

2005 Weed Management Recommendations For Professional Turfgrass Managers

Athletic Fields, Golf Courses, Commercial Lawns and Turfgrass-Sod



Turfgrass Weed Management (PB1539)

Weed Management Recommendations For Professional Turfgrass Managers:

Athletic Fields, Golf Courses, Commercial Lawns and Turfgrass-Sod



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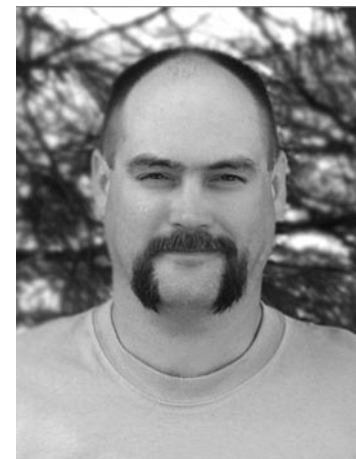
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This manual is prepared to assist professional turfgrass managers with developing effective weed management programs. It is intended for use by certified pesticide applicators and their assistants and is not intended for use by either homeowners or non-certified pesticide applicators.

This manual contains information regarding grass and broadleaf weeds, herbicides, herbicide application rates and timing, turfgrass tolerance and precautions. The use of brand or trade names is for clarity and information, and does not imply the endorsement of a product to the exclusion of others that may be of similar, suitable composition. It does not guarantee or warrant the standard of a product.

Herbicide labels are constantly reviewed and revised. Listed herbicides were registered for the prescribed use when this manual was printed. Should the registration or prescribed use of a herbicide be canceled prior to revision of this publication, the herbicide would no longer be recommended by the University of Tennessee.

Herbicides must be used in strict accordance with the product label – to do otherwise is a violation of federal law. Always read and understand product label directions and precautions before selecting, purchasing, transporting, storing and applying a herbicide. Any discrepancy in this manuscript with a product label is completely unintentional. If such a discrepancy exists within this manuscript, in all cases, use the product label as the authority to guide you in the legal use of the product.

New Herbicide listed for 2005: *Certainty* (sulfosulfuron).

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Introduction

This manual is intended to assist professional turfgrass managers and certified pesticide applicators in developing effective weed management programs for athletic fields, golf courses, commercial lawns and turfgrass-sod.

Optimizing Turfgrass Health

The best approach to minimizing turfgrass weed problems is to maintain a healthy, dense turf. Actively growing turfgrasses compete with weeds for nutrients, water, light and space. Turf mowed infrequently and at an improper mowing height is often weak and weedy.



Similarly, turf quality is often very low when turfgrasses are growing in infertile, compacted or poorly drained soils. The following Extension publications contain more information regarding the selection, establishment, care or renovation of turfgrasses in Tennessee.

a. Residential Turfgrass:

- PB1213 Managing Cool-season Lawngrasses in Shade
- PB1248 Renovating Fescue and Kentucky Bluegrass
- PB1350 Turfgrass Seed
- PB1448 Zoysia
- PB1038 Lawn Fertilization and Management
- PB1061 Soil Testing
- PB1096 Liming Acid Soils in Tennessee

b. Athletic Fields

- PB1452 Maintenance Guide-Tall Fescue Sports Turf
- PB1453 Maintenance Guide-Bermudagrass Sports Turf

Weed Types and Life Cycles

Your choice of best management strategy, including appropriate herbicide(s) and application timing, is dependent on weed type and life cycle. Weeds can be divided into three types: broadleaves, grasses and sedges. Within each type, weeds may have one of three basic life cycles: summer annual, winter annual or perennial.

Weed Types

Broadleaf weeds are generally easiest to identify. They are distinctive from and are not botanically closely related to grasses or sedges. Broadleaf weeds have wide leaves that are generally produced in pairs or multiples. Leaves are detached from the main stem by a sub-stem or petiole. They may be simple (having one leaflet, like dandelion) or compound (having more than one leaflet, like clover). Veins within the leaf of broadleaf weeds often produce a netted appearance. Selective herbicides used to control or suppress broadleaf weeds generally are not effective for controlling grasses and sedges.



Grass weeds like crabgrass and goosegrass are botanically related to turfgrasses. They often have a similar appearance and growth habit. Unlike broadleaf weeds, leaves of grasses are not detached from the main stem. They are usually narrow with a blade-like appearance. Leaves are produced one at a time in two vertical rows. Veins within leaves run parallel. Stems are usually round or flat.

Grass weeds are often very difficult to control once they emerge in turf. They are most often best controlled with preventative or preemergence herbicides. As their name implies, preemergence herbicides must be applied prior to weed seed germination. They act by preventing establishment.



Sedges (e.g., yellow nutsedge, *Kyllinga* spp.) are not grasses but have leaves that are similar in appearance. Since herbicides used to control grasses generally have little impact on sedges, it is important to distinguish between the two types. Sedges have two key identifying characteristics: leaves arranged in three vertical rows and a triangular stem.

Life Cycles

Summer annuals complete their life cycle within 12 months. They usually germinate in the spring, grow or develop during the summer, produce seed and die in the fall or after the first hard frost.

Winter annuals complete their life cycle in 12 months, generally overlapping two calendar years. Seed of winter annuals often germinates in late summer and early fall. Plants are dormant



or semi-dormant through the winter, and flower the following spring. Winter annuals mature and die in late spring or early summer.

Summer and winter annuals are usually prolific seed producers. Seeds lying on the soil surface are a ready source of infestation and weeds establish when environmental conditions are favorable.

Perennials live for more than two years. For example, dandelion, a simple perennial, may germinate from seed, but also produce a tap root that, when severed, is capable of recovering. A complex perennial can spread by creeping above- or below-ground vegetative structures (such as stolons, rhizomes or nutlets) or seed.

Perennial weeds are often very difficult to control. To control a mature plant that has already produced considerable vegetative reproductive structures may require repeated control measures. Removal of the aboveground shoot growth often contributes little towards long-term control. Long-term control may require sequential herbicide treatment to weaken the above- and below-ground structures.

WEED IDENTIFICATION

Broadleaf Weeds

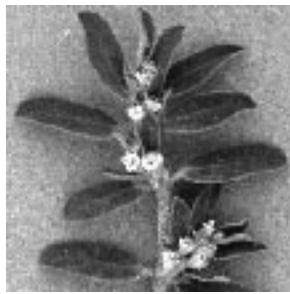
Summer Annuals



Prostrate knotweed¹



Prostrate spurge¹



Spotted spurge¹



Ragweed¹



Carpetweed¹



Kochia¹



Lespedeza



Horsenettle¹



Hairy Galinsoga¹



Bedstraw

Winter Annuals



Henbit¹



Deadnettle



Common chickweed¹



Mouse-ear chickweed¹
(can be perennial)



Buttercup



Carolina geranium
(can be perennial)

¹ Photo Credit to Arlyn W. Evans

Perennials



Wild garlic



Dandelion



White clover



Broadleaf plantain



Ground ivy



Curly dock



Broadleaf dock¹



Virginia buttonweed¹



Oxalis¹



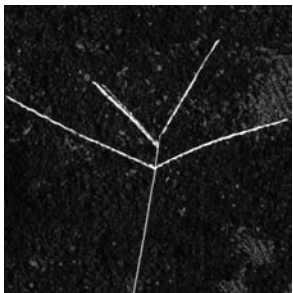
Wild strawberry



Wild violet

Weedy Grasses

Summer Annuals



Large crabgrass¹



Smooth crabgrass¹



Goosegrass



Yellow foxtail¹



Green foxtail¹

¹ Photo Credit to Arlyn W. Evans

Winter Annuals



Annual bluegrass



Little barley¹

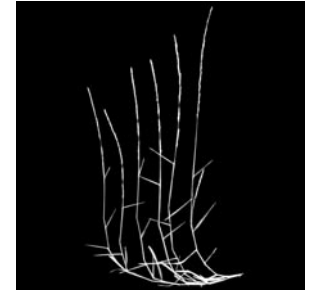
Perennials



Dallisgrass¹



Bermudagrass



Nimblewill¹

Sedges

Summer Annuals



Annual sedge¹

Perennials



Yellow nutsedge²



Purple nutsedge



Kyllinga²

¹ Photo Credit to Arlyn W. Evans

² Photo Credit to Jimmy R. Summerlin

³ Photo Credit Joe C. Neal

Developing Weed Management Strategies

Optimum turf care can minimize weed problems; however, certain weeds have growth habits very similar to the turfgrasses that enable them to establish and grow alongside turfgrasses. Such weeds often require preventative strategies. Other weeds may appear during stress periods (may be indicators of turfgrass health), requiring curative control after they emerge.

Implement best management strategies by first identifying and assessing the extent of the weed problem. Best management strategies may include adjustments in the turf care program, as well as the development of an effective herbicide program (involving product selection, application type and timings).

Assessing Weed Problems

A turf may have diverse microenvironments, with variations in soil type, soil fertility, shade level, slope and exposure. As a result, weed problems may not be uniform throughout the turf area. The appropriate weed control strategies will be determined by the weed species present.



Begin a site evaluation by drawing a map of the turf area. Divide the map into easily identified zones. With this map as a reference, walk the area recording the following:

- a. Weed species present
- b. Weed stage of growth
- c. Weed population
- d. Previous control measures
- e. Health of turfgrass
- f. High-traffic or low-traffic areas
- g. Degree of sun exposure
- h. Dry or water-logged areas

Separate weed species according to type (e.g., broadleaf, grass and sedges) and growth stage. For example, in a particular zone, winter annual broadleaf weeds may account for 30 percent of the ground cover, with 70 percent turfgrass. Using this technique, formally assess the turfgrass weed pressure twice each year, in the spring and again in late summer or early fall. The early fall assessment will be the most extensive, as summer annuals, winter annuals, biennials and perennials should be present, in different stages of growth, but identifiable. Summer annuals will be near the end of their life cycle, but will indicate control needs for next spring. Winter annuals will be young and easier to control. Perennial broadleaf weeds are also easier to control in the fall. Use the spring assessment to evaluate the success of fall herbicide treatments and gauge the health of your turf prior to summer stresses.

Recorded assessments serve as tools to measure turfgrass management program effectiveness and the need for adjustments in control strategies. These assessments will help identify areas requiring treatment and weed species present. This information is of value when selecting a herbicide and timing of the application.

Control Strategies

The best control strategy may include adjusting turf care practices and/or the application of appropriate herbicide(s). Choice of control strategy depends on the weeds present, population density and distribution. Crabgrass, goosegrass and other grassy weeds that can be anticipated are best controlled with preventative or preemergence herbicides. For established weeds, two options are physical removal (which is essentially ineffective when dealing with perennials, especially if only the top growth is removed) or treatment with curative or postemergence herbicides. If annual weeds are few and in a localized area, physical removal may be possible. An herbicide application may be required if annual or perennial weeds dominate large areas of turf. The herbicide may be applied to individual problem areas or to the entire area (dependent on assessment results). Choice of an appropriate herbicide is dependent on weed susceptibility and turfgrass tolerance. Herbicide application timing depends on the growth stage of the target weed(s) and weather conditions. Generally, weeds are easiest to control early in their life cycle.

Application Timing And Herbicide Formulations

Application Timing

Herbicides used to control turfgrass weeds may be classified by application timing. An herbicide may be applied before (pre-emergence) or after (postemergence) weeds emerge.

A preemergence herbicide moves into the surface soil and acts by preventing newly germinated weed seedlings from developing. Preemergence herbicides must be applied prior to the germination period of the target weed(s). The timing of target weed seed germination is life cycle-dependent. These herbicides may impact emerging seedlings of summer and winter annuals and some perennial weeds. Preemergence herbicides generally provide some residual activity (meaning that weed control may last for several weeks after the initial application). They generally require rainfall or irrigation soon after application to move from the thatch or soil surface into the top few inches of soil where the bulk of weed seed germination occurs. Lack of activation by rainfall or irrigation usually results in poor weed control.

A postemergence herbicide may be applied as a foliar spray to control newly established weeds in well-established turfgrass. Postemergence herbicides act by contacting the aboveground foliage or aerial shoot tissue. A postemergence herbicide may be classified as contact or systemic. Contact herbicides act on the top growth contacted in the initial application. A systemic herbicide acts on the contacted foliage and systemically moves within the plant to control above- and below-ground plant parts not contacted in the initial application. Systemic herbicides are preferred for control of established perennial weeds.

Certain herbicides have only preemergence or postemergence activity. Others may be predominantly preemergence with limited postemergence activity on select weeds. A few herbicides are predominantly postemergence with limited preemergence activity.

In addition, some herbicides are exclusive for weedy grasses or broadleaf weeds, while other herbicides may be predominantly preemergence for grasses with additional, limited preemergence activity on broadleaf weeds.

Herbicide Formulations (application types)

Herbicides may be formulated in several ways (e.g., solid or liquid). However, they can be simply grouped into herbicides meant to be applied as a dry granular to the soil surface or those meant to be mixed with water and applied as an aqueous spray.

Granular preemergence herbicides are often applied to turf using a drop (fertilizer-type) spreader. Certain preemergence herbicide formulations are mixed with water and applied as a liquid spray. Postemergence herbicides are generally mixed with water and applied as a foliar spray, uniformly covering the foliage of emerged weeds.

Calibration of Herbicide Application Equipment

Granular Application

Two types of spreaders are commonly used for applying granular fertilizers and lime: rotary (centrifugal) or gravity flow (drop). For application of granular herbicides (and other granular pesticides), the drop spreader is preferred, because metering of material generally is not influenced by travel speed (metering is controlled by the distance the drive wheels travel) and it provides a more uniform distribution pattern. To be uniformly effective, the herbicide concentration must be consistent throughout the soil surface area. Lack of uniform application causes problems, including over-dosing, often resulting in injury to desired turf, or under-dosing, resulting in poor weed control. Rotary spreaders lack the accuracy required to achieve uniform treatment. A properly calibrated drop spreader can provide uniform application to the soil throughout the treated area.

To achieve uniform application, calibrate the drop spreader to apply one-half the total rate needed. Herbicide rates are usually presented in terms of the amount of product per 1,000 sq. ft. Divide this rate by two and calibrate with this half rate as the metering target. Make two passes over the area to be treated, with the passes in opposite directions.



For equipment settings and calibration, refer to the owner's manual for the drop spreader. Most spreaders are marketed with a metering gauge and a quick reference chart.

For additional information regarding the calibration of drop spreaders for herbicides or rotary spreaders for fertilizer and lime applications, please refer to Extension publication *SP268G, Calibrating Fertilizer Spreaders for Lawns and Gardens*.

Liquid Application

When applying herbicides in liquid, the objective is to apply a uniform concentration of the herbicide to the treated area. The herbicide formulation (e.g., SP, soluble powder) is first uniformly mixed with water as a carrier, and then applied as a liquid spray (rather than a solid granule). Two

liquid application types are broadcast or spot treatment.

Broadcast application refers to the uniform treatment of the entire turf area. Broadcast applications require precision and the calibration of a broadcast application requires attention to consistent, optimum travel speed and flow rate. For complete step-by-step directions to sprayer calibration for broadcast application of liquids, please refer to Extension publication PB 1276, *A Guide to Proper Sprayer Calibration*.

Spot treatment refers to application of the liquid only to the problem area or to small localized areas where weeds are present. For



spot treatment, the herbicide(s) rate is usually given per gallon of water carrier (resulting in a percentage concentration or rate of herbicide per given volume of water). Mix the solution in the appropriate concentration and treat the foliage in the localized area to wetness (not to runoff). Then move on to the next problem area.

Herbicides meant to be mixed with water and sprayed as liquid often require the addition of a surfactant (refer to product label). A surfactant may be needed (depending on the chemical nature of the herbicide active ingredient and formulation) to enhance the performance of the herbicide active ingredient by providing one or more of the following requirements:

- Uniform spreading of the spray droplet or uniform wetting of the plant foliage;
- Allowing the spray droplet to adhere to the foliage;
- Allowing the herbicide active ingredient to directly contact the foliage (the active ingredient is not suspended in the water or on hairs on the leaf away from the actual leaf tissue);
- Facilitating the movement of the herbicide active ingredient from the water droplet through the leaf tissue.

HERBICIDE APPLICATION TIMING CALENDARS

Residential Turf Herbicide Application Timing Calendars

Cool-season Residential Turf Herbicide Application Timing Calendar

Instructions: This calendar is intended to aid in planning the timing of herbicide applications. Application timings are based on the life cycle of the target weeds and available herbicide options. The number of herbicide applications depends on the desired level of weed control and turf appearance. Using this planning calendar, choose the appropriate herbicide(s) and application type (formulation) from the following section 'HERBICIDE OPTIONS, USE DIRECTIONS and PRECAUTIONS.' To aid in choosing the appropriate herbicide(s), refer to the section 'TURFGRASS TOLERANCE TO HERBICIDES' to determine appropriate herbicide based on the tolerance of your turfgrass type to the herbicide(s) and 'WEED SUSCEPTIBILITY TO HERBICIDES' to choose the herbicide that will provide the most effective control.

Note: The following calendar is intended for use in years when re-seeding or over-seeding is not being considered. Re-seeding or over-seeding intervals for herbicides need to be considered prior to applying certain herbicides.

Application		Month	Target Weeds	Maintenance Level	Tips
Type	Timing				
PRE	Late Summer to Early Fall	Aug. Sept.	Grasses (Annual Bluegrass)	High	PRE herbicide can be applied to limit the establishment of annual bluegrass or <i>Poa annua</i> . Annual bluegrass often germinates in early September. To limit germination, PRE herbicides must be applied prior to germination (Do not apply if considering fall seeding).
POST	Fall	Oct. Nov.*	Broadleaf Weeds	High	* Control of newly emerged winter annuals may be achieved with an application of a POST herbicide. This fall application combined with a winter application will improve the control of difficult perennial weeds like wild garlic (please refer to 'Broadleaf Weeds PRE and POST Herbicide Options').
POST	Winter	Dec. Jan. Feb. *	Broadleaf Weeds	High Low	* Perennial and winter annual (established or newly emerged) broadleaf weeds may be controlled with a POST herbicide application (please refer to 'Broadleaf Weeds: PRE and POST Herbicide Options').

Application		Month	Target Weeds	Maintenance Level	Tips
Type	Timing				
PRE	Spring	February* March **	Grasses (Summer Annuals)	High Low	*, ** For PRE control of crabgrass, make first application in late February or early March in West Tenn. or mid-March to early April in East Tenn. Crabgrass seeds often germinate when the soil temperature has been 55 F (or 65 F air temperature) for four or more days. A visual indicator would be abundant <i>Forsythia</i> bloom.
PRE	Late Spring to Summer	May * June**	Grasses (Summer Annuals)	High Low	*, ** Make second or split application of a PRE herbicide for continued summer annual weed grass control. This second application improves residual control of crabgrass and later-germinating goosegrass. Goosegrass seed generally begins germination 4 to 6 weeks after crabgrass. Residual control from the initial PRE herbicide application can be as little as 4 weeks or as much as 12 weeks (product-dependent). When choosing a herbicide option for this second application, please refer to weed susceptibility tables for a herbicide that provides good-to-excellent control of goosegrass.
POST	Late Spring to Summer	May June July Aug.	Grasses	High	Establishment of weedy grasses can be prevented with timely applications of PRE herbicides. Summer annuals escaping PRE herbicide treatment and perennial grasses may require control with POST herbicides. Difficult-to-control perennial grasses may require repeat applications. Please refer to 'Established Perennial and Annual Grasses: POST Herbicide Options' for specific herbicides and control directions.
POST	Late Spring to Summer	May June July Aug.	Sedges	High * Low *	* The need for this application is dependent on the presence of emerged sedges. Anticipate emergence in early May. Treat when plants have 3 to 6 leaves of new growth. Herbicide choice is dependent on the sedge present. The plant species must be determined prior to herbicide application (refer to 'Weed Identification'). For choice of appropriate herbicide and application timing, please refer to 'Sedges: POST Herbicide Options.'

Warm-season Residential Turf Herbicide Application Timing Calendar

Instructions: This calendar is intended to aid in planning the timing of herbicide applications. Application timings are based on the life cycle of the target weeds and available herbicide options. The number of herbicide applications depends on the desired level of weed control and turf appearance. Using this planning calendar, choose the appropriate herbicide(s) and application type (formulation) from the following section 'HERBICIDE OPTIONS, USE DIRECTIONS and PRECAUTIONS.' To aid in choosing the appropriate herbicide(s), refer to the section 'TURFGRASS TOLERANCE TO HERBICIDES' to determine appropriate herbicide based on the tolerance of your turfgrass type to the herbicide(s) and 'WEED SUSCEPTIBILITY TO HERBICIDES' to choose the herbicide that will provide the most effective, broad spectrum control.

Note: Herbicide choice is dependent on turfgrass type, tolerance to the herbicide and application timing. Please refer to 'USE DIRECTIONS and PRECAUTIONS' and 'TURFGRASS TOLERANCE TO HERBICIDES'.

Application		Month	Target Weeds	Maintenance Level	Tips
Type	Timing				
PRE	Late Summer to Early Fall	Aug. Sept.	Grasses (Annual Bluegrass)	High	PRE herbicide can be applied to limit the establishment of annual bluegrass or <i>Poa annua</i> . Annual bluegrass generally germinates in early September. To limit germination, PRE herbicides must be applied prior to germination. If considering over-seeding with perennial ryegrass, only certain herbicides can be used. Refer to the 'Winter Annual Grasses: PRE and POST Herbicide Options' section.
POST	Fall	Nov.*	Broadleaf Weeds	High	* Control of newly emerged winter annuals may be achieved with an application of POST herbicide. This fall application combined with a winter application will improve the control of difficult perennial weeds like wild garlic. Please refer to 'Broadleaf Weeds PRE and POST Herbicide Options.'
POST	Winter	Dec. Jan. Feb. *	Broadleaf Weeds	High Low	In over-seeded or in non-over-seeded bermudagrass, perennial and winter annual (established and newly emerged) broadleaf weeds may be controlled with a POST herbicide application. Please refer to 'Broadleaf Weeds: PRE and POST Herbicide Options.'
POST	Winter	Jan. Feb.	Winter Annuals (grasses and broadleaf Weeds)	High Low	To non-over-seeded dormant bermudagrass, certain non-selective herbicides can be applied for control of annual bluegrass and winter annual and perennial broadleaf weeds. Please refer to 'Winter Annual Grasses: PRE and POST Herbicide Options.'

Application		Month	Target Weeds	Maintenance Level	Tips
Type	Timing				
PRE	Spring	February* March **	Grasses (Summer Annuals)	High Low	*, ** For PRE control of crabgrass, make first application in late February or early March in West Tenn. or mid-March to early April in East Tenn. Crabgrass seed often germinates when the soil temperature has been 55 F (or 65 F air temperature) for four or more days. A visual indicator would be abundant <i>Forsythia</i> bloom.
PRE	Late Spring to Summer	May* June**	Grasses (Summer Annuals)	High Low	*, ** Make second or split application of PRE herbicide for continued summer annual weedy grass control. This second application improves residual control of crabgrass and later-germinating goosegrass. Goosegrass seed generally begins germination 4 to 6 weeks after crabgrass. Residual control from the initial PRE herbicide application can be as little as 4 weeks or as much as 12 weeks (product-dependent). When choosing a herbicide option for this second application, please refer to weed susceptibility tables for a herbicide that provides good-to-excellent control of goosegrass.
POST	Late Spring to Summer	May June July Aug.	Grasses	High	Establishment of weedy grasses can be prevented with timely applications of PRE herbicides. Summer annuals escaping PRE herbicide treatments and perennial grasses may require control with POST herbicides. Difficult-to-control perennial grasses may require repeat applications. Please refer to 'Established Perennial and Annual Grasses: POST Herbicide Options' for specific herbicides and control directions.
POST	Summer	June July	Broadleaf Weeds	High	POST herbicides may be needed to control emerged summer annual and perennial broadleaf weeds. Note of caution: when the phenoxy-type herbicides are applied under warm temperatures, vapor from the herbicides may move from the treated site, causing injury to sensitive plants. Refer to 'Broadleaf Weeds: PRE and POST Herbicide Options'.
POST	Late Spring to Summer	May June July Aug.	Sedges	High * Low *	* The need for this application is dependent on the presence of emerged sedges. Emergence can be anticipated in early May. Treat when the sedges have 3 to 6 leaves of new growth. Herbicide choice is dependent on the sedge present. The plant species must be determined prior to herbicide application (please refer to 'Weed Identification'). For choice of appropriate herbicide and application timing, please refer to 'Sedges: POST Herbicide Options.'

Athletic Field Herbicide Application Timing Calendars

Tall Fescue Athletic Field Herbicide Application Timing Calendar

Of the cool-season turfgrasses, tall fescue is most often used for athletic fields. The following calendar provides a starting point in developing a weed management program for managing a tall fescue sports turf.

Instructions: This calendar is intended to aid in planning the timing of herbicide applications. Application timings are based on the life cycle of the target weeds and available herbicide options. The number of herbicide applications depends on the desired level of weed control and turf appearance. Using this planning calendar, choose the appropriate herbicide(s) and application type (formulation) from the following section 'HERBICIDE OPTIONS, USE DIRECTIONS and PRECAUTIONS.' To aid in choosing the appropriate herbicide(s), refer to the sections 'TURFGRASS TOLERANCE TO HERBICIDES' to determine appropriate herbicide based on the tolerance of your turfgrass type to the herbicide(s) and 'WEED SUSCEPTIBILITY TO HERBICIDES' to choose the herbicide that will provide the most effective control.

Note: The following calendar is intended for use in years when re-seeding or over-seeding is not being considered (re-seeding or over-seeding intervals for herbicides need to be considered prior to applying certain herbicides).

Application		Month	Target Weeds	Maintenance Level	Tips
Type	Timing				
PRE	Late Summer to Early Fall	Aug. Sept.	Grasses (Annual Bluegrass)	High	PRE herbicides can be applied to limit the establishment of annual bluegrass or <i>Poa annua</i> . Annual bluegrass generally germinates in early September. To limit germination, PRE herbicides must be applied prior to germination. Do not apply if considering fall seeding.
POST	Fall	Oct. Nov.*	Broadleaf Weeds	High	* Control of newly emerged winter annuals may be achieved with an application of POST herbicide. This fall application combined with a winter application will improve the control of difficult perennial weeds like wild garlic. Please refer to 'Broadleaf Weeds PRE and POST Herbicide Options.'
POST	Winter	Dec. Jan. Feb. *	Broadleaf Weeds	High Low	* Perennial and winter annual (established or newly emerged) broadleaf weeds may be controlled with a POST herbicide application. Please refer to 'Broadleaf Weeds: PRE and POST Herbicide Options.'

Application		Month	Target Weeds	Maintenance Level	Tips
Type	Timing				
PRE	Spring	February* March **	Grasses (Summer Annuals)	High Medium Low	*, ** For PRE control of crabgrass, make first application in late February or early March in West Tenn. or mid-March to early April in East Tenn. Crabgrass seed often germinate when the soil temperature has been 55 F (or 65 F air temperature) for four or more days. A visual indicator would be abundant <i>Forsythia</i> bloom.
PRE	Late Spring to Summer	May* June**	Grasses (Summer Annuals)	High Low	*, ** Make second or split application of PRE herbicide for continued summer annual weedy grass control. This second application improves residual control of crabgrass and later-germinating goosegrass. Goosegrass seed generally begins germination 4 to 6 weeks after crabgrass. Residual control from the initial PRE herbicide application can be as little as 4 weeks or as much as 12 weeks (product-dependent). When choosing a herbicide option for this second application, please refer to weed susceptibility tables for a herbicide that has good-to-excellent activity on goosegrass.
POST	Late Spring to Summer	May June July Aug.	Grasses	High	Establishment of weedy grasses can be prevented with timely applications of PRE herbicides. Summer annuals escaping PRE herbicide treatments and perennial grasses may require control with POST herbicides. Difficult to control perennial grasses may require repeat applications. Please refer to 'Established Perennial and Annual Grasses: POST Herbicide Options' for specific herbicides and control directions.
POST	Late Spring to Summer	May June July August	Sedges	High* Low*	* The need for this application is dependent on the presence of emerged sedges. Emergence can be anticipated in early May. Ideal treatment time is when the plants have 3 to 6 leaves of new growth. Herbicide choice is dependent on the sedge present. The plant must be positively identified (refer to 'Weed Identification' section. For choice of appropriate herbicide and application timing, please refer to 'Sedges: POST Herbicide Options.'

Bermudagrass Athletic Field Herbicide Application Timing Calendar

The following calendar provides a starting point for developing a weed management program for managing weeds in a bermudagrass sports turf.

Instructions: This calendar is intended to aid in planning the timing of herbicide applications. Application timings are based on the life cycle of the target weeds and available herbicide options. The number of herbicide applications is dependent on the desired level of weed control and turf appearance. Using this planning calendar, choose the appropriate herbicide(s) and application type (formulation) from the following section 'HERBICIDE OPTIONS, USE DIRECTIONS and PRECAUTIONS.' To aid in choosing the appropriate herbicide(s) refer to the sections 'TURFGRASS TOLERANCE TO HERBICIDES' [to determine appropriate herbicide based on the tolerance of your turfgrass type to the herbicide(s)] and 'WEED SUSCEPTIBILITY TO HERBICIDES' (to choose the herbicide that will provide the most effective control).

Note: Herbicide choice is dependent on turfgrass type, tolerance to the herbicide and application timing (Please refer to 'USE DIRECTIONS and PRECAUTIONS' and 'TURFGRASS TOLERANCE TO HERBICIDES').

Application		Month	Target Weeds	Maintenance Level	Tips
Type	Timing				
PRE	Late Summer to Fall	Aug. Sept.	Grasses (Annual Bluegrass)	High	PRE herbicide can be applied to limit the establishment of annual bluegrass or <i>Poa annua</i> . Annual bluegrass generally germinates in early September. To limit seed germination, PRE herbicides must be applied prior to germination. If considering over-seeding with perennial ryegrass, only certain herbicides can be used. Please refer to the 'Winter Annual Grasses: PRE and POST Herbicide Options' section.
POST	Fall	Nov.	Broadleaf Weeds	High	Control of emerged winter annuals may be achieved with an application of a POST herbicide. This fall application combined with a winter application will improve the control of difficult perennial weeds like wild garlic. Please refer to 'Broadleaf Weeds PRE and POST Herbicide Options.'
POST	Winter	Dec. Jan. Feb.	Broadleaf Weeds	High Low	In over-seeded or in non-over-seeded bermudagrass, perennial and winter annual (established and newly emerged) broadleaf weeds may be controlled with a POST herbicide application. Please refer to 'Broadleaf Weeds: PRE and POST Herbicide Options.'
POST	Winter	Jan. Feb.	Winter Annuals (Grasses and Broadleaf Weeds)	High Low	To non-over-seeded dormant bermudagrass, certain non-selective herbicides can be applied for control of annual bluegrass and winter annual and perennial broadleaf weeds. Please refer to 'Winter Annual Grasses: PRE and POST Herbicide Options.' Note: bermudagrass must be dormant.

Application		Month	Target Weeds	Maintenance Level	Tips
Type	Timing				
PRE	Spring	February* March **	Grasses (Summer Annuals)	High Low	*, ** For PRE control of crabgrass, make first application in late February or early March in West Tenn. or mid-March to early April in East Tenn. Crabgrass germinates when the soil temperature has been 55 F (or 65 F air temperature) for four or more days. A visual indicator would be abundant <i>Forsythia</i> bloom.
PRE	Late Spring to Summer	May* June**	Grasses (Summer Annuals)	High Low	*, ** Make second or split application of PRE herbicide for continued summer annual weedy grass control. This second application improves residual control of crabgrass and later-germinating goosegrass. Goosegrass seed generally begins germination 4 to 6 weeks after crabgrass. Residual control from the initial PRE herbicide application can be as little as 4 weeks or as much as 12 weeks (product-dependent). When choosing a herbicide option for this second application, please refer to the weed susceptibility tables for a herbicide that has good to excellent activity on goosegrass.
POST	Late Spring to Summer	May June July Aug.	Grasses	High	Establishment of weedy grasses can be prevented with timely applications of PRE herbicides. Summer annuals escaping PRE herbicide treatments and perennial grasses may require control with POST herbicides. Difficult-to-control perennial grasses may require repeat applications. Please refer to 'Established Perennial and Annual Grasses: POST Herbicide Options' for specific herbicides and control directions.
POST	Summer	June July	Broadleaf Weeds	High	POST herbicides may be needed to control emerged summer annual and perennial broadleaf weeds. Note of caution: the phenoxy-type herbicides are susceptible to causing off-site injury. Applied under warm temperatures, vapor from these herbicides can move from the treated site causing injury to sensitive plants. Please refer to 'Broadleaf Weeds: PRE and POST Herbicide Options.'
POST	Late Spring to Summer	May June July Aug.	Sedges	High* Low*	* The need for this application is dependent on the presence of emerged sedges. Emergence can be anticipated in early May. Treat when the plants have 3 to 6 leaves of new growth. Herbicide choice is dependent on the sedge present. The plant species must be positively identified prior to applying herbicide (refer to 'Weed Identification'). For choice of appropriate herbicide and application timing, please refer to 'Sedges: POST Herbicide Options.'

HERBICIDE OPTIONS: USE DIRECTIONS AND PRECAUTIONS

SUMMER ANNUAL GRASSES (e.g. crabgrasses, goosegrass, foxtails and others): PRE HERBICIDE OPTIONS

Overall Comments: The following table lists preemergence (PRE) herbicides for controlling summer annual grasses like the crabgrasses and goosegrass. These herbicides may also have activity towards other annual and perennial grasses arising from seed. In addition, PRE herbicides also provide PRE control of certain annual broadleaf weeds (please refer to weed-susceptibility tables). Weeds controlled depend on herbicide choice and application timing.

- ▶ PRE herbicides act by preventing germinating seedlings from developing (generally do not inhibit actual seed germination). To be effective, these herbicides must be applied prior to, not after, seedling emergence.
- ▶ Products with more than one active ingredient may improve weed control spectrum (e.g., additional grass and broadleaf weeds).
- ▶ PRE herbicides for weedy grass control provide residual activity over an extended period. The duration of residual activity is product-dependent.
- ▶ For optimum weed control, PRE herbicides need 1/2 inch of rainfall or irrigation within 24 to 48 hours after application. Lack of timely rain or irrigation may result in poor weed control (product dependent).

Fertilizer/ Herbicide Combinations: PRE herbicides are often combined with granular fertilizer. The ideal application timing for turfgrass fertilization may not be the same as that required for PRE herbicides. The application of fertilizer/herbicide combinations may result in wasted fertilizer or may adversely affect turfgrass health. When optimum timing for weed control and fertilization do not coincide, use herbicides not combined with a fertilizer.

SUMMER ANNUAL GRASSES (e.g., crabgrasses, goosegrass, foxtails and others)

- ▶ Crabgrass seeds germinate in the spring when the soil temperature has been 55 F (air temperature 65 or greater) for four or more days.
- ▶ Goosegrass seeds generally germinate four to six weeks later than crabgrass seed.
- ▶ Target the first application in late February or early March in West Tenn. or mid-March to early April in East Tenn. Generally, abundant *Forsythia* bloom corresponds with soil temperatures favorable for crabgrass germination (monitoring of soil temperature will aid in timing of initial application).
- ▶ To extend residual activity, make a second or split application approximately 6 to 8 weeks later (product-dependent).
- ▶ Altering preemergence herbicides may increase the spectrum of weeds controlled in addition to the crabgrasses and goosegrass.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses PRE	benefin -BALAN 2.5 G	3 lb.	120 lb.	2 .75 lb.	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysiagrass	-Do not apply to bentgrass or golf course greens. -Should not be applied in the spring to turfgrass seeded the previous fall. -Do not re-seed within 4 months of last application. -Do not over-seed within 6 weeks of last application. -May thin winter grasses over-seeded in warm- season grasses. -Do not use on newly sprigged turfgrass. -For summer annual grasses, make second application 4 to 6 weeks after initial application.
	benefin + oryzalin -XL 2 G	2 to 3 lb.	100 to 150 lb.	2.5 to 3.5 lb.	Tall Fescue Bermudagrass Centipedegrass Zoysiagrass	
Grasses PRE	benefin + trifluralin -TEAM 2 G	1.5 to 3 lb.	75 to 150 lb.	1.75 to 3.5 lb.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue P. Ryegrass Bermudagrass Centipedegrass Zoysiagrass	-Safe to apply to well-established turfgrass listed. -Do not apply to putting greens. -Safe on bentgrass fairways and other high cut bentgrass areas. -Do not apply in the spring to turfgrass seeded the previous fall. -Do not re-seed within 4 months of last application. -Do not over-seed within 4 months of last application. -Do not use on newly sprigged turfgrass. -For summer annual grasses, make second application 10 to 12 weeks after initial application.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
	bensulide -BENSUMEC 4LF	7.6 to 12.4 lb.	1.9 to 3.1 gal.	5.6 to 9.1 fl. oz.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue P. Ryegrass Bermudagrass Centipedegrass Zoysiagrass	-Safe to apply to well-established turfgrass listed. For use on bentgrass putting greens. -Do not use on bermudagrass putting greens. -Do not apply in the spring to turfgrass seeded the previous fall. -Do not re-seed within 4 months of last application. -Do not over-seed within 3 months of last application. -Do not use on newly sprigged turfgrass. -For summer annual grasses, make second application 8 to 12 weeks after initial application.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses PRE	dithiopyr -DIMENSION EC	0.5 lb.	2 qts.	1.5 fl. oz.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue P. Ryegrass Bermudagrass Centipedegrass Zoysiagrass	-Provides PRE and early POST control of crabgrass (up to 3-leaf stage). POST activity is improved with addition of non-ionic surfactant (0.50% volume/ volume). -Apply to well-established turfgrasses listed that have received at least two mowings. -Do not apply to colonel bentgrass. Certain varieties of fine fescue may be susceptible. Bermudagrass TIFGREEN (328) is susceptible. -Can be applied to putting greens. -For sod production, sod needs to be established for 6 months. Do not apply within 3 months of sod harvest. -Do not re-seed within 4 months of last application. -Bermudagrass can be over-seeded with perennial ryegrass 8 weeks after last application. -Does not require immediate irrigation for activation. -For summer annual grasses, make second application 5 to 10 weeks after initial application.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses PRE	siduron -TUPERSAN 50 WP	10 lb.	20 lb.	7.3 oz.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue Zoysiagrass	-Can be used at 2.9 oz. per 1,000 sq. ft. when seeding cool-season grasses listed. -Can also be used in newly sprigged or established <i>Zoysiagrass</i> . -Do not apply to warm-season grasses other than <i>Zoysiagrass</i> . -For bentgrass, see label for variety susceptibility.
	metolachlor -PENNANT MAGNUM	4.0 lb.	4 pts.	1.5 fl. oz.	Bermudagrass Centipedegrass Zoysiagrass	-Can be applied to well-established warm-season grasses listed. -May cause temporary slowed growth and/or yellowing. -Do not re-seed 4 months before or 6 months after application. -Do not apply in the fall if considering over-seeding. -For activity, requires <u>½ inch of rainfall or irrigation within 7 days after application.</u> -Make only one application.
	napropamide -DEVIRINOL 50 DF -DEVIRINOL 2 G	2 to 3 lb.	4 to 6 lb. 100 to 150 lb.	1.5 to 2.2 fl. oz. 2.3 to 3.4 lb	Tall Fescue Bermudagrass Centipedegrass Zoysiagrass	-Do not apply to turfgrass less than 3 months old. -Do not apply to bentgrass. -Do not re-seed or over-seed within 4 months before or after application. -For activity, requires <u>½ inch of rainfall or irrigation within 7 days after application.</u> -Repeat application 4 to 6 weeks later.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses PRE	oryzalin -SURFLAN 4 AS	1.5 to 2 lb.	1.5 to 2.0 qts.	1.0 to 1.5 fl. oz.	Bermudagrass Centipedegrass Zoysiagrass	-Do not apply to tall fescue. -Do not apply to greens, tees or bentgrass. -Can be applied to well-established, warm-season grasses listed. -May thin over-seeded grasses. -Delay re-seeding or over-seeding for 4 months after last application. -Single application of 1.5 oz. product per 1,000 sq. ft. or split application of 1.0 oz. product per 1,000 sq. ft. 8 to 10 weeks after first application. -Requires ½ inch rain within 21 days after application.
	oxadiazon -RONSTAR G	2 to 4 lb.	100 to 200 lb.	2.3 to 4.6 lb.	Bentgrass Ky. Bluegrass Tall Fescue P. Ryegrass Bermudagrass Zoysiagrass	- NOT FOR USE ON HOME LAWNS. -Do not apply to bentgrass mowed at 3/8 in. or less. Creeping red fescue is susceptible. -Do not apply to putting greens or tees. -Do not apply to wet turf. -Requires ½ inch rainfall or irrigation within 24 hours after application.
	oxadiazon -RONSTAR 50 WSP	2 to 3 lb.	4 to 6 lb.	1.5 to 2.2 oz.	Bermuda (DORMANT) Zoysiagrass (DORMANT)	-NOT FOR USE ON HOME LAWNS. -Apply when dormant (thus, do not use in fall for annual bluegrass) at least 2 to 3 weeks prior to greenup. -May be applied when establishing. -Apply immediately after sprigging.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses PRE	oxadiazon + prodiamine -REGALSTAR G	3 lb.	200 lb	4.6 lb.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue P. Ryegrass	-NOT FOR USE ON HOME LAWNS. Do not apply to wet turf. -Apply only to bentgrass fairways. -Do not apply to wet turf. -Requires ½ inch rainfall or irrigation within 24 hours of application.
	oxadiazon + prodiamine -REGALSTAR II 1.2 G	2.4 lb.	200 lb	4.6 lb.	Bermudagrass Centipedegrass Zoysiagrass	
	pendimethalin -numerous products and formulations	1.5 to 3.0 lb.	See label	See label	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue P. Ryegrass Bermudagrass Centipedegrass Zoysiagrass	-Apply to well-established turfgrasses that have been mowed at least four times. -Do not apply to greens or tees. -Do not apply to bentgrass greens or tees. -Do not re-seed within 3 months of last application. -For summer annual grasses, make one application. -Requires ½ inch rain within 30 days after application.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses PRE	prodiamine -BARRICADE 65 WG -REGALKADE 0.5 G -BARRICADE 4FL	0.5 to 1 lb.	0.75 to 1.5 lb. 10 to 20 lb 10 to 48 fl oz.	0.27 to 0.55 oz. 3.67 to 7.3 lb. 0.25 to 1.2 fl oz.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue P. Ryegrass Bermudagrass Centipedegrass Zoysiagrass	-May be used on established grasses listed. -Do not re-seed within 7 months of last application. -Do not apply to putting greens. -Certain varieties of bentgrass are susceptible (see label). -Do not apply within 60 days after over-seeding. -Do not apply more than 0.30 oz. per 1,000 sq. ft. when sprigging or plugging bermudagrass. -Sod needs to be established for one year. Do not harvest sod within 4 months of last application. -For summer annual grasses, make second application 8 to 10 weeks after initial application. -Requires ½ inch rain within 14 days of application.

WINTER ANNUAL GRASSES (e.g. *Poa annua*/annual bluegrass): PRE and POST HERBICIDE OPTIONS

Overall Comments: The following table lists preemergence (PRE) and postemergence (POST) herbicide options for control of annual bluegrass *Poa annua* (predominant winter annual grass weed in turf in Tennessee).

- ▶ PRE herbicides act by preventing germinating seedlings from developing (generally do not inhibit actual seed germination). These herbicides must be applied prior to, not after, seed germination.
- ▶ Products with more than one active ingredient may improve weed control spectrum (e.g. additional broadleaf weeds).
- ▶ PRE herbicides for grass weed control provide residual activity over an extended period. The duration of residual activity is product-dependent.
- ▶ For optimum weed control, many PRE herbicides need to be activated by 1/2 inch of rainfall or irrigation 24 to 48 hrs after application. Lack of timely activation by rain or irrigation may result in poor weed control (product dependent).

Fertilizer/ Herbicide Combinations: PRE herbicides for grasses are often combined with granular fertilizer. The ideal application timing for turfgrass fertilization may not be the same as that required for PRE herbicides. Fertilizer/herbicide combinations may result in wasted fertilizer or may adversely affect turfgrass health. When optimum timing for weed control and fertilization do not coincide, use herbicides not combined with a fertilizer.

WINTER ANNUAL GRASSES (e.g. *Poa annua*/annual bluegrass):

- ▶ In Tennessee, annual bluegrass generally begins to germinate in early September. For PRE control of this troublesome annual grass weed, target application for late August or early September.

CAUTION: Generally, PRE herbicides for annual bluegrass should not be applied if considering fall re-seeding or over-seeding (unless otherwise stated on the product label).

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses Winter Annuals (<i>Poa annua</i>) PRE	benefin benefin + oryzalin bensulide dithopyr metolachlor napropamide oryzalin oxadiazon pendimethalin prodiamine	▶ The same herbicides listed in the previous section for PRE control of summer annual weedy grasses (with the exception of siduron) can also be used for PRE control of annual bluegrass when applied in late summer or early fall. Siduron does not control annual bluegrass. ▶ BALAN, TEAM and DIMENSION are the only PRE herbicides that can be applied prior to over-seeding bermudagrass with perennial ryegrass (see use directions and precautions). ▶ Do not apply any of the other PRE herbicides in the fall if considering over-seeding. ▶ Please refer to 'Summer Annual Grasses: PRE Herbicide Options' for example product names, use rates, and additional use directions and precautions.				

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses - <i>Poa annua</i> in Bermudagrass to be over- seeded PRE	Benefin -BALAN 2.5 G	1.5 lb.	60 lb.	1.4 lb.	Bermudagrass	-Bermudagrass can be over-seeded with perennial ryegrass 6 wks after application when benefin is applied at the low rate of 1.4 lb. per 1000 sq. ft. See 'Summer Annual Grasses: PRE Herbicide Options' for additional use directions and precautions.
	benefin + trifluralin -TEAM 2 G	1.5 lb.	75 lb.	1.75 lb.	Bermudagrass	-Bermudagrass can be over-seeded with perennial ryegrass 8 wks after application when the benefin+trifluralin combination is applied at the low rate of 1.5 lb. active ingredient per acre. -See 'Summer Annual Grasses: PRE Herbicide Options' for additional use directions and precautions.
	dithiopyr - DIMENSION 1 EC	0.5 lb.	2 qts.	1.5 fl. oz.	Bermudagrass	-Bermudagrass can be over-seeded with perennial ryegrass 8 wks after last application. -Bermudagrass TIFGREEN (328) is susceptible. -Can be applied to putting greens.
Grasses - <i>Poa annua</i> in Bermudagrass to be over- seeded PRE	fenarimol -RUBIGAN 1 AS	1.4 to 2 lb.	179 to 256 oz.	4.1 to 5.8 oz.	Bermudagrass	-The fungicide RUBIGAN has PRE herbicidal activity towards annual bluegrass. -Can be applied to bermudagrass to be over-seeded. -Can be applied to bermudagrass greens and tees. -Use two to three applications to a total of 3 oz. per 1,000 sq. ft. Last application needs to be at least 14 days prior to over-seeding with perennial ryegrass.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses - <i>Poa annua</i> PRE and early POST	ethofumesate -PROGRASS 1.5 EC	1 lb.	2.67 qt.	2 fl. oz.	Bentgrass Ky. Bluegrass Tall Fescue P. Ryegrass Bermudagrass (DORMANT)	-For use by professional applicators. Can be applied to home lawns by certified applicators. Not registered for use by homeowners. -Do not apply to putting greens. -Rate given is for dormant bermudagrass. -- Reduced rates required for other turfgrasses listed. Please refer to product label. -Provides PRE and early POST control of annual bluegrass (in addition to chickweed and clover) and PRE control or POST suppression of other weeds (see weed susceptibility). -Common bermudagrass is less tolerant than hybrid bermudagrass. <u>When over-seeding</u> , apply 2 weeks after emergence when seedlings are 1 inch tall or after the first cutting. Make second or third application at 21-to 28-day intervals. Do not apply later than Feb. 1 st or 4 wks prior to spring green up. -Can be used on creeping bentgrass maintained at fairway height.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses - <i>Poa annua</i> PRE and/or POST	pronamide KERB 50 WSP	1 to 1.5 lb.	2 to 3 lb.	0.75 to 1 oz.	Bermudagrass Centipedegrass Zoysiagrass	-RESTRICTED USE PESTICIDE. Use restricted to certified applicators or persons under their direct supervision. -For annual bluegrass, provides PRE and POST control. Control will be gradual, taking 3 to 5 weeks. -Apply when air temp. is less than 55 F. -Spring application can be made to remove fall over-seeded perennial ryegrass. Make application when warm-season grasses are at 50 percent green-up as a dormant application, prior to green-up may slow green-up. -Make take 4 to 6 weeks to transition. -Requires ½ inch rainfall or irrigation within 24 hrs. of application for optimum weed control.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
<i>Poa annua</i> and certain winter annual broadleaf weeds PRE and/or POST	atrazine -AAtrex 4 L -Atrazine 90 DF	1 to 2 lb.	1 to 2 qt. 1.1 to 2.2 lb.	0.75 to 1.5 fl. oz. 0.4 to 0.8 oz.	Bermudagrass (DORMANT) Centipedegrass Zoysiagrass	-RESTRICTED USE PESTICIDE, with use restricted to certified applicators or persons under their direct supervision. -Apply after Oct. 1 st to non-over-seeded turfgrasses listed. A second application can be made at least 30 days after initial application (before April 15th). -Do not over-seed within 4 months before or 6 months after application. -Provides PRE and early POST control of annual bluegrass and PRE control of certain broadleaf weeds. -For only annual bluegrass, use low rate. -Use high rate for PRE control of broadleaf weeds. -Apply only the low rate to newly sprigged turfgrass. -Do not use on golf greens. -Requires ½ in. rainfall or irrigation within 10 days after application.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
<i>Poa annua</i> and certain winter annual broadleaf weeds PRE and/or POST	simazine -PRINCEP 4 L -PRINCEP 90 DF	1 to 2 lb.	1 to 2 qt. 1.1 to 2.2 lb.	0.75 to 1.5 fl. oz. 0.4 to 0.8 oz.	Bermudagrass Centipedegrass Zoysiagrass	-Apply after Oct. 1 st . Provides PRE and POST activity on annual bluegrass and certain broadleaf weeds and only PRE activity on other broadleaf weeds. For weeds that emerge after initial application a second application can be made at least 30 days after initial application (before June 1st.). -Apply a single application of the low rate on newly sprigged turfgrass or certain hybrid bermudagrass (see label). -Do not re-seed or over-seed with desired turfgrass 4 months before or 6 months after application. -Requires ½ in. rainfall or irrigation within 10 days after application. -Do not use on golf greens.
<i>Poa annua</i> and certain winter annual broadleaf weeds PRE and/or POST	metribuzin -SENCOR 75 DF	0.25 to 0.5 lb.	0.33 to 0.67 lb.	0.12 to 0.25 oz.	Bermudagrass	-RESTRICTED USE PESTICIDE, with use restricted to certified applicators or persons under their direct supervision. -To dormant bermudagrass, make a single application at the high rate. -To non-dormant bermudagrass, apply the low to high rate. Proper application to non-dormant bermudagrass will result in temporary discoloration. If necessary, make second application no sooner than 1 week after initial application. -Apply in 40 gallons of water carrier. -For best results delay mowing until after rainfall or irrigation. -Do not apply to golf course greens, tees or turf mowed closer than ½ inch.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
<i>Poa annua</i> and other winter weeds POST	glyphosate -ROUNDUP 4 L	0.5 lb.	0.5 qt.	0.37 fl oz.	Bermudagrass (DORMANT)	-Must be dormant. Apply prior to initiation of green up. -Will also remove over-seeded perennial ryegrass. -Apply in 5 to 20 gallons of water carrier with 0.5% volume/volume non-ionic surfactant.
	diquat -REWARD 2 L	0.25 to 0.50 lb.	1 to 2 pt.		Bermudagrass (DORMANT)	-Must be dormant, apply prior to initiation of green up. -Will also remove over-seeded perennial ryegrass. -Apply in 20 to 100 gallons of water carrier with 1 to 2 pt. of non-ionic surfactant per 100 gallons of water carrier. May require repeat application.
<i>Poa annua</i> -Post	Paclobutrazol -Trimmit Trinexapac-ethyl -Primo Maxx	8 fl oz 6 fl oz/a			Bentgrass including putting greens	-Excellent management program for gradual removal of annual and perennial ecotypes of annual bluegrass (<i>Poa annua</i>) from bentgrass putting greens. Slight injury to bentgrass can occur with Trimmit when temperatures exceed 85 F. -Apply Trimmit at 8 fl oz/a on April 1 and May 1. Apply Primo Maxx at 6 fl oz/a on June 1, July 1, and August 1. Continue Trimmit application at 8 fl oz/a beginning September 1, October 1, and November 1. -This Trimmit Primo Maxx program should be applied on a 4-week schedule similar to the one suggested. A second year of application may be necessary for complete eradication.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Various cool-season grasses -tall fescue -annual ryegrass -volunteer ryegrass -overseeded ryegrass removal - <i>Poa annua</i> - <i>Poa trivialis</i> -bentgrass -Kentucky bluegrass POST	foramsulfuron -REVOLVER 0.19 SC (0.19 lb ai/gal)	0.013 to 0.038 lb.	8.8 to 26.2 fl oz.	0.1 to 0.6 fl oz.	Bermudagrass Zoysiagrass	-For professional use on golf courses, athletic fields, sod farms, residential, and non-residential turf. -Care should be taken when herbicide could move with surface water on to non-target susceptible species, such as bentgrass or perennial ryegrass. -Tracking of applied herbicide onto non-target species by maintenance equipment or human traffic should also be considered. It is recommended that light frequent irrigations be used to wash the herbicide from the leaf surface and into the soil profile 4 to 6 hours after application. -Apply as foliar spray along with a non-ionic surfactant at 0.25 to 0.50% volume/ volume (or 1 to 2 pts. per 100 gallons of water carrier). -Repeat applications 4 to 6 weeks later may be necessary for complete control of difficult-to-control species. - For use on Common, Tifway 419, Tifgreen 328, Tifsport, Tifdwarf, Vamont bermudagrass and Meyer zoysiagrass [Other bermudagrass and zoysiagrass varieties are most likely tolerant, but a small area should be treated to evaluate sensitivity before large scale applications are made.]

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Various cool-season grasses -tall fescue -annual ryegrass -volunteer ryegrass -overseeded ryegrass removal - <i>Poa annua</i> - <i>Poa trivialis</i> -bentgrass -Kentucky bluegrass POST	trifloxysulfuron -MONUMENT 75WG	0.25 to 0.42 oz.	0.33 to 0.56 oz.	0.21 to 0.36 grams	Bermudagrass Zoysiagrass	-For professional application on golf courses, sod farms, and other non-residential areas. -Apply as foliar spray along with a non-ionic surfactant at 0.25 to 0.50% volume/ volume (or 1 to 2 pts. per 100 gallons of water carrier). -Repeat applications may be necessary for complete control. -Potential tracking and movement problems (see foramsulfuron).
-Removal of overseeded perennial ryegrass. - <i>Poa annua</i> - <i>Poa trivialis</i> POST	rimsulfuron -TRANXIT GTA	0.125 to 0.50 oz.	0.5 to 2.0 oz.	0.32 to 1.30 grams	Bermudagrass Zoysiagrass Centipede	-For professional application on golf courses, athletic fields, sod farms, and professionally-managed non-residential areas. -Should not be applied in any areas where children can contact turf. -Apply as foliar spray along with a non-ionic surfactant at 0.25 to 0.50% volume/ volume (or 1 to 2 pts. per 100 gallons of water carrier). -Potential tracking and movement problems (see foramsulfuron). -Other cool-season grasses controlled: little barley, tall fescue, blue-eyed grass - For use on Emerald, Zenith, and Meyer zoysiagrass - Centipedegrass has displayed moderate tolerance to TRANXIT GTA

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
	metsulfuron -Blade (60%w/w) -Manor (60%w/w)	0.08 to 0.60 oz.	0.125 to 1.0 oz.	0.08 to 0.65 g	Bermudagrass Centipede Zoysiagrass	-For professional application on golf courses (excluding greens), sod farms, residential and non-residential turf. -Potential tracking and movement problems (see foramsulfuron). -Add NIS at 0.25%v/v.
-Rough-stalk bluegrass (<i>Poa trivialis</i>) -Annual bluegrass (<i>Poa annua</i>) -Tall fescue	sulfosulfuron -Certainty	0.75 to 2.0 oz.	0.56 to 1.5 oz	0.37 to 0.98 g	Bermudagrass Zoysiagrass St. Augustine Centipedegrass	-For professional application on the listed warm-season grasses. -Should not be applied in any areas where children can contact turf. -Apply as foliar spray along with a non-ionic surfactant at 0.25 to 0.50% volume/ volume (or 1 to 2 pts. per 100 gallons of water carrier). -Potential tracking and movement problems (see foramsulfuron).

BROADLEAF WEEDS (Annuals and Perennials): PRE and POST HERBICIDE OPTIONS

Overall Comments: The following table lists preemergence (PRE) and postemergence (POST) herbicides for control of broadleaf weeds. Also the PRE herbicides for summer annual grasses provide limited (product dependent) PRE activity towards summer annual broadleaf weeds (refer to weed susceptibility table). Broadleaf weeds can be controlled with POST herbicides. Several POST herbicides selectively control established broadleaf weeds in established turfgrass. For optimum control, application(s) need to be timed early in the life cycle of summer and winter annuals. Established perennials (e.g. wild garlic), may require repeat application(s).

- ▶ POST herbicides for broadleaf weeds do not require activation by rain or irrigation.
- ▶ If turf is under drought stress, irrigate or wait for a rain to allow weeds to resume active growth.
- ▶ Do not apply if rain is forecast.
- ▶ Ensure uniform application (as activity is dependent on foliar uptake) and do not overlap spray pattern.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT RATE per Acre	PRODUCT RATE per 1,000 sq. ft.		
Broadleaf Weeds PRE	isoxaben -GALLERY 75 DF	0.5 to 1.0 lb.	0.66 to 1.33 lb	0.25 to 0.5 oz.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipede Zoysiagrass	-Only PRE herbicide marketed for broadleaf weed control (does not control grass weeds). -Apply prior to the germination of target weeds. -To newly seeded, re-seeded or over-seeded turfgrass, apply only after new seedlings have reached the three-leaf stage and are tillering. -Do not seed, re-seed or over-seed within two months of the last application. -Do not apply to putting greens or tees. -Requires activation with ½ in. rainfall or irrigation within 21 days of application.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT RATE per Acre	PRODUCT RATE per 1,000 sq. ft.		
Broadleaf Weeds (Winter annuals) POST	metribuzin -SENCOR 75 DF**	0.25 to 0.5 lb.	0.33 to 0.67 lb.	0.12 to 0.25 oz.	Bermudagrass	-Provides POST and PRE control of many winter annual weeds including; henbit, chickweed, clovers and knotweeds in addition to annual bluegrass (refer to weed susceptibility). -Use restricted to commercial applicators or individuals operating under their direct supervision. Apply only to bermudagrass mowed at ½ inch or greater. Do not apply to putting greens or tees. -To dormant bermudagrass, apply 0.25 oz. per 1,000 sq. ft. prior to green up. -To actively growing bermudagrass, apply at 0.12 to 0.25 oz. per 1,000 sq. ft. This application may result in temporary injury (thus dormant application preferred).
Broadleaf Weeds (Winter and summer annuals) POST	carfentrazone -QUICKSILVER 1.9 EC	0.016 to 0.031 lb.	1.1 to 2.1 fl oz	0.025 to 0.048 fl oz	KY bluegrass Perennial ryegrass Tall fescue Fine fescues, Creeping bentgrass Common bermudagrass Bahiagrass Zoysiagrass Centipede	- Restricted to professional application to residential or non-residential turfgrass, athletic fields, and golf courses. -Newly seeded or established turf. -Established turfgrass. Not for use on Hybrid Bermudagrass. -Can be applied with phenoxy herbicides, such as 2,4-D, dicamba, or MCP, to broaden weed control spectrum and improve weed control. -Carfentrazone is moderately toxic to fish and toxic to aquatic invertebrates. Do not apply to surface water or in a manner in which the herbicide could come in contact with aquatic life.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT RATE per Acre	PRODUCT RATE per 1,000 sq. ft.		
Broadleaf Weeds (Winter and Summer annuals) POST	bentazon plus atrazine -PROMPT 5 L **	0.5 to 0.75 lb. 0.5 to 0.75 lb.	 1.8 to 2.4 pt.	 0.66 to 0.88 fl. oz.	 Bermudagrass Centipede Zoysiagrass	-RESTRICTED USE PESTICIDE with use restricted to professional application to residential or non-residential turfgrass. -Apply early after weed establishment as use rate is based on weed size (refer to product label). -Thorough coverage required. Apply in 20 gallons water carrier per acre. -May require addition of crop oil concentrate (@ 2 pt. per acre or 0.75 fl. oz. per 1,000 sq. ft.) depending on target weeds (see product label). -Apply only to warm-season turfgrasses listed. -Apply no sooner than 10 days after sprigging or plugging. -On newly sprigged turfgrass and established hybrid bermudagrass, may cause temporary slowing of growth and/or yellowing. -Do not apply to putting greens.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT RATE per Acre	PRODUCT RATE per 1,000 sq. ft.		
Broadleaf Weeds (Annuals and Perennials)	The herbicides 2,4-D, MCPP and dicamba are listed individually; however, for optimum broad-spectrum weed control, products containing combinations of these three herbicides may be used rather than a product with a single herbicide. Refer to weed susceptibility table.					
POST	PRECAUTIONS: Products containing “phenoxy” herbicides, such as 2,4-D, MCPP and dicamba, can cause injury to or loss of desired plants, shrubs and trees. Cotton, tobacco, tomatoes, and roses are all especially sensitive. Injury can result as: a. Phenoxy herbicides can release vapors from treated areas into the air and drift. Application of products containing these herbicides must be applied when the air temperature is less than 85 F. b. Application of products containing these herbicides combined with other herbicides for non-selective weed control. Read the product label to be sure that the product is intended for use on turfgrass. c. Application underneath or around desired vegetation. d. Application or over-application to areas of the turf where roots of desired vegetation are established. e. Application when air is not still. f. Use of the same sprayer to make later application of fungicides or insecticides to desired vegetation. Removal of phenoxy herbicide residues from the sprayer after application is very difficult. Sprayer should be designated for application of phenoxy herbicides. A second sprayer should be used for application of other pesticides. Fertilizer/Herbicide Combinations: Granular fertilizer products pre-mixed with phenoxy herbicides are readily available. However, control of established broadleaf weeds may be less than desirable when applied in granular form. For optimum effectiveness, these herbicides are most often applied POST (alone, not mixed with fertilizer) as liquids (contacting the foliage).					
	2,4-D amine -VARIOUS -2,4-D AMINE 4 L	0.75 to 1.0 lb.	1.5 to 2 pt.	0.55 to 0.73 fl. oz.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue	-Apply to well-established grasses listed. -To newly seeded or re-seeded turfgrass, delay application until after at least the second mowing (apply only if weeds are present). -Delay re-seeding for 4 weeks after last application. -Do not apply to newly over-seeded warm season grasses. -May cause injury to bentgrass. Reduce use rates by one half (refer to product label).
	MCPP -VARIOUS -MCPP 2 EC	1 to 1.75 lb.	4 to 7 pt.	1.5 to 2.6 fl. oz.	Bermudagrass Centipede Zoysiagrass	

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT RATE per Acre	PRODUCT RATE per 1,000 sq. ft.		
Broadleaf Weeds (Annuals and Perennials) POST	dicamba -VARIOUS -BANVEL 4 S -VANQUISH 4 S	0.25 to 0.50 lb.	0.5 to 1.0 pt.	0.2 to 0.4 fl. oz.	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Zoysiagrass	-Apply to well-established grasses listed. To newly seeded or re-seeded turfgrass, delay application until after at least the second mowing (apply only if weeds are present). -Delay re-seeding for at least 4 weeks after last application. -Do not apply to newly over-seeded warm season grasses.
	2,4-D plus MCPA or MCPP plus dicamba <i>-many formulations</i> -THREE-WAY -TRIMEC -TRIPower	Various products with various concentrations. Thus refer to actual product label for use rates.			Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysiagrass	-This combination of active ingredients provides the most broadspectrum weed control compared to either active ingredient applied alone (refer to weed susceptibility table). -Use reduced rate on cool-season grasses (refer to product label). -On warm-season grasses use higher rate. Temporary injury may result with applications made to warm-season grasses during transition periods (dormancy to greenup and green to dormancy).
	clopyralid plus triclopyr -CONFRONT	0.28 to 0.56 lb. 0.09 to 0.19 lb.	1 to 2 pt.	0.37 to 0.74 fl. oz.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysiagrass	-Not for use by homeowners. -In addition to other broadleaf weeds, has activity on clovers and thistles. -Apply only to well-established turfgrasses listed. -Do not re-seed within three weeks after application. -Do not use on golf course greens or tees. -To bentgrass, apply only the lowest rate (may cause injury, see label). -Use rate is dependent on target weed(s). Refer to product label. -Do not apply to warm-season grasses when mowing height is less than ½ inch.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT RATE per Acre	PRODUCT RATE per 1,000 sq. ft.		
Broadleaf Weeds (Annuals and Perennials) POST	clopyralid + triclopyr + 2,4-D -MOMENTUM	0.04 to 0.06 lb. 0.75 to 1.0 lb. 1.0 to 1.33 lb.	3 to 4 pt.	1.1 to 1.5 fl. oz.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysiagrass	-Not for use by homeowners. -Do not use on golf course greens and tees. -Not for use on turf grown for sod. -Do not apply to these turfgrasses unless potential temporary injury can be tolerated. -To these turfgrasses, do not apply more than 3 pt. per acre. -If repeat application is required, delay for at least 4 weeks. -Do not apply to warm-season grasses with less than ½ inch mowing height. -Delay re-seeding for at least 4 weeks after last application.
Broadleaf weeds (Annual and Perennials) Only suppression of <i>Veronica</i> spp. POST	fluroxypyr -SPOTLIGHT	0.13 to 0.47 lb. ae	0.67 to 2.50 pt.	10.7 to 40.0 floz.	Bentgrass* Ky. Bluegrass Annual Ryegrass Per. Ryegrass Tall Fescue Red Fescue Fine Fescue Bermudagrasses Centipedegrass Zoysiagrass	-Not for use on golf course tees and greens. -Cool-season grasses have greater tolerance than warm-season grasses. Some injury to warm-season grasses must be tolerated. -Use low rate on bentgrass and bermudagrass, and only if some injury can be tolerated. -Use < 1.33 pt/A/application on all warm-season species and only if some injury can be tolerated.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT RATE per Acre	PRODUCT RATE per 1,000 sq. ft.		
Broadleaf weeds (Annuals and Perennials)	carfentrazone + 2,4-D + MCPP + dicamba -SPEED ZONE	0.012 to 0.030 0.38 to 0.97 0.12 to 0.30 0.035 to 0.088 lb.	2 to 5 pt.	0.7 to 1.8 fl oz.	Bentgrass Ky. Bluegrass Annual Ryegrass Per. Ryegrass Tall Fescue Red Fescue Fine Fescue Bermudagrass, common and hybrid Zoysiagrass	- The addition of carfentrazone to phenoxy herbicides is primarily for the purpose of increasing the time to weed phytotoxicity and increasing cool weather performance. -Can be applied to established turf, after the second mowing of seedlings (species-dependent), and four weeks after sprigging of turfgrasses. -Do not apply to bentgrass putting greens. -Do not apply when air temperatures exceed 90F, as some turfgrass injury can be expected.
Broadleaf weeds (annuals and perennials) POST	carfentrazone + MCPA + MCPP + dicamba -POWER ZONE	0.10 to 0.03 0.55 to 1.66 0.11 to 0.33 0.05 to 0.16 lb.	2 to 6 pt.	0.7 to 2.2 fl oz.	Bentgrass Ky. Bluegrass Annual Ryegrass Per. Ryegrass Tall Fescue Red Fescue Fine Fescue Bermudagrass, common and hybrid Zoysiagrass	- The addition of carfentrazone to phenoxy herbicides is primarily for the purpose of increasing the time to weed phytotoxicity and increasing cool-weather performance. - Power Zone may temporarily discolor some hybrid bermudagrass species. -Do not apply to bentgrass putting greens. -Do not apply when air temperatures exceed 90F, as some turfgrass injury can be expected.
Broadleaf weeds -Wild garlic (Wild onions)	Wild onion, technically is wild garlic (<i>Allium vineale</i>). Wild garlic is a perennial requiring repeat applications of some of the previously listed herbicides. Target fall application after the first hard frost, and after re-growth has occurred. Optimum control should be achieved with fall and either winter or early spring applications, repeated annually. If sufficient regrowth occurs in the spring or fall, a second application will aid in long-term control. See label for specific rates and recommendations.					

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT RATE per Acre	PRODUCT RATE per 1,000 sq. ft.		
	2,4-D amine -VARIOUS -2,4-D AMINE 4 L	3 lb.	3 qt.	2.2 fl. oz.	Ky. Bluegrass Fine Fescue Tall Fescue	Note: Use products containing 2,4-D alone or in combination with dicamba. MCPP or MCPA alone will not control, or is weak on wild garlic; 2,4-D and dicamba have activity. See previous use directions and precautions.
	2,4-D plus dicamba with or without MCPP or MCPA -Various, see previous listing	Various products with various concentrations. Thus refer to actual product label for use rates.			Bermudagrass Centipede Zoysiagrass	
Broadleaf weeds -Wild garlic (Wild onions) POST	imazaquin -IMAGE 1.5 LC	0.37 to 0.5 lb.	1.0 to 1.33 qt.	0.75 to 1 fl. oz.	Bermudagrass Centipedegrass Zoysiagrass	-In addition to POST activity towards wild garlic, will provide additional PRE and POST control of certain broadleaf weeds. -Apply only to well-established warm-season grasses listed. -Do not apply to warm-season grasses over-seeded with perennial ryegrass. If tall fescue is present and desired, do not apply. -Will remove tall fescue. -Do not re-seed or over-seed or sprig turfgrasses for at least 6 wks after last application. -Do not apply within 6 wks of initiation of greenup. -Spot spray, mix 2 fl. oz. in 3 gallons of water and apply to wetting. -Add non-ionic surfactant at 0.25% v/v (or 2 pt. per 100 gallons water carrier).

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT RATE per Acre	PRODUCT RATE per 1,000 sq. ft.		
<u>Some specific broadleaf weeds in certain warm-season grasses:</u> wild carrot, common chickweed, shepherd's-purse, cutleaf evening-primrose, henbit, field pansy, spotted spurge, dollarweed. POST	rimsulfuron -TRANXIT GTA	0.125 to 0.50 oz.	0.5 to 2.0 oz.	0.011 to 0.045 oz	Bermudagrass Zoysiagrass Centipede	-For professional application on golf courses, athletic fields, sod farms, and professionally-managed non-residential areas. -Should not be applied in any areas where children can contact turf. -Apply as foliar spray along with a non-ionic surfactant at 0.25 to 0.50% volume/ volume (or 1 to 2 pts. per 100 gallons of water carrier). -Care should be taken when herbicide could move with surface water on to non-target susceptible species, such as bentgrass or perennial ryegrass. Tracking of applied herbicide on to non-target species by maintenance equipment or human traffic should also be considered. It is recommended that light, frequent irrigations be used to wash the herbicide from the leaf surface and into the soil profile 4 to 6 hours after application. - For use on Emerald, Zenith, and Meyer. -Centipedegrass has displayed moderate tolerance to TRANXIT GTA.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT RATE per Acre	PRODUCT RATE per 1,000 sq. ft.		
Virginia buttonweed, dandelion, henbit, oxalis, clover, dichondra, spotted spurge. POST	trifloxysulfuron -MONUMENT 75WG	0.25 to 0.42 oz.	0.33 to 0.56 oz.	0.008 to 0.013 oz	Bermudagrass Zoysiagrass	-For professional application on golf courses, sod farms, and other non-residential areas. -Apply as foliar spray along with a non-ionic surfactant at 0.25 to 0.50% volume/ volume (or 1 to 2 pts. per 100 gallons of water carrier). -Repeat applications may be necessary for complete control of difficult to control weeds. -Similar tracking and movement issues as rimsulfuron. - Calibrating sulfonylurea herbicides for use over small areas is difficult due to their low use rates. To calibrate for 1,000 sq ft areas: First, create a stock solution by mixing 0.1 oz of the given sulfonylurea herbicide with 1 liter of water. Next, multiply 338 by the amount (in dry oz) you want to apply to 1000 sq ft, for example 0.015 oz. In this example, extract 0.50 fl oz from the stock solution. Mix with 1 gallon of water (adding 0.32 fl oz of non-ionic surfactant). Spray this amount evenly over the 1000 sq. ft. area.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT RATE per Acre	PRODUCT RATE per 1,000 sq. ft.		
Henbit POST	foramsulfuron -REVOLVER 0.19 SC (0.19 lb ai/gal)	0.013 to 0.038 lb.	8.8 to 26.2 fl oz.	0.1 to 0.6 fl oz.	Bermudagrass Zoysiagrass	-For professional use on golf courses, athletic fields, sod farms, residential, and non-residential turf. -Similar tracking and movement issues as rimsulfuron. -Apply as foliar spray along with a non-ionic surfactant at 0.25 to 0.50% volume/ volume (or 1 to 2 pts. per 100 gallons of water carrier). -Repeat applications 4 to 6 weeks later may be necessary for complete control of difficult to control species. - For use on Common, Tifway 419, Tifgreen 328, Tifsport, Tifdwarf, Vamont bermudagrasses and Meyer zoysia. Other bermudagrass and zoysiagrass varieties are most likely tolerant, but a small area should be treated to evaluate sensitivity before large scale applications are made.
Henbit, chickweed, dandelion, speedwells, clovers, dichondra, Virginia buttonweed, wild garlic, many others. POST	chlorsulfuron -TELAR 75WDG -CORSAIR 75 WDG	0.75 to 4.0 oz	1.0 to 5.33 oz.	0.023 to 0.122 oz	Ky bluegrass Fine fescue Bentgrass (≥0.5 inch mow height) Bermudagrass Zoysiagrass*** Centipedegrass***	- For professional application in turfgrass systems, including sod farms. -Do not apply to tall fescue or ryegrass. -Similar tracking and movement issues as rimsulfuron. -Apply as foliar spray along with a non-ionic surfactant at 0.25 to 0.50% volume/ volume (or 1 to 2 pts. per 100 gallons of water carrier). -Repeat applications 4 to 6 weeks later may be necessary for complete control of difficult to control species. -Discoloration or delayed green-up can occur when applications are made during times of environmental stress or during spring transition.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT RATE per Acre	PRODUCT RATE per 1,000 sq. ft.		
Numerous broadleaves, including henbit, white clover, dandelion, chickweed and ground ivy. POST	metsulfuron -Blade (60%w/w) -Manor (60%w/w)	0.08 to 0.60 oz.	0.125 to 1.0 oz.	0.08 to 0.65 g	Ky Bluegrass Fine fescue Bermudagrass Centipede Zoysiagrass	-For professional application on golf courses (excluding greens), sod farms, residential and non-residential turf. -For broadleaf weed control in certain turfgrasses. -Use lower rates for Ky bluegrass, fine fescue, and centipedegrass. -Similar tracking and movement issues as rimsulfuorn. -Add surfactant at 0.25% v/v.

**ESTABLISHED PERENNIAL (e.g. Dallisgrass), and ANNUAL GRASSES (e.g. Crabgrasses and Goosegrass):
POST HERBICIDE OPTIONS**

Overall Comments: The following table provides postemergence (POST) control options for certain established perennial and annual weedy grasses in turf. Ideally, the establishment of weedy grasses in turf needs to be prevented with pre-emergence (PRE) herbicides wherever possible. POST herbicide options with an acceptable margin of selectivity, providing control of established weedy grasses and turfgrass tolerance are limited. Application of available herbicides requires precision to minimize the potential for injury to desired turf.

- ▶ In general, control of perennial grasses will require repeat herbicide applications.
- ▶ For optimum control of perennial grasses, make applications early before target weeds get well developed or when re-growth is young.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses -crabgrasses -goosegrass -other grasses POST	sethoxydim -VANTAGE 1EC	0.28 lb.	2.25	0.8 fl. oz.	Centipedegrass	-Use of this herbicide would be for spot treatment only. VANTAGE is selective for all grasses including turf. Requires precise application. -Can be used on established centipedegrass (see label for directions). -In new plantings, do not apply until centipedegrass has 3 in. of new stolon growth. -In established centipedegrass, do not apply until at least 3 weeks after spring green up. -Do not mow for 7 days before or after application. -Do not apply to turfgrasses other than centipedegrass (Other turf spot treat only). -Does not control dallisgrass, annual bluegrass or sedges. -Does not require addition of spray-solution additives (e.g., crop oil concentrate).

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses -crabgrasses -goosegrass -other grasses POST	quinclorac -DRIVE 75 DF	0.75 lb.	1 lb.	0.37 oz.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Zoysiagrass	-Provides early POST control of crabgrasses but weak on goosegrass and dallisgrass. Requires tank-mix partner for PRE goosegrass control and extended PRE crabgrass control (see weed susceptibility). -DRIVE will not interfere with seeding re-seeding or over-seeding. Make application before turf seedlings emerge. -Do not apply to fine fescue unless part of a blend. -May cause temporary discoloration of fine fescues, hybrid bermudagrass and creeping bentgrass. -May be applied before or after sprigging bermudagrass or Zoysiagrass. -Do not apply to centipede grass. -Do not use on golf course greens or collars. -Do not mow for 2 days before or after application. -Requires the addition of a crop oil concentrate. Use highly refined oil to minimize potential for injury (refer to supplier). Add at 0.73 fl. oz. per 1,000 sq. ft. -Avoid drift to non-target vegetation (especially tomatoes).
	fenoxaprop -ACCLAIM EXTRA 0.57 EC	0.06 to 0.17 lb.	13 to 39 fl. oz.	0.3 to 0.9 fl. oz.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue Zoysiagrass	-Safe to apply to well-established turfgrasses listed. -Do not apply to bermudagrass. -Can be used on bentgrass (see specific directions in product label). -Can be applied to newly plugged <i>Zoysia</i> . -Does not control dallisgrass. -Does not control broadleaf weeds or sedges. -Controls emerged annual grasses.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses -crabgrass -goosegrass -broadleaf weeds POST	metribuzin -SENCOR 75 DF	0.25 to 0.50 lb.	0.33 to 0.67 lb.	0.12 to 0.24 oz.	Bermudagrass	-RESTRICTED USE PESTICIDE, with use restricted to certified applicators or individuals working under their direct supervision. -For use on bermudagrass maintained mowing height of ½ inch or greater. -To dormant bermudagrass use at high rate for broadleaf weed and annual bluegrass control. To non-dormant bermudagrass use at low rate with MSMA for control of emerged crabgrass and goosegrass. -Do not apply to greens or tees. -Not for use in sod production.
Grasses -goosegrass POST	diclofop-methyl -ILLOXAN 3 EC	0.75 to 1 lb.	33 to 43 fl. oz.	0.75 to 1 fl. oz.	Bermudagrass	-For use on golf courses only. Provides POST control of goosegrass in bermudagrass greens, tees, fairways and closely mowed rough areas. -RESTRICTED USE PESTICIDE, with use restricted to certified applicators or individuals working under their direct supervision. -Apply only to well-established bermudagrass. -Do not re-seed for at least 2 months after application. -Thorough spray coverage is essential. Apply in 30 to 60 gallons of water carrier. -Product is most effective on goosegrass under close mowing. Activity is less in higher mowed areas (e.g. rough areas). -Use low rate when goosegrass has 1 to 3 leaves. -Use high rate when goosegrass has 4 leaves or more. -Add non-ionic surfactant (0.25% volume/ volume).

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses -dallisgrass and -crabgrasses -goosegrass -other grasses POST	MSMA -VARIOUS -MSMA 6 L -BUENO 6 L -MSMA TURF 6 L	2 to 3 lb.	See label	See label	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Zoysiagrass	-May result in injury when applied to bentgrass (see product label of use precautions). -Injury to well-established cool-season grasses listed can be severe. -Well established <i>Zoysia</i> is slightly sensitive. - Injury will be temporary when properly applied. -To cool-season grasses, apply at 1 fl. oz. per 1,000 sq. ft. To warm-season grasses, apply up to 2 fl. oz. per 1,000 sq. ft. Do not add surfactant. -Apply at air temperature from 80 to 90 F. -Rainfall or irrigation within 24 hours will decrease effectiveness. -For dallisgrass, may require repeat applications at 7 to 21 day intervals. -Do not re-seed for at least 2 weeks after last application. -In addition to grasses, is also active on broadleaf weeds and sedges. -Control of sedges will require repeat applications (refer to Sedges: POST Herbicide Options table and actual product label) .
Grasses -dallisgrass and -crabgrasses -goosegrass -other grasses POST	MSMA -VARIOUS -MSMA 6 L -BUENO 6 L -MSMA TURF 6 L plus metribuzin -SENCOR 75 DF	1.5 to 2 lb. Plus 0.125 to 0.25 lb.	1.9 to 2.5 pt. 0.17 to 0.33 lb.	0.75 to 1 fl. oz. 0.06 to 0.12 oz.	Bermudagras	-Provides improved grass control including goosegrass and dallisgrass compared to MSMA alone. -Apply only to bermudagrass. -See previous comments on metribuzin alone.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Grasses -dallisgrass and -crabgrasses -goosegrass -other grasses POST	MSMA plus 2,4-D, MCP, P, dicamba -VARIOUS -TRIMEC PLUS	1.8 Plus 0.48 0.48 0.12	1 to 1.67 gal.	3 to 5 fl. oz.	Ky. Bluegrass Tall Fescue Bermudagrass Zoysiagrass	-Combination provides improved activity towards grass weeds including goosegrass and dallisgrass compared to MSMA alone. For dallisgrass, may require repeat application 14 days later. In addition, combination provides activity towards broadleaf weeds. -To established tall fescue and/or Kentucky bluegrass apply only 3 fl. oz. per 1,000 sq. ft. -To tall fescue and/or Kentucky bluegrass, do not apply if air temperature exceeds 80 F. -To established bermudagrass or <i>Zoysia</i> , apply 3 to 5 fl. oz. per 1,000 sq. ft. -Do not apply to bermudagrass or <i>Zoysia</i> when air temperature exceeds 90 F.
Common bermudagrass (suppression) POST	fluazifop -FUSILADE II T/O	0.03 to 0.09 lb.	2 to 6 fl. oz.	0.05 to 0.14 fl. oz.	Tall Fescue Zoysiagrass	-Requires precise application. -Requires addition of non-ionic surfactant (0.25 to 0.5% volume/ volume or ½ to 1 pt. per 25 gallons). -For tall fescue, apply 0.11 to 0.14 oz. per 1,000 sq. ft. when common bermudagrass is breaking dormancy. Apply again in fall just prior to bermudagrass dormancy. ----- -For Zoysiagrass, apply 0.07 to 0.09 oz. product per 1,000 sq. ft. in late spring and repeat every 3 to 4 weeks. In late summer, reduce rate to 0.04 to 0.07 oz. product per 1,000 sq. ft.
Common bermudagrass (suppression) POST	fenoxaprop -ACCLAIM EXTRA 0.57 EC	0.09 lb.	20 fl. oz.	0.46 fl. oz.	Ky. Bluegrass Fine Fescue Tall Fescue Zoysiagrass	-Requires precise application. -Initial application in spring when common bermudagrass is breaking dormancy. Repeat application every 28 to 35 weeks (dependent on re-growth).

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
-Goosegrass -Centipedegrass and dallisgrass suppression	foramsulfuron -REVOLVER 0.19 SC (0.19 lb ai/gal)	0.013 to 0.038 lb.	8.8 to 26.2 fl oz.	0.1 to 0.6 fl oz.	Bermudagrass Zoysiagrass	-For professional use on golf courses, athletic fields, sod farms, residential, and non-residential turf. -Care should be taken when herbicide could move with surface water on to non-target susceptible species, such as bentgrass or perennial ryegrass. -Tracking of applied herbicide on to non-target species by maintenance equipment or human traffic should also be considered. It is recommended that light frequent irrigations be used to wash the herbicide from the leaf surface and into the soil profile 4 to 6 hours after application. -Apply as foliar spray along with a non-ionic surfactant at 0.25 to 0.50 % volume/ volume (or 1 to 2 pts. per 100 gallons of water carrier). -Repeat applications 4 to 6 weeks later may be necessary for complete control of difficult to control species. - For use on Common, Tifway 419, Tifgreen 328, Tifsport, Tifdwarf, Vamont bermudagrass, and Meyer zoysiagrass. Other bermudagrass and zoysiagrass varieties are most likely tolerant, but a small area should be treated to evaluate sensitivity before large scale applications are made.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Bahiagrass, foxtails, ryegrasses.	metsulfuron -Blade (60%w/w) -Manor (60%w/w)	0.08 to 0.60 oz.	0.125 to 1.0 oz.	0.08 to 0.65 g	Ky Bluegrass Fine fescue Bermudagrass Centipede Zoysiagrass	-For broadleaf weed control in certain turfgrasses. -Use lower rates for Ky bluegras, fine fescue, and centipedegrass. -Care should be taken when herbicide could move with surface water on to non-target susceptible species, such as bentgrass or perennial ryegrass. Tracking of applied herbicide on to non-target species by maintenance equipment or human traffic should also be considered. It is recommended that light frequent irrigations be used to wash the herbicide from the leaf surface and into the soil profile 4 to 6 hours after application. -Can be used for overseeding removal of perennial ryegrass. -Also controls several broadleaf species.
Broadleaf signalgrass, bahiagrass, dallisgrass and crabgrass suppression	trifloxysulfuron -MONUMENT 75WG	0.25 to 0.42 oz.	0.33 to 0.56 oz.	0.21 to 0.36 g	Bermudagrass Zoysiagrass	-For professional application on golf courses, sod farms, and other non-residential areas. -Apply as foliar spray along with a non-ionic surfactant at 0.25 to 0.50 % volume/ volume (or 1 to 2 pts. per 100 gallons of water carrier). -Repeat applications may be necessary for complete control of difficult to control weeds. -Care should be taken when herbicide could move with surface water on to non-target susceptible species, such as bentgrass or perennial ryegrass. -Tracking of applied herbicide on to non-target species by maintenance equipment or human traffic should also be considered. It is recommended that light frequent irrigations be used to wash the herbicide from the leaf surface and into the soil profile 4 to 6 hours after application.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient Per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Johnsongrass	sulfosulfuron -Certainty	0.75 to 2.0 oz.	0.56 to 1.5 oz	0.37 to 0.98 g	Bermudagrass Zoysiagrass St. Augustine Centipedegrass	-Apply 0.75 to 2.0 oz/a and a second application after re-growth occurs. Maximum yearly limit: 2.6 oz/a. Include 0.25% v/v surfactant. Can be utilized in native warm-season grass planting- see herbicide label for details.

SEDGES (e.g. Yellow Nutsedge): POST HERBICIDE OPTIONS

Overall Comments: The following table lists postemergence (POST) herbicide options for controlling sedges. Prior to choosing an option, the weed must first be identified as a sedge. Refer to weed identification section for visual aids. Sedges are often confused with grasses. Sedges have a uniquely triangular or three-sided stem and produce leaves present in groups of three. Grasses have a round or flat stem and produce leaf blades one at a time with the appearance of leaves in pairs. Within the sedges, annual and yellow nutsedge (most common) have a spear-like leaf tip. Purple nutsedge has a blunt- or boat-shaped leaf tip. Herbicide options for purple nutsedge are different than those for annual and yellow nutsedge. Choice of appropriate herbicide is dependent on proper identification (Note that in general herbicides for controlling grasses lack activity on sedges). Kyllinga is rare. Kyllinga is more difficult to identify (presence of seed head is helpful) but differs from other sedges by having finer-textured leaves and is low growing. Kyllinga can tolerate close mowing.

Sedges are vigorous perennials (with the exception of the less frequent annual sedge), making them difficult to control. Control of these weeds will require repeat applications.

- ▶ Target first application when sedges have three to six leaves.
- ▶ Make second or third applications when weeds have sufficient re-growth (three to six leaves or approximately 14 to 21 days after previous application).
- ▶ Infestations of these weeds are often localized. Application often can be a spot treatment or a broadcast treatment to a localized area and treatment of the entire turf may not be necessary.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-season Warm-season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Yellow nutsedge and annual sedge POST	bentazon -BASAGRAN T/O -LESCOGRAN	1 lb.	1 qt. 1 qt.	0.75 fl. oz. 0.75 fl. oz.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysiagrass	-Apply only to well-established grasses listed. -Do not apply to putting greens. -Does not control grass weeds. Will provide POST control of certain broadleaf weeds. -For optimum sedge control, do not mow within 3 to 5 days before or after application. -Do not apply if rain is anticipated within 48 hours. -Requires thorough coverage as activity is by foliar uptake. -Requires addition of crop oil concentrate at 0.75 fl. oz. per 1,000 sq. ft. -Make repeat application when sufficient re-growth occurs (approximately 10 to 21 days after initial application).
Purple nutsedge and Kyllinga (in addition to annual sedge and yellow nutsedge) POST	MSMA -VARIOUS -MSMA 6 L -BUENO 6 L -MSMA TURF 6 L	2 to 3 lb.	2.67 to 4.0 pt.	1 to 1.5 fl. oz.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Zoysiagrass	-Injury may result when applied to bentgrass (see product label for use precautions). -Injury to well-established cool-season grasses listed can be severe. -Well-established Zoysiagrass is slightly sensitive. Injury will be temporary when properly applied. -Bermudagrass is tolerant. -To cool-season grasses, apply only the lowest rate. -To warm-season grasses, apply up to 2 fl. oz. per 1,000 sq. ft. -Do not add surfactant. -Apply at air temperatures from 80 to 90 F. -Rainfall or irrigation within 24 hours will decrease effectiveness. -For optimum sedge control, make repeat application 14 to 21 days later (dependent on regrowth).

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-season Warm-season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
1Purple nutsedge and <i>Kyllinga</i> spp. (in addition to annual sedge and yellow nutsedge) POST	imazaquin -IMAGE 1.5 LC	0.25 to 0.50 lb.	1.3 to 2.7 pt.	0.5 to 1 fl. oz.	Bermudagrass Centipedegrass Zoysiagrass	-Apply only to well-established warm-season grasses listed. May cause temporary yellowing. -Do not apply during spring green up or fall transition to dormancy. -Do not apply to putting greens. -Do not apply to warm-season grasses over-seeded with perennial ryegrass. -Do not re-seed or over-seed for at least 45 days after application. -May be mixed with MSMA at 1.5 lb. (active) per acre for improved sedge control (refer to product label for turfgrass tolerance). -IMAGE 1.5 LC requires the addition of a non-ionic surfactant at 0.25% volume/ volume (or 2 pt. per 100 gallons water carrier). -Has activity towards wild garlic and other broadleaf weeds.
Purple nutsedge and <i>Kyllinga</i> spp. (in addition to annual sedge and yellow nutsedge) POST	halosulfuron -MANAGE 75 DF	0.031 to 0.062 lb.	0.67 to 1.33 oz.	0.015 to 0.03 oz.	Bentgrass Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysiagrass	-Apply only to well-established lawngrasses listed. -Do not apply to putting greens. -May require repeat application 6 to 10 weeks after the initial application. Do not make more than two applications per year. -Requires addition of nonionic surfactant at 0.25 to 0.50% volume/ volume (or 1 to 2 pts. per 100 gallons of water carrier). -For optimum control, do not mow within two days before or after application. -For spot treatment: mix 0.9 grams plus 1/3 fl. oz. of non-ionic surfactant to 1 gallon water carrier.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	Herbicide Rate			TURFGRASS TOLERANCE Cool-season Warm-season	USE DIRECTIONS AND PRECAUTIONS
		Active Ingredient per Acre	PRODUCT per Acre	PRODUCT per 1,000 sq. ft.		
Purple and Yellow nutsedge, <i>Kyllinga</i> spp., annual sedge, and various other non-tuberous sedges. POST	trifloxysulfuron -MONUMENT 75WG	0.25 to 0.42 oz	0.33 to 0.56 oz	0.008 to 0.013 oz	Bermudagrass Zoysiagrass	-For professional application on golf courses, sod farms, and other non-residential areas. -Apply as foliar spray along with a non-ionic surfactant at 0.25 to 0.50% volume/ volume (or 1 to 2 pts. per 100 gallons of water carrier). -Repeat applications may be necessary for complete control. -Care should be taken when herbicide could move with surface water on to non-target susceptible species, such as bentgrass or perennial ryegrass. -Tracking of applied herbicide on to non-target species by maintenance equipment or human traffic should also be considered. It is recommended that light, frequent irrigations be used to wash the herbicide from the leaf surface and into the soil profile 4 to 6 hours after application.
Purple and Yellow nutsedge, <i>Kyllinga</i> spp., annual sedge, and various other non-tuberous sedges. POST	sulfosulfuron -Certainty	0.75 to 2.0 oz.	0.56 to 1.5 oz	0.37 to 0.98 g	Bermudagrass Zoysiagrass St. Augustine Centipedegrass	-For professional application on the listed warm-season grasses. -Should not be applied in any areas where children can contact turf. -Apply as foliar spray along with a non-ionic surfactant at 0.25 to 0.50% volume/ volume (or 1 to 2 pts. per 100 gallons of water carrier). -Potential tracking and movement problems (see foramsulfuron).

TURFGRASS TOLERANCE TO HERBICIDES

Turfgrass Tolerance to Preemergence (PRE) Herbicides										
Herbicide (PRE)	Cool-season Turfgrass Tolerance						Warm-season Turfgrass Tolerance			
	Bent- grass	Bent- grass Golf Greens	Ky. Bluegrass	Tall Fescue	Fine Fescue	Perennial Ryegrass	Bermuda- grass	Bermuda- grass Golf Greens	Centipede- grass	Zoysia
atrazine	NR	NR	NR	NR	NR	NR	TD	NR	T	T
benefin	NR	NR	T	T	T	T	T	NR	T	T
benefin + oryzalin	NR	NR	NR	T	NR	NR	T	NR	T	T
benefin + trifluralin	NR	NR	T	T	S	T	T	NR	T	T
bensulide	T	T	T	T	T	T	T	T	T	T
dithiopyr	S*	S*	T	T	S*	T	T	T	T	T
ethofumesate	S	NR	S	S	S	T	TD	NR	NR	NR
fenarimol	NR	NR	NR	NR	NR	NR	T	T	NR	NR
isoxaben	T	NR	T	T	T	T	T	NR	T	T
metolachlor	NR	NR	NR	NR	NR	NR	T	NR	T	T
napropamide	NR	NR	NR	T	T	NR	T	NR	T	NR
oryzalin	NR	NR	NR	NR	NR	NR	T	NR	T	T
oxadiazon	S	NR	T	T	S	T	T	NR	NR	T
oxadiazon + bensulide	NR	NR	T	T	S	T	T	T	NR	T
oxidiazon + prodiamine	NR	NR	T	T	S	T	T	NR	NR	T
pendimethalin	NR	NR	T	T	T	T	T	T	T	T
prodiamine	NR	NR	T	T	T	T	T	NR	T	T
siduron	S	S	T	T	T	T	NR	NR	NR	T
simazine	NR	NR	NR	NR	NR	NR	T	NR	T	T
Key to Tolerance Codes; NR = Not Registered; T = tolerant; TD = Tolerant when dormant; S =Can be applied but with special use precautions; S* = dithiopyr cannot be applied to colonial bentgrass and red fescue.										

Turfgrass Tolerance to Postemergence (POST) Herbicides										
Herbicide (POST)	Cool-season Turfgrass Tolerance						Warm-season Turfgrass Tolerance			
	Bent- grass	Bent- grass Greens	Ky. Blue- grass	Tall Fescue	Fine Fescue	Perennial Ryegrass	Bermuda- grass	Bermuda- grass Greens	Centipede- grass	Zoysia
atrazine	NR	NR	NR	NR	NR	NR	TD	NR	T	T
bentazon	T	NR	T	T	T	T	T	NR	T	T
bentazon + atrazine	NR	NR	NR	NR	NR	NR	T	NR	T	T
carfentrazone	T	T	T	T	T	T	T	T	T	T
chlorsulfuron	T	NR	T	NR	T	NR	T	T	T	T
clopyralid + triclopyr	T	NR	T	T	T	T	T	NR	T	T
diclofop-methyl	NR	NR	NR	NR	NR	NR	T	T	NR	NR
diquat	NR	NR	NR	NR	NR	NR	TD	NR	NR	NR
ethofumesate	S	NR	S	S	NR	S	TD	NR	NR	NR
fluazifop	NR	NR	NR	S	NR	NR	NR	NR	NR	S
fluroxypyr	S	NR	T	T	T	T	S	NR	T	T
fenoxaprop	S	NR	T	T	T	T	NR	NR	NR	T
foramsulfuron	NR	NR	NR	NR	NR	NR	T	NR	NR	T
glyphosate	NR	NR	NR	NR	NR	NR	TD	NR	NR	NR
halosulfuron	T	NR	T	T	T	T	T	NR	T	T
imazaquin	NR	NR	NR	NR	NR	NR	S	NR	S	S
metribuzin	NR	NR	NR	NR	NR	NR	S	NR	NR	NR
metsulfuron	NR	NR	S	NR	S	NR	T	NR	T	T
pronamide	NR	NR	NR	NR	NR	NR	T	NR	NT	T
quinclorac	S	NR	T	T	S	T	T	NR	NR	T
rimsulfuron	NR	NR	NR	NR	NR	NR	T	NR	T	T
sethoxydim	NR	NR	NR	NR	S	NR	NR	NR	S	R
simazine	NR	NR	NR	NR	NR	NR	T	NR	T	T
sulfosulfuron	NR	NR	NR	NR	NR	NR	T	T	T	T
trifloxysulfuron	NR	NR	NR	NR	NR	NR	T	NR	NR	T
2,4-D	S	S	T	T	T	T	T	T	S	T
MCPP	T	T	T	T	T	T	T	T	T	T
dicamba	S	S	T	T	T	T	T	T	S	T
2,4-D + MCPP + dicamba	S	S	T	T	T	T	S	S	S	S
2,4-D + clopyralid + triclopyr	S	NR	T	T	T	T	S	NR	S	S
MSMA/DSMA	S	S	S	S	S	T	T	T	NR	S
MSMA + metribuzin	NR	NR	NR	NR	NR	NR	S	S	NR	NR
MSMA + 2,4-D + MCPP + dicamba	NR	NR	S	S	NR	NR	S	S	NR	S

WEED SUSCEPTIBILITY TO PRE HERBICIDES

KEY TO CONTROL CODES: E = Excellent (90 to 100%); G = Good (80 to 90%); F = Fair (70 to 80%); P = Poor (less than 70%); N = No Activity; - = Lack of information.

For a specific target weed(s) choose an appropriate herbicide that provides excellent (E) to good (G) control. Fair (F) to poor (P) control of additional weeds should be considered as added benefits in addition to control of specific target weeds. Ratings are based on optimum application timing and most susceptible stage of weed growth.

HERBICIDE CHOICE: This table is meant to assist in choosing the appropriate herbicide(s). This table is intended to complement the HERBICIDE APPLICATION CALENDARS and the HERBICIDE OPTIONS, USE, DIRECTIONS AND PRECAUTIONS.

WEED TYPE	atrazine	benefin	benefin + oryzalin	benefin + trifluralin	bensulide	dithiopyr	ethofumesate	fenarimol	isoxaben	metolachlor	napropamide	oryzalin	oxadiazon	oxadiazon + bensulide	oxadiazon + prodiamine	pendimethalin	prodiamine	siduron	simazine
GRASS WEEDS (arising from seed)																			
Common Bermudagrass	G	--	--	P	P	--	--	--	N	P	--	P	--	--	--	P	--	--	G
Bluegrass, annual	E	G	G	E	E	E	G	G	N	G	G	E	E	E	E	E	E	N	E
Crabgrass	F	G	E	E	E	E	G	--	N	G	E	E	E	E	E	E	G	G	G
Dallisgrass	P	P	G	F	F	E	N	--	N	G	--	F	--	--	G	F	G	--	P
Goosegrass	G	P	G	G	P	E	N	--	N	E	G	E	G	G	G	E	G	--	G
Jewgrass, annual	--	--	--	--	--	--	--	--	N	--	--	--	--	--	--	--	--	--	--
Nimblewill	--	--	--	--	--	--	--	--	N	--	--	--	--	--	--	--	--	--	--
Orchardgrass	G	--	--	G	--	G	G	--	N	--	G	G	--	--	G	G	G	G	G
Smutgrass	--	--	--	--	--	G	--	--	N	--	--	--	--	--	--	--	--	--	--
BROADLEAF WEEDS (arising from seed)																			
Bedstraw	G	--	--	--	F	--	--	--	G	--	--	--	G	G	G	--	--	N	G
Bittercress	G	--	G	--	F	G	--	--	G	--	--	G	G	G	G	P	--	N	G
Buttercup	G	--	N	--	--	--	--	--	G	--	--	--	--	--	--	--	--	N	G
Carolina geranium	G	--	N	--	--	G	--	--	G	G	G	G	--	--	G	--	G	N	G

WEED SUSCEPTIBILITY TO PRE HERBICIDES

KEY TO CONTROL CODES: E = Excellent (90 to 100%); G = Good (80 to 90%); F = Fair (70 to 80%); P = Poor (less than 70%); N = No Activity; - = Lack of information.

For a specific target weed(s) choose an appropriate herbicide that provides excellent (E) to good (G) control. Fair (F) to poor (P) control of additional weeds should be considered as added benefits in addition to control of specific target weeds. Ratings are based on optimum application timing and most susceptible stage of weed growth.

HERBICIDE CHOICE: This table is meant to assist in choosing the appropriate herbicide(s). This table is intended to complement the HERBICIDE APPLICATION CALENDARS and the HERBICIDE OPTIONS, USE, DIRECTIONS AND PRECAUTIONS.

WEED TYPE	atrazine	benefin	benefin + oryzalin	benefin + trifluralin	bensulide	dithiopyr	ethofumesate	fenarimol	isoxaben	metolachlor	napropamide	oryzalin	oxadiazon	oxadiazon + bensulide	oxadiazon + prodiamine	pendimethalin	prodiamine	siduron	simazine
Carpetweed	G	-	G	G	G	G	-	-	F	G	G	G	G	G	G	G	G	N	G
Chickweed, common	G	N	G	G	G	G	G	-	G	-	G	G	-	G	G	G	G	N	G
Chickweed, mouse-ear	G	N	P	-	G	G	P	-	G	-	P	P	-	G	G	G	G	N	G
Clover, hop	G	N	N	-	G	-	-	-	G	-	-	N	-	G	-	G	-	N	G
Clover, white	G	N	N	-	G	-	G	-	G	P	-	N	-	G	-	P	-	N	G
Dandelion	N	N	F	-	-	-	-	-	G	N	-	P	-	-	-	N	-	N	P
Deadnettle	G	N	G	G	G	-	-	-	G	P	-	G	-	G	-	G	-	N	G
Docks	P	N	N	-	G	-	-	-	F	N	-	N	-	G	-	N	-	N	P
Ground ivy	N	N	N	-	P	-	-	-	-	N	-	N	-	P	-	P	-	N	N
Henbit	G	N	E	G	G	G	-	-	G	-	G	G	-	G	G	G	G	N	G
Knawel	G	N	N	-	-	-	-	-	-	-	G	N	-	-	-	-	-	N	G
Knotweed	E	N	G	G	-	P	-	-	G	-	F	G	-	-	-	G	G	N	G
Lespedeza	E	N	N	-	-	G	-	-	-	P	-	N	-	-	-	P	-	N	E
Mugwort	-	N	N	N	N	N	-	-	N	-	N	N	-	N	-	N	-	N	-
Mustards	G	-	N	-	-	G	-	-	G	P	F	F	G	-	-	G	-	N	G

WEED SUSCEPTIBILITY TO PRE HERBICIDES

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Pennycress	G	-	-	-	-	-	-	-	G	-	F	-	G	-	-	G	-	N	G
Pepperweed	G	-	G	-	-	-	-	-	G	-	G	G	G	-	-	G	-	N	G
Plantain	G	-	P	-	-	P	-	-	G	G	P	G	-	-	-	P	-	N	P
Purslane	G	-	G	G	F	G	-	-	G	G	G	G	-	F	F	G	G	N	G
Red sorrel	P	-	-	-	-	-	-	-	G	-	P	N	-	-	-	-	-	N	P
Shepherdspurse	G	-	G	-	G	G	-	-	G	-	G	G	G	G	G	G	G	N	G
Speedwell	G	-	N	-	-	G	-	-	G	-	P	N	-	-	-	G	G	N	G
Spurge, prostrate	G	-	G	-	-	G	-	-	G	F	P	G	-	-	-	G	G	N	G
Virginia buttonweed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wild carrot	G	-	G	-	-	-	-	-	G	-	P	P	-	-	-	G	-	N	G
Wild garlic	N	-	-	-	-	-	-	-	-	-	N	N	-	-	-	N	-	N	N
Wild strawberry	N	-	-	-	-	-	-	-	-	-	-	N	-	-	-	-	-	N	N
Wild violet	P	-	-	-	-	-	-	-	-	-	-	N	-	-	-	-	-	N	P
Yarrow	G	-	-	-	-	-	-	-	-	-	P	N	-	-	-	G	G	N	G
Yellow woodsorrel (oxalis)	G	-	G	-	G	G	-	-	G	P	P	G	-	-	-	G	G	N	G

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SEDGES (emerged)																			
Annual sedge	N	N	N	N	N	N	F	N	N	G	N	N	G	G	G	N	N	N	N
Yellow nutsedge	N	N	N	N	N	N	P	N	N	G	N	N	N	N	N	N	N	N	N
Purple nutsedge	N	N	N	N	N	N	P	N	N	N	N	N	N	N	N	N	N	N	N
Kyllinga	N	N	N	N	N	N	P	N	N	N	N	N	N	N	N	N	N	N	N

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GRASS WEEDS																	
Common Bermudagrass	N	N	N	N	N	N	P	--	--	N	N	N	N	N	N	N	N
Bluegrass, annual	N	N	N	N	N	N	P	--	--	N	N	E	E	F	E	E	E
Crabgrass	N	N	N	N	N	N	G	G	G	N	N	N	--	N	N	F	F
Dallisgrass	N	N	N	N	N	N	G	G	G	N	N	N	F/G	N	N	F	F
Goosegrass	N	N	N	N	N	N	F	G	G	N	N	N	G/E	N	N	--	--
Jewgrass, annual	N	N	N	N	N	N	G	--	--	N	N	N	--	N	N	--	--
Nimblewill	N	N	N	N	N	N	--	--	--	N	N	N	--	N	N	--	--
Orchardgrass	N	N	N	N	N	N	--	--	--	N	N	N	--	N	--	--	--
Smutgrass	N	N	N	N	N	N	--	--	--	N	N	N	--	N	N	--	--
BROADLEAF WEEDS																	
Bedstraw	F	P	G	G	G	G	P	G	G	E	G	--	--	--	--	G	G
Bittercress	G	P	G	G	G	G	F	G	G	--	--	G	--	--	--	--	G
Buttercup	G	P	F	G	G	G	P	G	G	--	--	G	--	E	--	--	G
Carolina geranium	P	P	G	G	G	G	P	G	G	--	--	G	--	--	--	--	--

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Carpetweed	G	P	G	G	G	G	F	F	G	-	G	-	-	-	-	-	E
Chickweed, common	G	P	G	G	F	G	G	G	G	G	-	G	-	E	G	E	G/E
Chickweed, mouse-ear	P	G	E	G	F	G	P	G	G	G	-	-	-	E	-	-	-
Clover, hop	P	G	G	G	E	E	P	P	G	G	-	-	F	G	-	E	E
Clover, white	P	G	G	G	E	E	P	P	G	G	G	G	F	G	-	E	E
Dandelion	G	G	E	E	E	E	P	P	E	G	-	G	-	-	-	-	E
Deadnettle	F	P	E	E	E	E	P	G	E	E	-	G	-	G	G	E	E
Docks	G	P	G	E	E	E	P	-	E	-	-	G	-	G	-	-	-
Ground ivy	P	F	G	E	G	G	P	-	E	G	-	G	-	-	-	-	E
Henbit	P	G	G	E	E	E	F	G	E	G	-	G	E	E	G	-	E
Knawel	F	P	G	G	E	E	P	-	G	-	-	-	-	-	-	-	-
Knotweed	P	E	G	G	E	E	F	-	G	G	-	G	-	G	-	-	-
Lespedeza	P	P	G	G	E	E	P	P	G	-	-	G	-	-	-	-	-
Mugwort	N	N	P	G	G	G	P	-	G	-	-	-	-	-	-	-	-
Mustards	G	G	G	E	G	G	F	-	E	-	-	-	-	E	-	-	-

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Pennycress	G	G	G	E	G	G	P	-	E	-	G	G	-	E	-	-	-
Pepperweed	G	G	G	E	G	G	P	-	E	-	-	-	-	-	-	-	-
Plantain	G	G	G	E	E	E	P	-	E	G	-	-	-	-	-	-	-
Purslane	G	G	G	E	G	G	P	-	E	E	G	G	-	E	-	-	-
Red sorrel	P	P	G	F	E	E	P	-	F	-	-	-	-	-	-	-	-
Shepherd's purse	G	G	G	E	-	-	P	G	E	-	-	-	-	E	G	-	-
Speedwell	P	P	G	G	P	P	P	-	G	F	-	-	-	E	-	-	-
Spurge, prostrate	P	P	G	E	G	G	F	-	E	-	E	G	-	E	-	-	-
Virginia buttonweed	P	P	G	E	E	E	N	P	E	F	-	F	-	F	-	-	F
Wild carrot	P	P	F	E	-	-	P	G	E	-	-	-	-	G	G	-	-
Wild garlic	G	P	G	G	-	-	P	-	G	-	-	-	-	F	-	-	G/E
Wild strawberry	P	-	G	E	E	E	P	-	E	-	-	-	-	-	-	-	-
Wild violet	P	-	G	G	G	E	P	-	E	-	-	-	-	F	-	-	-
Yarrow	P	-	G	E	G	G	P	-	E	-	-	-	-	-	-	-	-
Yellow woodsorrel (oxalis)	P	-	G	E	F	F	G	-	E	-	-	G	-	-	-	-	-

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2SEDGES																	
Annual Sedge	N	N	N	N	N	N	F	F	F	N	N	N	N	N	F	E	E
Yellow nutsedge	N	N	N	N	N	N	F	F	F	N	N	N	N	N	F	E	E
Purple nutsedge	N	N	N	N	N	N	F	F	F	N	N	N	N	N	F	E	E
<i>Kyllinga</i> spp.	N	N	N	N	N	N	F	F	F	N	N	N	N	N	F	E	E

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WEED TYPE	atrazine	bentazon	bentazon + atrazine	diclofop-methyl	diquat	ethofumesate	fluzifop	fenoxaprop	glyphosate	halosulfuron	imazaquin	metribuzin	pronamide	quinclorac	sethoxydim	simazine
GRASS WEEDS																
Common Bermudagrass	F	N	--	N	P	F	G	G	G	N	N	P	N	N	G	N
Bluegrass, annual	E	N	E	P	G	G	G	G	G	N	F	G	E	P	P	G
Crabgrass	P	N	F	P	G	G	G	G	G	N	F	G	F	E	G	P
Dallisgrass	P	N	P	P	P	N	F	F	G	N	P	F	F	P	G	P
Goosegrass	G	N	P	G	G	N	G	G	G	N	P	G	F	P	G	P
Jewgrass, annual	--	N	--	--	--	--	G	G	G	--	--	--	--	--	G	--
Nimblewill	N	N	--	--	--	--	--	--	G	N	--	--	--	P	G	N
Orchardgrass	P	N	--	--	--	G	G	G	G	N	--	--	--	P	G	P
Smutgrass	--	N	F	--	--	--	--	--	F	--	--	F	--	P	G	--
BROADLEAF WEEDS																
Bedstraw	G	P	G	--	G	--	N	N	G	--	--	G	--	--	N	F
Bittercress	E	F	G	--	G	--	N	N	G	--	G	G	--	--	N	G
Buttercup	P	P	G	--	G	--	N	N	G	--	G	G	--	--	N	N
Carolina geranium	G	P	G	--	G	--	N	N	P	--	G	G	--	--	N	G

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Carpetweed	G	P	G	-	G	-	N	N	G	-	-	N	-	-	N	F
Chickweed, common	G	F	G	-	E	G	N	N	G	P	G	G	G	-	N	G
Chickweed, mouse-ear	G	P	G	-	E	P	N	N	G	-	G	G	G	-	N	G
Clover, hop	F	P	G	-	P	-	N	N	F	-	G	P	-	-	N	F
Clover, white	F	P	G	-	P	G	N	N	F	-	G	P	-	-	N	F
Dandelion	N	P	P	-	P	-	N	N	G	-	F	N	-	-	N	N
Deadnettle	E	P	G	-	G	-	N	N	G	-	G	G	-	-	N	F
Docks	N	P	-	-	P	-	N	N	G	-	-	-	-	-	N	N
Ground ivy	F	P	P	-	P	-	N	N	G	-	-	-	-	-	N	P
Henbit	E	P	P	-	G	-	N	N	G	-	G	G	-	-	N	F
Knawel	G	P	-	-	G	-	N	N	G	-	G	-	-	-	N	G
Knotweed	G	P	-	-	G	-	N	N	G	-	-	-	-	-	N	G
Lespedeza	E	P	-	-	P	-	N	N	G	-	-	P	-	-	N	G
Mugwort	-	P	-	-	P	-	N	N	F	-	-	-	-	-	N	-
Mustards	G	G	G	-	G	-	N	N	G	-	-	-	G	-	N	G

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Pennycress	G	F	F	-	G	-	N	N	G	-	-	-	G	-	N	G
Pepperweed	G	F	F	-	G	-	N	N	G	-	-	-	G	-	N	G
Plantain	F	P	P	-	P	-	N	N	G	-	-	-	-	-	N	F
Purslane	G	G	G	-	G	-	N	N	G	G	-	-	-	-	N	F
Red sorrel	F	P	-	-	G	-	N	N	G	-	G	-	-	-	N	F
Shepherdspurse	E	G	G	-	G	-	N	N	G	-	-	G	G	-	N	G
Speedwell	E	F	G	-	G	-	N	N	G	-	-	-	-	-	N	E
Spurge, prostrate	E	-	-	-	G	-	N	N	G	-	-	-	-	-	N	G
Virginia buttonweed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wild carrot	E	-	G	-	P	-	N	N	G	F	-	G	-	-	N	G
Wild garlic	N	P	N	-	P	-	N	N	P	-	G	-	-	-	N	N
Wild strawberry	N	P	-	-	P	-	N	N	G	-	-	-	-	-	N	N
Wild violet	F	P	-	-	P	-	N	N	G	-	G	-	-	-	N	N
Yarrow	E	P	G	-	G	-	N	N	G	-	-	G	-	-	N	G
Yellow woodsorrel (oxalis)	E	P	G	-	G	-	N	N	F	F	-	-	-	-	N	G

WEED SUSCEPTIBILITY TO POST HERBICIDES

KEY TO CONTROL CODES: E = Excellent (90 to 100%); G = Good (80 to 90%); F = Fair (70 to 80%); P = Poor (less than 70%); N = No Activity; - = Lack of information.

For a specific target weed(s) choose an appropriate herbicide that provides excellent (E) to good (G) control. Fair (F) to poor (P) control of additional weeds should be considered as added benefits in addition to control of specific target weeds. Ratings are based on optimum application timing and most susceptible stage of weed growth.

HERBICIDE CHOICE: This table is meant to assist in choosing the appropriate herbicide(s). This table is intended to complement the HERBICIDE APPLICATION CALENDARS and the HERBICIDE OPTIONS, USE, DIRECTIONS AND PRECAUTIONS.

WEED TYPE	atrazine	bentazon	bentazon + atrazine	diclofop-methyl	diquat	ethofumesate	fluzifop	fenoxaprop	glyphosate	halosulfuron	imazaquin	metribuzin	pronamide	quinclorac	sethoxydim	simazine
SEDGES																
Annual sedge	N	G	G	N	P	F	N	N	G	E	G	P	N	N	N	N
Yellow nutsedge	N	G	G	N	P	P	N	N	G	E	G	P	N	N	N	N
Purple nutsedge	N	N	P	N	P	P	N	N	F	E	G	N	N	N	N	N
Kyllinga	N	N	P	N	P	P	N	N	F	G	G	N	N	N	N	N

a U.T. Extension Reminder...

Common Weights and Measures

Length

Inch = 1/12 or 0.083 foot = 2.54 centimeters = 25.4 millimeters

Foot = 12 inches = 0.3048 meters = 30.48 centimeters

Yard = 36 inches = 3 feet = 0.9144 meters

Rod = 16.5 feet = 5.5 yards = 5.03 meters

Furlong = 220 yards

Mile = 1,760 yards = 5,280 feet = 1.61 kilometers = 8 furlongs = 80 chains

Liquid Measures

Teaspoon = 0.1667 fluid ounce = 80 drops = 4.93 milliliters

Tablespoon = 3 teaspoons = 0.5 fluid ounce = 14.8 milliliters

Fluid ounce = 2 tablespoons = 29.58 milliliters

Cup = 8 fluid ounces = 16 tablespoons = 236.6 milliliters

Pint = 2 cups = 16 fluid ounces = 473.2 milliliters

Quart = 4 cups = 2 pints = 32 fluid ounces = 0.946 liters

Liter = 2.113 pints = 1,000 milliliters = 1.057 quarts

Gallon = 4 quarts = 8 pints = 128 fluid ounces = 3.785 liters

Cubic foot of water = 7.5 gallons = 62.4 pounds = 28.3 liters

Acre inch of water = 27,154 gallons = 3,630 cubic feet

Dry Measures

Teaspoon (level) = 0.35 cubic inch = 5.74 cubic centimeters

Tablespoon (level) = 1.05 cubic inch = 3 level teaspoons = 17.21 cubic centimeters

Cup = 16 level tablespoons = 16.8 cubic inches = 275.3 cubic centimeters

Pint = 2 cups = 32 level tablespoons = 33.6 cubic inches = 550.6 cubic centimeters

Quart = 2 pints = 64 tablespoons = 67.2 cubic inches = 1.101 liters

Peck = 8 quarts = 16 pints = 538 cubic inches = 8.8 liters

Bushel = 4 pecks = 2,150 cubic inches = 32 quarts = 35 liters

Volumes

Cubic inch = 0.00058 cubic foot = 16.4 cubic centimeters

Cubic foot = 1,728 cubic inches = 0.037 cubic yard = 0.028 cubic meter

Cubic yard = 27 cubic feet = 0.765 cubic meters

Weights

Gram = 15.43 grains = 1,000 milligrams

Ounce = 28.35 grams = 437.5 grains

Pound = 16 ounces = 7,000 grains = 454 grams

Kilogram = 1,000 grams = 2.205 pounds

Ton (short) = 2,000 pounds = 0.907 metric tons

Ton (long) = 2,240 pounds = 1.016 metric tons

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