in both the initial and sequential applications, thus creating effective concentrations for each herbicide in the soil.

Post-emergence herbicides, such as MSMA (under a variety of trade names), Acclaim, Dimension and the newly released Drive, offer increased flexibility in a weed control system. Some professionals have opted not to use the traditional pre-emergence herbicide application, preferring a wait-and-see approach. If the summer weather is conducive to crabgrass, and/or regular scouting reveals newly emerging crabgrass, a post-emergence herbicide can be used in early- to mid-summer. This is useful on areas that traditionally have lower crabgrass pressure. During mild summers not conducive to crabgrass, this can reduce expenses and pesticide use.

Post-emergence herbicides are most effective on small crabgrass. The smaller the crabgrass plant, the lower the rate of herbicide necessary to be effective. Since post-

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emergence herbicides can be phytotoxic to turfgrass, the lower rates will also improve the safety margin. Accurate applications are essential to minimize possible phytotoxicity to the turfgrass.

If you apply post-emergence herbicides early in the summer, include a pre-emergence herbicide in the tank mix to control the later germinating crabgrass. Since Dimension has both pre- and post-emergence properties, it can be used alone to control young crabgrass that has not tillered and that has not yet germinated. Drive actually appears to control tillered crabgrass as well, if not better than younger crabgrass. Drive also is active on clover and a number of broadleaf weeds and appears to be one of the safer post-emergence herbicides on newly emerged seedlings.

Though post-emergence herbicides are



effective in controlling crabgrass, don't attempt to control crabgrass in late summer because the plants are too large and vigorous. Attempting to control crabgrass at this time will only result in disappointing con-

◀ Pre-emergence herbicide applications have been timed in the past to coincide with forsythia bloom.

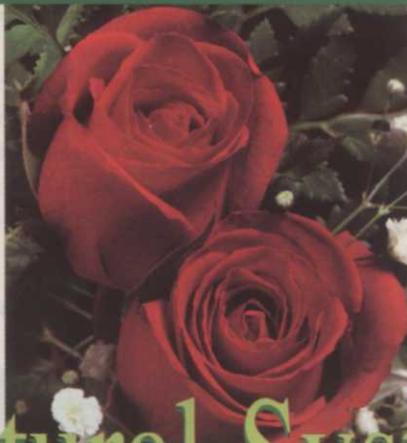
trol and possibly turf damage. Wait for the most effective, safest and cheapest control of crabgrass — the first frost.

By maintaining a dense, healthy stand of turf, you can limit the amount of crabgrass. This starts with the cornerstones of turf management: proper mowing, irrigation and fertilization. Maximizing these three cultural practices can almost eliminate crabgrass from many turf stands.

—Zac Reicher is Assistant Professor of Agronomy and the Turfgrass Extension Specialist at Purdue University, West Lafayette, IN

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The South's ornery new weeds

Use the latest control strategies for the newest, nastiest weeds in warm-season turfgrass.

By BERT McCARTY, Ph.D.

Turf managers have seen an increase in "new" weeds in the last 5 to 10 years. Previous tough-to-control weeds such as crabgrass, goosegrass, chickweed and henbit caused many turf managers to lose their jobs. Today, however, many of these weeds have adequate control measures, but new weeds have taken their place. Possible explanations for this shift include:

- ▶ Significant increase in the use of pre-emergence herbicides, especially on fertilizer carriers, which do an excellent job on most grass weeds, but allow other weeds to escape and thrive.
- ▶ Significant reduction in the use of traditional post-emergence herbicides which provided adequate control of most weeds, such as MSMA, DSMA and 2,4-D, which provided good general weed control at reasonable prices.
- ▶ Overwatering, which favors certain weeds such as sedges and annual bluegrass, giving these weeds the advantage over the turf.

Up-and-coming weeds

Post-emergence herbicide control options are listed. You, however, must decide if these herbicides can be safely applied to the particular turfgrass species in your area.

Spreading dayflower (*Commelina diffusa*)

- ▶ Summer annual with fleshy, smooth stems; flowers with three blue petals; reproduces by seed and stem fragments; prefers moist habitats
- ▶ Occurs from Massachusetts, Missouri, Indiana, south into Florida and west to Texas, Kansas and Oklahoma.
- ▶ Products containing atrazine or simazine applied twice 30 days apart. Prompt (a pre-mix of atrazine and Basagran) also works well. Tank mixes of MSMA or DSMA with Sencor or multiple

Spreading dayflower



application of two- or three-way broadleaf herbicide mixtures also provide good control but can cause phytotoxicity to certain turfgrass species.

Doveweed (*Murdannia nudiflora*)

► Summer annual with fleshy, creeping stems rooting at nodes; alternate leaves; small, inconspicuous blue to purple flowers; reproduces by seed

► Occurs from North Carolina south through Florida, west into Texas

► Control the same as spreading dayflower

Torpedograss (*Panicum repens*)

► Perennial grass; robust, sharply pointed, creeping rhizomes; reproduces primarily by rhizomes

► Occurs along the North Carolina coasts on golf courses south throughout Florida west into

Texas

► Nonselective control is with at least 3 applications of glyphosate (Roundup Pro) spaced 3 weeks apart. Other nonselective control involves fumigating with methyl bromide and re-planting. Selective control

(or suppression) has recently become available with quinclorac (Drive). Drive should be applied 2 or 3 times spaced 3 to 4 weeks apart. Expect some minor temporary turfgrass discoloration.

Smutgrass (*Sporobolus indicus*)

► Clumping perennial grass; leaf blades flat, very thin; seed often infected with black fungus (or smut); reproduces by seed

► Occurs from Virginia into Florida, west to Texas, inland to Oklahoma and Missouri

► Selective control has been very elusive. Summer atrazine or simazine applications provide about 50% control, but expect temporary turfgrass damage. TFC lists smutgrass, but control is often very erratic with this product. Nonselective control is spot spraying or rope wicking glyphosate (Roundup). If rope wicking, treat in two directions.

Mat lippia or matchweed (*Phyla nodiflora*)

► Mat-forming perennial broadleaf plant with prostrate growing, hairy stems; stems rooting at nodes; leaves opposite with large teeth towards the tip; flowers rose-purple or white, in a head at tip of



Smut fungi on smutgrass seedhead.

a long stalk, resembling a match head; reproduces by seed and stolons

► Prefers sandy coastal plains and occurs from Pennsylvania to Florida, Arkansas, Oklahoma, Texas, California and Hawaii

► Products containing atrazine or simazine applied twice 30 days apart. Prompt (a pre-mix of atrazine and Basagran) also works well. Products containing two- or three-way broadleaf herbicide mixtures applied at least twice 7 days apart also work in tolerant turfgrasses.

Annual blue-eyed-grass (*Sisyrinchium rosulatum*)

► Winter annual, member of the Iris family; appears similar to goosegrass except it is a cool-season annual; leaves flat, light green, all clustered at the base; has zigzag-shaped stems; flowers pale purple to white with a rose-purple eye ring; reproduces by seed

► Occurs from North Carolina south into Florida and west to Texas and Arkansas.

► Products containing atrazine or simazine applied twice 30 days apart. Prompt (a pre-mix of atrazine and Basagran) also works well. Sencor also provides excellent control in tolerant turfgrasses. Products containing two- or three-way broadleaf herbicide mixtures applied at least twice 7 days apart also work.

Chamberbitter (Niruri, Gripeweed) (*Phyllanthus urinaria*)

► Small, erect summer annual broadleaf weed, escaped from ornamental industry; leaves oblong, arranged in two rows; flowers inconspicuous (not showy); fruit green, warty, without a stalk, attached

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Torpedograss

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Chamberbitter

directly to underside of branch; reproduces by seed

► Occurs in the southeastern United States west to Texas

► Control products the same as matchweed. Treat when plants are small.

Thin or bull paspalum (*Paspalum setaceum*)

► Clump-forming perennial grass; leaf blades flat, hairy to almost smooth with a fringe of stiff hairs along the leaf margins; common in sandy soils; reproduces by seed and clump fragments

► Occurs throughout the coastal plains from Long Island to Florida, west to New Mexico and Colorado, north through Nebraska, Ohio and Tennessee

► Repeat applications of MSMA or DSMA are required every 7 days until complete control is achieved.

Lawn burweed or spurweed (*Soliva pterisperma*)

► Low-growing, freely branched winter annual broadleaf weed; leaves opposite, twice divided into narrow segments or lobes; flowers small and inconspicuous; fruits have sharp spines; reproduces by seed

► Occurs in most southern states from North Carolina to Florida, west to Texas

► Pre-emergence or post-emergence applications of simazine or atrazine provide

excellent control. Prompt and Sencor also work well in tolerant turfgrasses. Repeat applications of two- or three-way broadleaf herbicide mixtures also provide control. Key to control is applications in fall when weeds are small.

Annual or water sedge (*Cyperus compressus*)

► Summer annual sedge; seedhead is a cluster of flat greenish, glossy spikes at the top of bare stems; tolerates close mowing heights; reproduces by seed

► Occurs from Minnesota, Ohio and New York, south through Florida and west to Texas

► Basagran, Image, Manage all provide good control.

Repeat applications of MSMA or DSMA also work.

Annual bluegrass, perennial biotype (*Poa annua* var. *reptans*)

► Similar to annual biotypes except the perennial biotypes produce less seedheads, often produce short stolons and form larger patches compared to annual biotypes; perennial biotypes occur from the transition zone northward where bentgrass is



Annual sedge

grown year-round as greens; triazine (atrazine/simazine) tolerant biotype occur

► In bentgrass greens, selective control is very erratic. Growth regulators such as paclobutrazol (Scotts Turf Enhancer) applied twice in fall 30 days apart followed by 2 or 3 applications in spring allows bentgrass to eventually out-compete the Poa. Several years of this program may be necessary and the treated Poa takes on a characteristic yellow-green appearance following application.

Kyllinga (*Kyllinga* spp.)

► Perennials: perennial or green kyllinga (*K. brevifolia*); *K. gracillima* = *K. brevifolioides* (no common name); white kyllinga (*K. nemoralis*)

► Annuals: annual kyllinga, *K. odorata* = *C. sesquiflorus* (acts as an annual in United States but is a short-lived perennial in the tropics); *K. pumila* and *K. squamulata* (no common names)

► Appear similar to nutsedges except kyllinga does not form underground nutlets; perennial kyllinga species form weed patches from stolons.

► Most kyllinga species occur from Delaware and Rhode Island south through the Carolina into Florida, west to Texas, California and in Hawaii. Currently, white kyllinga is thought to be restricted in the United States to Hawaii, however, it probably can survive in portions of the mainland including southern California and south Florida.

► Annual kyllinga species can be controlled with Basagran, Image, Manage or repeat applications of MSMA or DSMA. Perennial species require repeat applications of Image, Image + MSMA or Manage.

Bert McCarty is Associate Professor of Turf at Clemson University, Clemson, SC



Annual kyllinga

Top 10 Ornamental Weeds

David Letterman's top 10 list is popular, but this group of pesky landscape weeds has more staying power.

BY JEFFREY F. DERR, Ph.D.

If you focus on the 10 weeds that represent the major weed groups infesting our landscapes, you will have a good base of information on the subject. Each weed life cycle group, with the exception of biennial weeds, is represented by at least one member.

I have listed possible chemical control options for these weeds. While there are nonchemical methods for control, that is a topic for another article. You can integrate chemical and cultural control in an IPM program.

You will deal with more than the 10 weeds listed here, but remember that control strategies for other weeds in that group may be quite similar to those listed. For example, yellow foxtail is in the summer annual grass category, just like large crabgrass. Chemical control options are essentially identical for these two weeds. In other cases, control strategies may be different for closely related weed species. Herbicide recommendations differ for yellow nutsedge compared to purple nutsedge, although both are perennial sedges. Check herbicide labels

and other sources of information for control of weeds not listed in this article.

Summer annuals

Large crabgrass is a troublesome weed in many situations, including landscape beds. It begins to germinate in spring when soil temperatures have risen above 50° to 55°F. It can germinate throughout the spring and summer, making it difficult to achieve season-long control with a single herbicide application. Split applications of pre-emergence herbicides, spaced 2 to 3 months apart, are often used for long-term control.

The best way to control crabgrass is through pre-emergence herbicide application. Products available for pre-emergence crabgrass control include Pendulum, Surflan, Barricade, Treflan/Preen, Ronstar, Devrinol and Dimension. All can be used on woody ornamentals but only certain ones can be used on annual and perennial flowers. Consider using a granular formulation for enhanced crop safety, especially for herbaceous ornamentals. Although certain pre-emergence broadleaf herbicides will suppress crab-

grass, they generally do not provide the level of control seen with the crabgrass preventers.

Crabgrass can be controlled selectively post-emergence using the post-emergence grass herbicides Acclaim, Envoy, Fusilade/Ornamec or Vantage. Since these products have little soil residual, a pre-emergence herbicide should be applied to extend the length of control. Treat prior to tillering of crabgrass for optimum results.

Prostrate spurge (spotted spurge) is a low-growing summer annual broadleaf that germinates during the warm months of late spring and summer. Certain crabgrass preventers such as Pendulum or Surflan are fairly effective on this weed. The combination products on the market, such as Rout, OH2 and Snapshot, provide good control in woody ornamental species. It is difficult obtaining long-term control of spurge since no herbicide provides excellent control of this weed for more than about 2 months. As with crabgrass, split applications can provide longer control. Prostrate spurge is difficult to control post-

emergence. Use careful applications of nonselective herbicides such as Roundup Pro, Finale or Reward.

I generally place *common groundsel* in the summer annual broadleaf category, although it overlaps the



Spotted Spurge

winter annual category as well. It can tolerate mild frost and survive through a mild winter. Most crabgrass preventers provide poor control of this weed and it is, therefore, quite difficult to control in herbaceous plantings.

Products that contain oxyfluorfen, such as the granular materials Rout or Regal O-O, or the liquid formulation Goal, provide excellent control of groundsel. Goal is mainly used on conifers since it will damage foliage of most other ornamental species. The granular formulations are a better choice in landscapes containing a variety of woody species. Other herbicides, such as Gallery, Snapshot, Ronstar and Princep, (if triazine sensitive) will control groundsel. For post-emergence control, use Goal where possible, primarily in dormant conifers

Annuals

▶ Live <1 year

▶ Reproduce by seed

Summer annuals:

Germinate in spring, flowers produce seed in late summer/early fall, die in fall.

Winter annuals:

Germinate fall through late winter, flowers produce seed in spring, die in late spring/early summer.

and dormant deciduous trees. Otherwise use careful applications of a nonselective herbicide.

Winter annuals

Annual bluegrass germinates in fall and early spring. The best way to control it is through application of a crabgrass preventer in August, prior to the initiation of germination. Annual bluegrass tolerates most post-emergence grass herbicides. Envoy is the only one in this group that will control annual bluegrass. Alternatively, the nonselectives such as Roundup Pro or Finale provide excellent control. Kerb will control emerged winter annuals like annual bluegrass in certain established woody ornamentals, along with providing residual control. Barrier/Casoron can also be used for pre-emergence and post-emergence control of a range of winter annual weeds (it can only be used on established woody ornamentals). Kerb and Barrier/Casoron work best when applied under cold conditions in late fall or winter.

Common chickweed is a winter annual broadleaf that germinates in fall and early spring. As with annual bluegrass, timing is critical for a pre-emergence application. Late August would be a good time to treat in most areas. Essentially all pre-emergence herbicide used in ornamentals, with Ronstar a major exception, will control common chickweed. I am often asked in spring how to control chickweed post-emergence. In most ornamentals, especially herbaceous species, there is no selective control of emerged chickweed, as well as other emerged broadleaf weeds. Common chickweed is best con-

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GENERAL GUIDELINES FOR SELECTIVE PRE-EMERGENCE AND POST-EMERGENCE CONTROL IN HERBACEOUS AND WOODY ORNAMENTALS.

	<i>Herbaceous ornamentals</i>		<i>Woody ornamentals</i>	
	Selective Pre-emergence control	Selective post-emergence control	Selective pre-emergence control	Selective post-emergence control
Large crabgrass	Yes	Yes	Yes	Yes
Prostrate spurge	Yes	No	Yes	No
Common groundsel	Yes	No	Yes	Limited options
Annual bluegrass	Yes	Yes	Yes	Yes
Common chickweed	Yes	No	Yes	Limited options
Bermudagrass	No	Yes	No	Yes
Yellow nutsedge	Yes	No	Yes	Yes
Wild garlic	No	No	No	No
Creeping woodsorrel	Yes (from seed)	No	Yes (from seed)	No
Mugwort	No	No	Yes	No



Common chickweed

trolled through pre-emergence herbicide application. Nonselective post-emergence herbicides will control emerged chickweed.

Perennial weeds

Post-emergence herbicides are generally used to control perennial weeds, with a few exceptions. *Bermudagrass* is an example of a perennial weed that often cannot be controlled using pre-emergence herbicides. Although certain pre-emergence herbicides will suppress pegging down of bermudagrass stolons, post-emergence herbicides are required for control. The best option in broadleaf ornamentals are post-emergence grass herbicides such as Vantage, Fusilade/Ornamec or Envoy. Repeat treatments will be needed for control. Although these are systemic chemicals, one application may will not completely kill the rhizome system of bermudagrass.

Yellow nutsedge is a perennial weed that grows especially well in wet sites under full sun. An effective way to control this weed in many herbaceous and woody ornamentals is through a pre-emergence application of Pennant. Barrier/Casoron could be used pre-emergence in selected woody species. Directed spray applications of Basagran or Manage are possible around established woody ornamentals. Alternatively, a non-selective post-emergence herbicide can be spot-applied for control of this weed.

Wild garlic is a common perennial weed in landscapes. Unfortunately, most pre-emergence herbicides have no effect on this weed. Careful applications of Finale or Roundup are the only option in most landscapes.

Creeping woodsorrel is a low-growing perennial with mostly reddish-purple leaves. This plant throws its seed several feet when the seed pods are mature. It is sensitive to the nonselective herbicides Finale and Roundup. Include a pre-emergence broadleaf herbicide to stop re-establishment by seed.

Mugwort (wild chrysanthemum) is one of the most difficult-to-control field nursery weeds and can become a landscape problem

through contaminated nursery stock. There are no selective controls for this weed in herbaceous ornamentals. Barrier/Casoron can be applied in winter for control in established woody ornamentals. This weed can be difficult to control with Roundup. Scout for mugwort in new plantings and remove before it becomes established.

Knowing when different weed species germinate will guide you in timing pre-emergence applications. Grasses and sedges can be controlled selectively in many landscape situations



Mugwort

post-emergence. You'll need to be diligent, especially for perennial weeds, since few options besides application of a non-selective herbicide exist.

Once we learn how to control this entire list of weeds, a new set of species will probably invade our landscapes. Then it will be time to develop a new top 10 list!

Jeffrey Derr is Associate Professor of Weed Science with Virginia Tech.