University of Tennessee, Knoxville
Trace: Tennessee Research and Creative Exchange

Home Garden, Lawn, and Landscape | UT Extension Publications

April 2010

PB956 Managing Lawn Weeds

Follow this and additional works at: http://trace.tennessee.edu/utk_agexgard

Recommended Citation
"PB956 Managing Lawn Weeds," , , http://trace.tennessee.edu/utk_agexgard/86

The publications in this collection represent the historical publishing record of the UT Agricultural Experiment Station and do not necessarily reflect current scientific knowledge or recommendations. Current information about UT Ag Research can be found at the UT Ag Research website.
This Lawn Management - Insects, Weeds and Diseases is brought to you for free and open access by the UT Extension Publications at Trace: Tennessee Research and Creative Exchange. It has been accepted for inclusion in Home Garden, Lawn, and Landscape by an authorized administrator of Trace: Tennessee Research and Creative Exchange. For more information, please contact trace@utk.edu.

Agricultural Extension Service
The University of Tennessee
PB956

Managing Lawn Weeds:
A Guide for Tennessee Homeowners

Lawns and Weed Management (PB956)

Acknowledgments of Contributors

Although only the primary authors of this manual are listed, several key individuals contributed to the creation and completion of this manual that we trust you will find very useful. The authors wish to express sincere gratitude for the efforts provided by the following individuals:

Lois Stinnett (Senior Secretary, Plant and Soil Science), for her patience and expertise in developing and formatting the text and tables for the manuscript.

Elmer Ashburn, Mark Halcomb, Tom Mueller, Neil Rhodes and Wanda Russell (Leader, Plant and Soil Science Extension, Area Horticulture Extension Agent, Plant and Soil Science Research and Teaching, Specialist with Plant and Soil Science Extension and Editor with Agricultural Extension Communications) for their time and expertise in review and insightful suggestions for improving of the manuscript.

Gary Dagnan, (Communication Specialist with Agricultural Extension Communications) for his patience, expertise and especially for his individual creativity in formatting the manuscript into its present form.

Arlyn W. Evans (Professional Photographer) for supporting the Agricultural Extension Service by allowing the use of the noted pictures in the weed identification section.

Jimmy R. Summerlin (Research Associate with Plant and Soil Science Research and Teaching) for providing noted additional pictures for the weed identification section.

Managing Lawn Weeds: A Guide For Tennessee Homeowners

Darren K. Robinson, Assistant Professor
Plant and Soil Science

Tom Samples, Professor
Ornamental Horticulture and Landscape Design

Managing Lawn Weeds: A Guide for Tennessee Homeowners is provided by The University of Tennessee Agricultural Extension Service to assist residents of Tennessee with managing weeds in their home lawns. This manual provides information on cultural methods to minimize weed problems, in addition to the use of herbicides. Thus, this manual and the recommendations herein are intended to assist homeowners in developing cultural and/or herbicidal control programs for weeds. For specific herbicide recommendations, this manual is meant as a reference and is not intended to replace the actual herbicide product labels. Be sure to read, understand and follow the actual herbicide product label directions.

The use of example brand or trade names in this publication is intended to aid in clarity of information. It does not imply approval of the product to the exclusion of others which may be of similar or suitable composition. It does not guarantee or warrant the standard of the product. Should the registration of a herbicide be later canceled prior to revision of this manual, it would no longer be recommended by The University of Tennessee.

Contents

INTRODUCTION **7**
Publication Purpose **7**
Weeds in Your Lawn, and Why **7**
An Herbicide is Not a Quick Fix **7**
What Are Your Expectations for Your Lawn? **7**
Considering Professional Lawn Care Service **7**

LAWN CARE FOR OPTIMUM APPEARANCE AND MINIMIZING WEEDS **8**
Introduction **8**
Lawn Care Tips **8**
Mowing **8**
Fertility and Liming 9
Need for Additional Water 9
Remove Fallen Leaves 9
Selecting Lawngrasses for Open Areas 10
Selecting Lawngrasses for Shade Areas 10

DEVELOPING WEED-MANAGEMENT STRATEGIES **10**
Assessing Weed Problems 10
Control Strategies 11

WEED TYPES AND LIFE CYCLES **11**
Types 11
Broadleaf Weeds 11
Grass Weeds 12
Sedges 12
Life Cycles 12
Summer Annuals 12
Winter Annuals 12
Perennials 12

WEED IDENTIFICATION **13**
Broadleaf Weeds 13
Summer Annuals 13
Winter Annuals 13
Perennials 14

Grass Weeds 14
Summer Annuals 14
Winter Annuals 15
Perennials 15
Sedges 15
Summer Annuals 15
Perennials 15
Other Yard Weeds....15

HERBICIDE APPLICATION....16
Herbicide Types....16
Preemergence 16
Postemergence....16
Herbicide Formulations and Application Equipment....16
Equipment Calibration 17
Conversion Table for Calibration 18

HERBICIDE APPLICATION CALENDAR 19

HERBICIDE OPTIONS FOR CONTROLLING LAWN WEEDS 20
Summer (e.g. Crabgrass and Goosegrass) and Winter Annual Grasses: PRE Herbicide Options 20
Established Perennial (e.g. Dallisgrass) and Annual Grasses: POST Herbicide Options 25
Broadleaf Weeds (Annuals and Perennials): PRE and POST Herbicide Options....28
Sedges (e.g Yellow Nutsedge): POST Herbicide Options 32
Weed Susceptibility to Herbicides 34
Broadleaf Weed Susceptibility to PRE Herbicides....34
Grass and Sedge Weed Susceptibility to PRE Herbicides....37
Weed Susceptibility to POST Herbicides....38

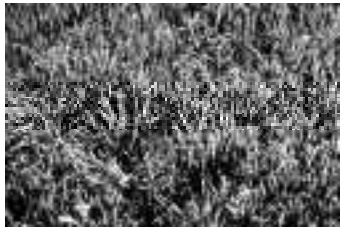
ALGAE AND MOSS: HERBICIDE OPTIONS 42

HONEYSUCKLE, SUMAC, KUDZU and POISON IVY: HERBICIDE OPTIONS 43

LANDSCAPE EDGING: HERBICIDE OPTIONS 45

INTRODUCTION

Publication Purpose



The purpose of this publication is to explain why you have weeds in your lawn, and to provide you with the information on how to, and encourage you to, adopt a total lawn care approach (in addition to herbicides). This complete approach will help you achieve a pleasing lawn with minimal weeds.

Weeds in Your Lawn, and Why

"What do I do about the weeds in my lawn? Is there something I can spray?" These are common questions asked by homeowners each year. A better question would be, "Why do I have weeds in my lawn?" Weeds invade your lawn because at some point there is room or space (along with other growth requirements) available for them to grow. Healthy lawngrasses compete against weeds by forming a closed canopy that limits light and space for weeds to germinate and establish. Thus, the number of weeds present can be an indicator of the competitive health of your lawn.

An Herbicide Is Not a Quick Fix

"Is there something I can spray?" A better question may be, do you really want to remove the weeds in your lawn? With weeds present, at least your lawn is green. An herbicide can be used to remove weeds by making conditions unfavorable. However, unless you put effort into having this available space covered by competitive lawngrass, you will have bare patches. If conditions do not favor lawngrass growth, weeds will often be the first to return. Thus, to reduce weeds in your lawn, you have to put some effort into providing an environment that favors the growth of your lawngrass vs. weeds. An herbicide application is not a quick fix. Herbicides only aid in this plant selection process.

What Are Your Expectations for Your Lawn?

Balance your expectations (or desired level of appearance) with the time, effort and money you have available or are willing to devote to achieving this desired level. Your effort level may depend on your enjoyment for yard work and how much free time you have available. Many people love to relax by beautifying their lawn and landscape. Others may not enjoy yard work or, more commonly, have limited free time. Generally there are three levels of lawn maintenance: high (immaculate lawn, requiring significant inputs of time, expertise and money); medium (pleasing lawn, requiring moderate inputs of time, expertise and money); and low (satisfactory lawn, requiring low inputs of time, expertise and money). Depending on your desired level of lawn quality and available time, you may consider employing a professional lawn care service.

Considering Professional Lawn Care Service

A professional lawn care service may help you obtain the lawn quality you desire. Certain lawn maintenance practices require expertise or specialized knowledge on product choice, application equipment and timing.

When hiring a lawn care professional, consider the level of assistance you require. Additional considerations include:

- **Reputation** — check with friends and neighbors and ask for references.
- **License and certification** — Tennessee requires lawn care professionals to hold a pesticide applicator's license, liability insurance and charter number.
- **Membership in professional organizations** — such as the Tennessee Turfgrass Association or the Professional Lawn Care Applicators Association, which promote professionalism and education on best management methods.
- **Customized services** — or willingness to customize management techniques to fit your needs and schedule.
- **Willingness to share expertise** — a professional who explains cultural practices, so you can be assured services suit your needs and desire to learn.
- **Cost**

LAWN CARE FOR OPTIMUM APPEARANCE AND MINIMIZING WEEDS

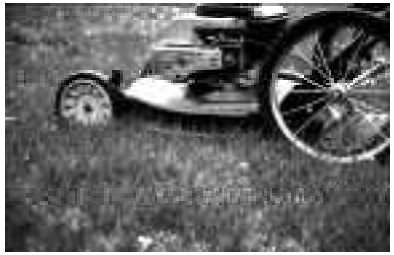
Introduction

Ideally, you probably want a great-looking lawn with minimal weeds without using up a lot of your free time. Minor additions and/or adjustments in your current lawn care program may go far toward improving the quality of your lawn and minimizing the weeds. The following section provides general suggestions for minor adjustments in how to care for your lawn to optimize quality and minimize weeds. Most anyone with a strong interest, a willingness to learn and the necessary time is capable of using Extension information/ publications to achieve a nice lawn. If you are interested in more information, several excellent references are available at your local county Extension office. Examples of these include, PB1576, *Lawn Care: Selecting, Establishing and Maintaining the Fescues* and PB 1632, *Establishing and Maintaining a Bermudagrass Lawn in Tennessee.*

Lawn Care Tips

Mowing

Most of your lawn care time is spent mowing. How and when you mow your lawn can have a great impact on weed growth. To optimize the health of your lawn and reduce weeds, adopt the following guidelines.



Ideal Mowing Heights For Common Tennessee Lawngrasses

TYPE	SPECIES	MOWING HEIGHT (in) Minimum		Maximum
Warm-Season	Common Bermudagrass	3/4	to	1 1/2
	Hybrid Bermuda	1/2	to	1 1/2
	Centipedegrass	1	to	2
	Zoysia	3/4	to	1 1/2
Cool-Season	Fine Fescue	1 1/2	to	2 1/2
	Kentucky Bluegrass	1 1/2	to	2 1/2
	Perennial Ryegrass	1 1/2	to	2 1/2
	Tall Fescue	2	to	3

Mow at the correct height. Mowing height can drastically affect the space available for weeds. Each type of lawngrass has an ideal mowing height range. Consistently mowing at an appropriate height allows the lawngrass to naturally close in or overlap, forming a closed canopy and reducing the space available for weeds. Lawngrasses have a maximum and minimum mowing height tolerance. Mowing above the maximum tolerance results in bushy growth (opening the canopy and providing space for weeds). Mowing below the minimum tolerance is the most common. Scalping, the removal of too much leaf surface, often results in a weak and weedy lawn. Mowing below the minimum tolerance does not leave enough leaf surface to support optimum growth of roots and new shoots. Repeated scalping often results in short, fine leaves; shallow rooting; and an open canopy. Thus, mowing lawngrasses at the ideal height can greatly reduce the space available for weeds to grow. Refer to the previous table for ideal mowing heights.

Use the correct mowing frequency. How often do you mow or how tall do you let your lawn grow before mowing? Generally, you do not want to remove more than 1/3 of the grass height in a single mowing.

For example, if you mow your tall fescue lawn at a 2-inch cutting height, then mow when it reaches 3 inches tall. If you mow your hybrid bermudagrass lawn at a 1-inch cutting height, then mow when it reaches 1.5 inches tall. The frequency at which you mow is dependent on rate of growth, not a set date. Removing more than 1/3 of the height will stress the grass, affecting optimum root and new shoot growth and subsequent canopy closure. If your lawn grows too tall between mowings, gradually remove the excess height by taking 1/3 of the height with several mowings rather than removing an excess amount in a single mowing.

Raise the cutting height prior to periods of environmental stress. Mowing height determines the amount of leaf surface to support growth. In periods of environmental stress, such as dry weather, raise the cutting height to the maximum tolerance. For warm-season grasses, raise the cutting height in early fall to insulate soils against extreme low temperatures. For cool-season

grasses, raise the cutting height in late spring to promote root growth for improved summer drought tolerance and to help insulate against extreme high temperatures.

Mow with a sharp blade. Mowing with a dull blade usually tears the grass blade, exposing a large, jagged edge that is prone to moisture loss and disease entry. A clean cut allows the grass to recover quickly, maintaining a healthy canopy and neater appearance.

Alternate the mowing direction. Try not to mow in the same direction every time. Alternating mowing direction encourages upright growth in addition to distributing wear and reducing soil compaction.

Recycle clippings. Allowing small leaf clippings to drop, rather than bagging, cycles nutrients essential for lawngrass growth and survival. For more information on recycling clippings, refer to Extension PB 1455, *Lawn Care to Reduce Landscape Waste*.

Fertility and Liming

If lawngrasses are to achieve optimum growth and compete against weeds, the soil must be fertile, supplying the required mineral nutrients in appropriate amounts at the proper time. Through the year, lawngrasses have periods of active growth and periods of slowed growth, or dormancy. Nutrient demand is dependent on growth rate. Nutrients applied in excess or at the wrong time may be lost or captured by weeds. Soils in Tennessee may require additions of the primary nutrients nitrogen, phosphorus and potassium. Nitrogen is often soluble in water and mobile in soil. Nitrogen is also the nutrient required in the greatest amount by lawngrasses. Applied excessively or at the wrong time, nitrogen may weaken your lawn. Test the soil before applying fertilizer.

In addition to nutrients, your soil may need amending with lime. Most soils in Tennessee become acid (or sour) unless lime is applied. As a result, lawns become less hardy and weeds become more prevalent as the lawngrass is gradually thinned.

Assessing soil fertility, the need for lime and fertilization schedules for lawns are explained in Extension PB1038, *Fertilization and Management of Home Lawns.*

Need for Additional Water

Water, whether provided by rainfall or supplemental irrigation, is essential for lawngrass health and survival. Generally, 75 percent or more of the weight of a lawngrass plant is water. Actively growing lawngrass usually requires 1 to 1.5 inches of water per week. In Tennessee, the total annual rainfall distribution is generally insufficient to meet this demand. You may decide to add additional water to your lawn by irrigating.

Irrigate your lawn early in the morning (e.g., 5:00 to 10:00 a.m.) to reduce disease potential and waste by evaporation. Irrigating in the afternoon increases the loss by evaporation. Irrigating in the evening increases the period of leaf wetness, often promoting disease. For best results, water deeply and infrequently. Irrigate until the soil is moistened to a 4- to 6-inch depth. Do not irrigate again until the appearance of the first symptoms of drought stress (e.g. rolled leaves and bluish-green color). This promotes deep rooting. Irrigating frequently for short durations often results in shallow roots, reducing your lawn's tolerance to drought and other stresses.

Irrigation may also promote the germination and growth of summer annual weeds. Summer annual weeds germinate on or just below the soil surface. Light, frequent irrigation may provide needed water for summer annual weeds and may not penetrate deep enough to benefit lawngrass growth.

Remove Fallen Leaves

Fall is the period when cool-season lawngrasses have the opportunity to recover from summer stresses. Fallen tree leaves may restrict light and limit recovery. Timely leaf removal will improve the availability of

light for optimum recovery. When a dense mat of leaves is not removed in a timely manner, lawngrass growth is weak and plants may die. After leaves are removed, the weakened health of your lawngrass provides space for fall-germinating weeds.

Selecting Lawngrasses for Open Areas

When establishing or renovating your lawn, select a lawngrass species or variety appropriate for your specific site and needs. Considerations include the level of care, soil type, exposure and location requirements. Tennessee is located in a transitional zone between northern cool-humid and southern warm-humid climates. Within the state, certain locations favor warm-season lawngrasses; others, cool-season grasses. Bermudagrass, zoysia and centipede are perennial warm-season lawngrasses. Warm-season grasses grow best during the spring and summer (optimum growth between 80 to 95 F). These lawngrasses lose color during winter dormancy. Perennial cool-season lawngrasses include Kentucky bluegrass, fine fescuses and tall fescue. Cool-season lawngrasses grow best during the spring and fall months (optimum growth between 60 and 75 F) and maintain color during the winter.

In addition to choosing between a warm- or cool-season lawngrass, choose a variety or a blend of varieties that are known to be adapted to your area. Contact your county Extension office for more information on recommended lawngrass species and varieties for your area.

Selecting Lawngrasses for Shade Areas

Within your landscape, there may be areas with different growth conditions. Some areas may receive full sun, while others receive very little if any light. Shaded lawns are often weak and thin due to low light intensity and limited energy reserves. This weak growth often results in an open canopy, favoring the invasion of shade-tolerant weeds.

In light- to moderate-shaded areas, choose a species or mixture of species that are shade-tolerant. To maximize light penetration, prune the lower limbs of trees and large shrubs as much as feasible (Refer to Extension PB 1163, *Pruning Shrubs In The Landscape*). In areas of intense shade, landscape with mulch or establish a shade-tolerant ground cover. (For more information refer to Extension PB 713, *Landscape Mulching Materials*, and PB1585, *Annual and Perennial Flower Shade Gardening in Tennessee*).

In general, cool-season lawngrasses are more shade tolerant than warm-season grasses. Cool-season grasses shaded during morning may wilt very quickly when exposed to full sunlight in the afternoon. Fine fescues (like red, hard, chewings and sheep fescues) are often tolerant of shade. For example, red fescue tolerates medium shade. However, this species has limited heat tolerance. Although tall fescue is usually more heat-tolerant than red fescue, this species is less tolerant of shade. Kentucky bluegrass is more tolerant of high temperature than red fescue. However, Kentucky bluegrass has poor shade tolerance when maintained in dense stands (For more information refer to Extension PB 1213, *Managing Cool-season Lawngrasses in Shade*).

Among the warm-season lawngrasses, bermudagrass is essentially intolerant of shade. Zoysia is able to tolerate light, open shade; however, shoot density may decline and color may fade.

DEVELOPING WEED-MANAGEMENT STRATEGIES

Even under the best of lawn care, the potential for problems with certain weeds is continual. Optimum lawn care can go far to minimize weeds. However, certain weeds have growth habits similar to lawngrasses that enable them to establish in the presence of competitive lawngrass. Such weeds can be continual problems requiring preventative strategies. Other weeds may initiate during stress periods (may be indicators of lawngrass health), requiring control after establishment.

Implement best management strategies by first assessing the extent of your weed problems. Assessment includes the identification of existing and anticipated problem weeds. Best management strategies may include adjusting your lawn care program and/or the development of an effective herbicide program (involving product selection, application type and timing).

Assessing Weed Problems

Your lawn may have diverse environments or microclimates, with variations in soil type, condition (fertility and traffic or compaction) and sun exposure. As a result, weed problems may not be uniform throughout your

landscape. The appropriate weed control strategies will be determined by the weed species present.

Begin your evaluation by drawing a map of your property. Section your map into easily identified zones (e.g. front, back, sides or areas bordering shrubs, walks and driveways). With this map as a reference, walk your property and record what you see.

Note the following;
a. Weed species present
b. Weed stage of growth
c. Weed population
d. Previous control measures
e. Health of lawngrass
f. High traffic or low traffic areas
g. Degree of sun exposure
h. Dry areas or water-logging areas

Separate weed species according to plant type (e.g. broadleaf, grass and sedges) and stage of growth.

In assessing the size of the weed(s) population or the health of your lawn, use a percentage rating. For example, in a particular zone, winter annual broadleaf weeds may account for 30 percent of the ground cover and your lawngrass 70 percent. Using this technique, you could formally assess the health of your lawn 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 the 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 lawn prior to summer stresses.

Recorded assessments are management tools that will allow you to measure the success of your efforts and the need for adjustments in control strategies. Use them to develop and fine tune your control strategy. At a minimum, these assessments will identify areas requiring treatment, the weed species present and your subsequent choice of herbicide and timing of application.

Control Strategies

The best control strategy may include altering your lawn care practices and/or application of appropriate herbicide(s). Choice of control strategy will depend on the weeds present and population density or distribution. Certain weeds that can be anticipated (like crabgrass and goosegrass) are best controlled with preventative or preemergence herbicides. For established weeds, two options are physical removal (which is essentially ineffective towards 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 your easiest choice. If weeds are annuals that are abundant and spread over a large area, or perennials, a herbicide treatment may be required. The herbicide may be applied broadcast over the problem area or the entire yard (dependent on assessment results). Choice of an appropriate herbicide is dependent on weed susceptibility and lawngrass tolerance. Herbicide application timing is dependent on the growth stage of the weed(s) and weather conditions. Generally, weeds are easiest to control early in their life cycle.

Your choice of a best control strategy will depend on weed type(s) and life cycle(s).

WEED TYPES AND LIFE CYCLES

For control purposes, weeds can be divided into three types: broadleaf weeds, grass weeds and sedges. Within each type, weeds may have one of three basic life cycles: summer annual, winter annual or perennial.

Types

Broadleaf Weeds

Broadleaf weeds are generally easiest to identify. Broadleaf weeds (like dandelion and clover) are distinctive from and are not botanically closely related to grasses and sedges. Broadleaf weeds have leaves that are broad, and are generally produced in pairs or multiples. Leaves are detached from the main stem

by a sub-stem or petiole. Leaves may be simple (having one leaflet, like dandelion) or compound (having more than one leaflet, like clover). Veins within the leaf give a netted appearance in most cases.

Selective herbicides for controlling broadleaf weeds generally are not effective for controlling grass weeds and sedges.

Grass Weeds

Grass weeds (like crabgrass and goosegrass) are botanically related to lawngrasses. They have a similar appearance and growth habit. Leaves of grasses are not detached from the main stem. Leaves of grasses are 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 established in the lawn. Thus, grass weeds are generally best controlled with preventative or preemergence herbicides. Preemergence herbicides need to be applied prior to germination, as they act by preventing establishment.

Sedges

Sedges (like yellow nutsedge) are not grasses ,but have leaves that are similar in appearance and are thus often mistaken for grasses. Since herbicides used to control grass weeds are generally not effective 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. Stems of grasses are commonly round or flat with leaves in two vertical rows.

Life Cycles

Summer Annuals

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

Winter Annuals

Winter annuals complete their life cycle in 12 months but generally overlap two calendar years. Winter annuals germinate in late summer to early fall and begin to develop. Winter annuals 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 reproduce and spread by prolific seed production, serving as a ready source of infestation and establishment when conditions are favorable.

Perennials

Perennials live for more than two years and may regenerate indefinitely. A simple perennial, like dandelion, may germinate from seed, but produces a tap root that, when severed, can produce a new plant. A complex perennial can spread by seed in addition to creeping above- or below-ground vegetative structures (such as stolons, rhizomes or nutlets) capable of initiating a new plant.

Perennial weeds are often the most difficult to control. You are usually trying to control an established plant that has already produced considerable vegetative reproductive structures which may require repeat control measures. Removal of the above-ground shoot growth does little towards long-term control. Long-term control usually requires herbicide treatments that act on the above- and below-ground structures.

Your choice of a best management strategy, including appropriate herbicide(s), is dependent on weed type and life cycle. The "Weed Identification" section provides pictures to help with identification. This section separates weeds common in Tennessee lawns according to type and life cycle.

WEED IDENTIFICATION

Broadleaf Weeds

Summer Annuals

Prostrate knotweed[1]

Prostrate spurge[1]

Spotted spurge[1]

Ragweed[1]

Carpetweed[1]

Kochia[1]

Lespedeza

Horsenettle[1]

Hairy Galinsoga[1]

Bedstraw

Winter Annuals

Henbit[1]

Deadnettle

Field Madder

Common chickweed[1]

Mouse-ear chickweed[1]
(can be perennial)

Buttercup

Carolina geranium
(can be perennial)

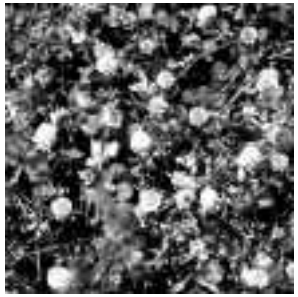
[1] Photo Credit to Arlyn W. Evans

Perennials

Wild onion/Wild garlic[1]

Dandelion

White clover


Hop clover

Broadleaf plantain

Narrowleaf plantain

Ground ivy

Curly dock

Broadleaf dock[1]

Virginia buttonweed[1]

Oxalis[1]

Wild strawberry

Wild violet

Grass Weeds

Summer Annuals

Large crabgrass[1]

Smooth crabgrass[1]

Goosegrass

Yellow foxtail[1]

Green foxtail[1]

[1] Photo Credit to Arlyn W. Evans

Winter Annuals

Annual bluegrass

Little barley[1]

Perennials

Dallisgrass[1]

Bermudagrass

Nimblewill[1]

Sedges

Summer Annuals

Annual sedge[1]

Perennials

Yellow nutsedge[2]

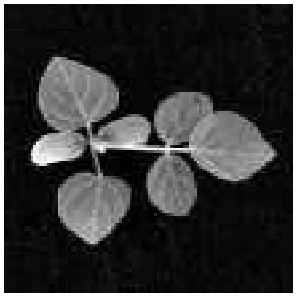
Purple nutsedge

Leaftips,[3]
Left - Yellow Nutsedge,
Right - Purple Nutsedge

Kyllinga[2]

Other Yard Weeds

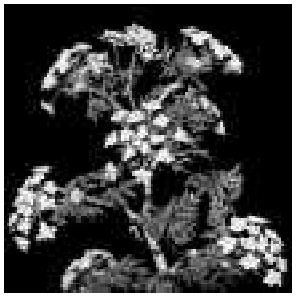
Moss and Algae



Kudzu[1]

Honey suckle

Poison Ivy[1]



Poison hemlock[1]

[1] Photo Credit to Arlyn W. Evans
[2] Photo Credit to Jimmy R. Summerlin
[3]Photo Credit Joe C. Neal

HERBICIDE APPLICATION

Herbicide Types

For controlling lawn weeds, there are generally two herbicide application types: preemergence and postemergence. Pre-emergence herbicides prevent weeds from becoming established. Postemergence herbicides are applied after weeds are established. Once established, certain weeds may be difficult to control. For example, trying to control an established grass weed in an established lawngrass can be very difficult. Herbicides with such a margin of selectivity are limited. Selectivity with a preemergence grass herbicide is achieved by application timing (applied to established lawngrasses, preventing grass seedlings from establishing). Postemergence herbicides are generally used to control emerged, broadleaf weeds in established lawns.

Preemergence (PRE)

Preemergence herbicides are applied to the soil and act as seeds germinate. These herbicides can act on summer and winter annuals, and some perennial weeds starting from seed. Preemergence herbicides need to be applied prior to germination. The time of germination for each weed species is life-cycle dependent. Preemergence herbicides generally provide some residual activity (meaning the weed control may last for several weeks after initial application). Preemergence herbicides may provide excellent grass weed control and have limited activity on broadleaf weeds. Except where specifically noted, do not apply preemergence herbicides to newly established or reseeded lawns for at least three months.

To ensure best performance with preemergence herbicides:

1. Remove trash, leaves and thatch to allow the herbicide to directly contact the soil.
2. Apply the preemergence herbicide uniformly over the treatment area (as directed on the product label).
3. After application, apply one-half inch or more of irrigation. This activates the herbicide by moving it into the soil. Preemergence herbicides will not be as effective if not immediately activated by irrigation (unless otherwise noted on the product label).

Postemergence (POST)

Postemergence herbicides act on weeds after they have germinated and are applied to the above ground plant tissue. Weeds are generally easiest to control when young (early in their life cycle). Postemergence herbicides may be contact or systemic. Contact herbicides only kill the top growth contacted by the herbicide. Systemic herbicides applied to the top growth, move within the plant to control below ground reproductive structures not contacted in the initial application. Systemic herbicides are preferred when treating established perennial weeds.

Herbicide Formulations and Application Equipment

Herbicides for use in home lawns are available in several formulations. Generally there are two main types: granular- to be applied in a dry form using fertilizer-type spreaders, and liquids- powders or wettable granules formulated to be mixed with water and applied as a spray.

Granular

Granular herbicides are the most convenient and easiest to use. Many preemergence herbicides are marketed as granular formulations. These products may also be available in combination with granular fertilizers.

Fertilizer/ herbicide combinations have several advantages:

1. Convenient, saving one additional trip over the lawn.
2. Can be conveniently applied with a common fertilizer spreader (no specialized equipment needed).
3. Spray drift is avoided that may occur with foliar spray.
4. The fertilizer may stimulate lawngrass growth and may reduce any ‘stunting’ effect of the herbicide.

Fertilizer/herbicide combinations have several common misuses and disadvantages:

1. Fertility rate, especially with nitrogen, may be too high, depending on lawngrass type and time of year.
2. Use around or underneath trees and shrubs that are not tolerant of the herbicide.
3. An additional pass around or underneath trees and shrubs to give them extra fertilizer, resulting in herbicide overdose that can injure or kill trees and shrubs.
4. More expensive than products used separately.
5. Fertilizer/herbicide combinations containing postemergence broadleaf herbicides (like 2,4-D and dicamba) applied preemergence are less effective than foliar sprays. Also, these products may injure desirable plants by root uptake.

Liquids

Most postemergence and some preemergence herbicides are sold in formulations meant to be mixed with water and applied as liquids. The actual product may be in a solid form, such as a powder or water-dispensible granule that mixes well with water. These formulations are meant to be applied using a sprayer or water hose-end attachments.

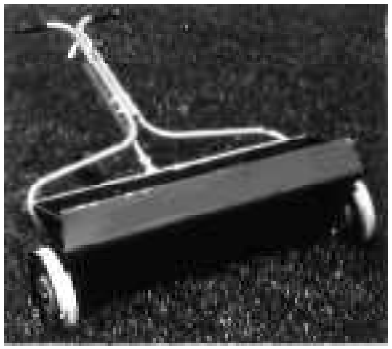
Sprayers may be pressurized by air, using a hand pump or by water pressure during filling, as in the case of hose-end sprayers. Avoid spray drift to desired plants by using low pressure (to maximize droplet size) and by not applying when the wind is greater than 5 mph. Hose-end attachments force the herbicide into the water flow. The accuracy of herbicide application is low with this equipment. A more appropriate use of hose-end attachments is the application of fungicides, insecticides and liquid fertilizers.

Many postemergence herbicides are packaged as liquids ready to use for spot treatments in squirt bottles or aerosol cans. Be cautious with aerosol cans. They can be misdirected and the herbicide may contact your face and eyes. For spot treatments, many postemergence herbicide labels may provide directions for use with a brush and can. The liquid herbicide mixture can be "painted" with a brush (or cloth or sponge) onto undesirable plants. This method is convenient for treating individual plants or a few plants in small problem areas.

Equipment Calibration

Spreaders

Granular spreaders (gravity drop or spinner types) usually provide an easy gauge for selecting the approximate setting for the desired application rate. In addition, usually the package for granular herbicides or herbicide/ fertilizer combinations provide specific directions on application rate and equipment calibration.



To ensure uniform coverage, or to avoid misses, more even distribution will be achieved by applying one-half the total rate in each of two passes in opposite directions (total rate to be applied is generally given as pounds per 1000 square feet).

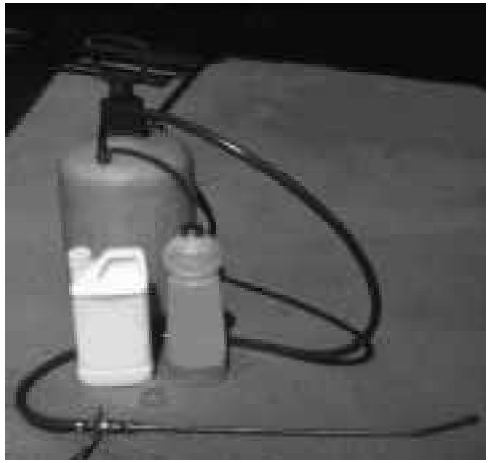
CAUTION: If you are applying hormone-or phenoxy-type herbicides (such as 2,4-D, MCPP or dicamba), do not use the same spreader to later apply fertilizer to desirable plants other than lawngrasses. There may be enough herbicide residue remaining in the spreader to injure desirable plants. Thoroughly rinse the spreader with soapy water and then rinse with clean water and let dry.

Sprayers

Herbicide applications with pressurized sprayers require accurate calibration. When treating large areas, proper calibration and consistent application are essential to avoid overdosing and/or missing areas.

To calibrate a liquid pressure sprayer, use the following steps:

1. Fill the tank full or to a marked level with water.
2. Spray an area 10 feet wide by 10 feet in length (or 100 square feet). Pay attention to your walking speed. A consistent walking pace is essential for consistent application.
3. Record the amount of water needed to refill the tank to the marked level. This is the amount of water required to treat 100 sq. ft. Multiply this amount by 10 to get the total amount of water required to treat 1000 sq. ft.



4. Empty out this water or add water until the tank is half full.
5. Then add the quantity of herbicide appropriate for the amount of water the tank holds.
6. Refill the tank with water (the action of the water during fill will aid in uniform mixing of the herbicide with the water). Shake the tank for 15 seconds.
7. During application, it may be necessary to stop and shake the tank to ensure continued uniform mixing. This is particularly true for wettable powder or water-dispersible granular formulations of herbicides.

a UT 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

Area

Square inch = 0.007 square foot = 6.45 square centimeters
Square foot = 144 square inches = 929.03 square centimeters
Square yard = 9 square feet = 0.836 square meters
Square rod = 30.25 square yards
Acre = 4,840 square yards = 43,560 square feet = 160 square rods = 4,047 square meters = 0.405 hectare
Hectare =10,000 square meters = 2.47 acres
Square mile = 640 acres = 2.59 square kilometers = 1 section
Section =1 square mile = 640 acres = 2.59 square kilometers

Liquid Measures

Teaspoon = 0.1667 fluid ounce = 80 drops = 4.93 milliliters
Tablespoons = 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 = 3 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

PB956-12M-3/01 E12-5215-00-027-01

The Agricultural Extension Service offers its programs to all eligible persons regardless of race, color, national origin, sex, age, disability or veteran status and is an Equal Opportunity Employer.
COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
The University of Tennessee Institute of Agriculture, U.S. Department of Agriculture, and county governments cooperating in furtherance of Acts of May 8 and June 30, 1914.
Agricultural Extension Service
Charles L. Norman, Dean

CONVERSION TABLE FOR CALIBRATION

APPLICATION RATE CONVERSIONS						
LIQUID FORMULATIONS				GRANULAR or DRY FORMULATIONS		
Rate per Acre (43,560 Square Feet)	Rate per 1000 Square Feet	Rate per 100 Square Feet		Rate per Acre (43,560 Square Feet)	Rate per 1000 Square Feet	Rate per 100 Square Feet
1 pt.	3/4 Tbs.	1/4 tsp.		1 lb.	2 ½ tsp.	1/4 tsp.
1 qt.	1 ½ Tbs.	1/2 tsp.		3 lbs.	2 1/4 Tbs.	3/4 tsp.
1 gal.	6 Tbs.	2 tsp.		4 lbs.	3 Tbs.	1 tsp.
25 gal.	4 ½ pts.	1 cup		6 lbs.	4 ½ Tbs.	1 1/2 tsp.
50 gal.	4 ½ qts.	1 pt.		8 lbs.	2/5 cup	1 3/4 tsp.
75 gal.	6 ½ qts.	1 ½ pts.		10 lbs.	½ cup	2 tsp.
100 gal.	9 qts	1 qt.		100 lbs.	2 1/4 lbs.	1/4 lb

CONVERSIONS FOR SMALL AMOUNTS				
3 teaspoons (tsp.)	=	1 tablespoon (Tbs.)		
2 tablespoons	=	6 teaspoons	=	1 fluid ounce
1 cup	=	16 tablespoons	=	8 fluid ounces
2 cups	=	1 pint	=	16 fluid ounces
2 pints	=	1 quart	=	4 cups
4 quarts	=	1 gallon	=	16 cups
16 ounces (by weight)	=	1 pound		

HERBICIDE APPLICATION CALENDAR

Instructions: This calendar is intended to aid in planning the timing of herbicide applications. Application timings are based on the life cycle of target weeds and available herbicide options. The number of herbicide applications is dependent on the desired maintenance level or quality of lawn appearance. Using this planning calendar, choose appropriate herbicide(s) and application type (or formulation) from the section HERBICIDES FOR CONTROLLING LAWN WEEDS.

APPLICATION TIMING	APPLICATION TYPE	TARGET WEEDS	MAINTENANCE LEVEL	TIPS
Late summer to early fall	PRE	GRASSES	High	Sites with history of annual bluegrass.*Apply in late summer or early fall prior to weed seed germination. Do not apply if considering fall re-seeding with desired lawngrass.
		BROADLEAVES	High Medium	Preventative for winter annuals.
Early fall	POST	GRASSES	High	Control of existing annual bluegrass.
Fall to early winter	POST	BROADLEAVES	High Medium Low	Control of existing perennial and emerged broadleaf weeds.
Spring	PRE	GRASSES	High Medium Low	Preventative for summer annuals like crabgrass and goosegrass prior to germination. Certain herbicides cannot be applied if considering spring re-seeding with desired lawngrass.
		BROADLEAVES	High Medium	Preventative for summer annuals prior to germination. Several of the PRE grass herbicides also have limited activity towards certain broadleaf weeds.
	POST	GRASSES	High Medium	Existing perennials, winter and summer annuals not controlled by preemergence herbicides. May only require spot treatment.
		BROADLEAVES	High Medium Low	Existing perennials, winter and summer annuals.
Summer	POST	GRASSES	High	Difficult to control perennials and summer annuals escaping preemergence herbicides.
		BROADLEAVES	High	Difficult to control perennials. May only require spot treatment.

HERBICIDE OPTIONS FOR CONTROLLING LAWN WEEDS

SUMMER AND WINTER ANNUAL GRASSES : PRE HERBICIDE OPTIONS

Overall Comments: The following table lists preemergence (PRE) herbicides for controlling annual grasses. Applied in the spring, these herbicides control summer annual grasses like crabgrass and goosegrass. Applied in late summer to early fall, these herbicides provide control of winter annual grasses like annual bluegrass. In addition, certain products provide limited PRE control of annual broadleaf weeds (refer to weed susceptibility table). Weeds controlled depends on herbicide choice and application timing.

- PRE herbicides act by preventing germinating seedlings from emerging (generally do not inhibit actual seed germination). Thus to have activity, 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. broadleaf weeds).
- PRE herbicides for grass weed control provide residual activity or prevent weed seed germination over an extended period. The duration of residual activity is product dependent.
- For optimum weed control, PRE herbicides need to be activated by 1/2 inch of rainfall or irrigation immediately after application . Lack of timely activation by rain or irrigation may result in poor weed control.

Fertilizer/ Herbicide Combinations: The ideal application timing for lawn fertilization may not be the same as that required for PRE grass herbicides. Thus, combination products may result in wasted fertilizer or may adversely affect ideal lawngrass health (refer to text for further discussion). When optimum timing for weed control and fertilization do not coincide, use products not combined with a fertilizer.

SUMMER ANNUAL GRASSES (crabgrass, goosegrass and others):

- Crabgrass germinates in the spring when the soil temperature has been 55 F (air temp. 65 or greater) for four or more days.
- Goosegrass generally germinates four to six weeks later.
- Target the first application for approximately March 15th in West and April 15th in East Tennessee. Generally, abundant Forsythia bloom corresponds with soil temperatures favorable for crabgrass germination.
- Make second application approximately 6 to 8 weeks later (product dependent).

WINTER ANNUAL GRASSES (annual bluegrass):

- In Tennessee, the predominant winter annual grass weed is annual bluegrass.
- In Tennessee, annual bluegrass generally begins to germinate in early September. Thus, for PRE control of annual bluegrass target application for the end of August to 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)	PRODUCT RATE per 1,000 sq. ft.	LAWNGRASS TOLERANCE: Cool -Season Warm -Season	USE DIRECTIONS AND PRECAUTIONS
* Note: * Next to product name, indicates a speciality product that may not be normally sold at common retail garden centers. Product may be available at or require order from agricultural chemical distributor. * or ** Next to a lawngrass type indicates a specific use precaution in the adjacent use directions and precautions.				
Grasses PRE	benefin -BALAN 2.5 G	1.8 to 2 .75 lb	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysia	Safe to apply to well-established lawngrasses listed. Do not apply in the spring to lawns seeded the previous fall. Do not re-seed within 4 months of last application. May thin winter grasses over-seeded in warm-season grasses. Do not use on newly sprigged lawngrasses. For summer annual grasses, make second application 4 to 6 weeks after initial application.
	benefin + oryzalin -XL 2 G	2.5 to 3.5 lb	Tall Fescue Bermudagrass Centipedegrass Zoysia	Safe to apply to well-established lawngrasses listed. Do not apply in the spring to lawns seeded the previous fall. Do not re-seed fescue within 4 months of last application. Do not over-seed within 3 months of last application. Do not use on newly sprigged lawngrasses. For summer annual grasses, make second application 4 to 6 weeks after the initial application.
	benefin + trifluralin -TEAM 2 G	1.75 to 3.5 lb	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysia	
	bensulide -BETASAN 4-E	9 fl. oz.		

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	PRODUCT RATE per 1,000 sq. ft.	LAWNGRASS TOLERANCE: Cool -Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
Grasses PRE	dithiopyr -DIMENSION 1 EC	1.5 fl. oz.	Ky. Bluegrass Fine Fescue * Tall Fescue Bermudagrass ** Centipedegrass Zoysia	Provides PRE and early POST control of crabgrass (up to 3 leaf stage). POST activity will be improved with addition of non-ionic surfactant (0.5% volume/ volume). Apply to well-established lawngrasses listed that have received at least two mowings prior to application. Do not re-seed or over-seed within 4 months of last application. Does not require immediate irrigation for activation. Make second application 5 to 10 weeks later. * Certain varieties of fine fescue may be susceptible. ** Bermudagrass TIFGREEN (328) is susceptible. ** For fall application, bermudagrass may be over-seeded with perennial ryegrass eight weeks after last application.
	siduron * -TUPERSAN 50 WP	7.3 oz.	Ky. Bluegrass Fine Fescue Tall Fescue Zoysia	Do not use in the fall for annual bluegrass control. Do not apply to warm-season grasses other than zoysia. 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 zoysia.
	metolachlor * -PENNANT 7. 8 E -PENNANT 5 G	0.75 to 1.5 fl. oz. 0.9 to 1.8 lb.	Bermudagrass Centipedegrass Zoysia	Do not apply to cool-season grasses. 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. Activation requires ½ inch of rainfall or irrigation within 7 days of application. Repeat application 6 to 8 weeks later.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	PRODUCT RATE per 1,000 sq. ft.	LAWNGRASS TOLERANCE: Cool -Season Warm -Season	USE DIRECTIONS AND PRECAUTIONS
Grasses PRE	napropamide * -DEVRINOL 50 DG -DEVRINOL 5 G	 1.5 to 2.2 fl. oz. 0.9 to 1.4 lb	Tall Fescue Bermudagrass Centipedegrass Zoysia	Do not apply to lawngrass less than 3 months old. Do not re-seed or over-seed within 4 months before or after application. For activity, requires ½ inch of rainfall or irrigation within 24 hours after application. Repeat application 4 to 6 weeks later.
	oryzalin * -SURFLAN 4 AS	 1.0 to 1.5 fl. oz.*	Tall Fescue * Bermudagrass Centipedegrass Zoysia	* Do not apply to tall fescue seeded or re-seeded the previous fall. * To tall fescue, do not apply more than 1.0 oz per 1000 sq. ft. in a single application. Can be applied to well-established, warm-season grasses listed. Will thin over-seeded grasses. Delay re-seeding or over-seeding by 4 months after last application. May be tank-mixed with GALLERY to improve PRE broadleaf weed control. Single application of 1.5 or split application of 1.0 oz. 8 to 10 weeks after first application. Requires ½ inch rain within 21 days after application.
	pendimethalin -PRE-M 3.3 EC -PRE-M 60 DG -PRE-M 60 WP -PENDULUM 2 G -PENDULUM 3.3 EC -PENDULUM 60 DG -PENDULUM 60 WG -HALTS CRABGRASS PREVENTER	 2.7 fl. oz. 1.8 oz. 1.8 oz. 2.0 lb. 2.7 fl. oz. 1.8 oz. 1.8 oz. 2.0 lb.	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysia	Apply to well-established lawns that have been mowed at least four times. Do not re-seed within 3 months of last application. Do not apply in the fall if considering over-seeding. For summer annual grasses, make second application 6 to 8 weeks after initial application. Requires ½ inch rain within 30 days of application.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT NAME (examples)	PRODUCT RATE per 1,000 sq. ft.	LAWNGRASS TOLERANCE: Cool -Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
Grasses PRE	prodiamine * -BARRICADE 65 WG -REGALKADE 0.5 G	0.28 to 0.4 oz. 1.5 to 6.9 lb.	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass * Centipedegrass Zoysia	May be used on established grasses listed. * Do not apply more than 0.30 oz. per 1,000 sq. ft. when sprigging or plugging bermudagrass. Do not re-seed or over-seed within 7 months of last application. For summer annual grasses, repeat application 8 to 10 weeks after initial application. Requires ½ inch rain within 14 days of application.

ESTABLISHED PERENNIAL (eg. Dallisgrass), and ANNUAL GRASSES: POST HERBICIDE OPTIONS

Overall Comments: The following table provides control options for certain established perennial and annual grass weeds. Ideally, establishment of grass weeds needs to be prevented with PRE grass herbicides. POST herbicide options with an acceptable margin of selectivity providing control of established grass weeds in lawngrasses are limited. Application of these herbicides requires precise application.

- In general, control of perennial grasses will require repeat applications.
- For optimum control of perennial grasses, make applications early in their development or when re-growth is young.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	PRODUCT RATE per 1,000 sq. ft.	LAWNGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
* Note: * Next to product name, indicates a speciality product that may not be normally sold at common retail garden centers. Product may be available at or require order from agricultural chemical distributor. * or ** Next to a lawngrass type indicates a specific use precaution in the adjacent use directions and precautions.				
Grasses -crabgrasses -goosegrass -other grasses POST	sethoxydim -VANTAGE	0.5 fl. oz.	Fine Fescue Centipedegrass	Requires precise application. Can be used in seedling and established centipedegrass. 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. Can be used in well-established fine fescues. Do not apply to other lawngrasses. Does not control sedges. Does not control annual bluegrass.
	fenoxaprop -ACCLAIM EXTRA*	0.3 to 0.9 fl. oz.	Ky. Bluegrass Fine Fescue Tall Fescue Zoysia	Requires precise application. Application to well-established lawngrasses listed may result in temporary injury (yellowing and stunted growth). Use rate is dependent on lawngrass tolerance and growth stage of grass weeds (refer to product label).

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	PRODUCT RATE per 1,000 sq. ft.	LAWNGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
Grasses -dallisgrass and -crabgrasses -goosegrass -other grasses POST	DSMA -CRABGRASS KILLER *(Green Light)* -CRABGRASS KILLER *(Ortho)*	8 fl. oz 8 fl. oz.	Ky. Bluegrass Fine Fescue * Tall Fescue * Bermudagrass Zoysia **	Requires accurate application. Bermudagrass is tolerant. * Injury to well-established cool-season grasses listed can be severe. ** Well established Zoysia is slightly sensitive. Injury will be temporary when properly applied. Apply when air temperature is 80 to 90 F. Rainfall or irrigation within 24 hours will decrease effectiveness. May require repeat applications. For perennial grasses, repeat 14 to 21 days later. Do not re-seed for at least 2 weeks after last application. May require addition of surfactant or non-phytotoxic crop oil (refer to product label). In addition to grasses, has activity towards broadleaf weeds and sedges. Control of sedges will require repeat applications (refer to Sedges: POST Herbicide Options table and actual product label) .
	MSMA -MSMA 6.6 L -912 Herbicide -CRABGRASS KILLER *(Green Light)* -CRABGRASS KILLER II *(Ortho)* -CRABGRASS and NUTGRASS KILLER *(Ortho)*	1 fl. oz. 1.5 fl. oz. 1 to 2 fl. oz. 3 fl. oz. Ready to Use (Spot Treatment)		
Common bermudagrass (suppression) POST	fluazifop -FUSILADE II	0.04 to 0.14 fl. oz.*	Tall Fescue * Zoysia **	Requires precise application. * 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. 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.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	PRODUCT RATE per 1,000 sq. ft.	LAWNGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
Common bermudagrass (suppression) POST	fenoxaprop -ACCLAIM EXTRA*	0.46 fl. oz.	Ky. Bluegrass Fine Fescue Tall Fescue Zoysia	Requires precise application. Initial application in spring when common bermuda breaks dormancy. Repeat application every 3 to 4 weeks (dependent on re-growth).
Annual blue-grass and winter broadleaf weeds PRE and POST	simazine -PRINCEP 4 L	0.75 to 1.5 fl. oz.	Bermudagrass Centipedegrass Zoysia	For annual bluegrass, apply after Oct. 1st. Provides PRE and early POST control of this weed and winter annual broadleaf weeds. For summer annual weeds, can be used in the spring, up to June 1st. Requires ½ inch rainfall or irrigation within 10 days after application. Do not seed or over-seed within 4 months before or 6 months after application.
Annual blue-grass and winter broadleaf weeds POST	glyphosate -(VARIOUS) ROUNDUP 4 L	0.37 fl. oz.	Bermudagrass (DORMANT)	Apply to dormant bermudagrass only. Must be applied when dormant prior to spring greenup. May require surfactant (refer to product label).
	diquat -REWARD 2 L	0.4 to 0.75 fl. oz.		

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

Overall Comments: The following table lists preemergence (PRE) and post-emergence (POST) herbicides for control of broadleaf weeds. Several POST herbicides are available that selectively control established broadleaf weeds in established lawns. Established broadleaf weeds can be controlled with POST herbicide options. For optimum control, application(s) need to be timed early in the life cycle of summer and winter annuals. Established perennials (e.g. wild onion), may require repeat application(s).

Note: For summer annual broadleaf weeds, PRE herbicides for summer annual grasses may provide limited (product dependent) PRE activity towards summer annual broadleaf weeds (refer to weed susceptibility table).

- POST herbicides for broadleaf weeds do not require activation by rain or irrigation.
- If lawn is under drought stress, irrigate or wait for a rain to cause weeds to resume active growth.
- Do not apply if rain is forecast.
- Ensure uniform application and do not overlap spray pattern.

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. Injury can result from:

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 lawns.
c. Application underneath or around desired vegetation.
d. Application or over-application to areas of the lawn 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. Thus, an individual sprayer should be designated for application of 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, postemergence control may be less than desirable when applied in granular form. For optimum activity and dollar value, these herbicides need to be applied POST (alone, not mixed with fertilizer) as liquids (contacting the foliage).

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	PRODUCT RATE per 1,000 sq. ft.	LAWNGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS

* Note: * Next to product name, indicates a speciality product that may not be normally sold at common retail garden centers. Product may be available at or require order from agricultural chemical distributor.
* or ** Next to a lawngrass type indicates a specific use precaution in the adjacent use directions and precautions.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	PRODUCT RATE per 1,000 sq. ft.	LAWNGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
Broadleaf Weeds PRE	isoxaben -GALLERY 75 DF	0.25 to 0.5 oz.	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysia	Only PRE herbicide just for broadleaf weed control. Apply to well-established lawns (to newly seeded, re-seeded or over-seeded lawns, 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. Requires activation with ½ in. rain or irrigation within 21 days of application.
Broadleaf Weeds POST	The herbicides 2,4-D, MCPP and dicamba are listed individually due to availability of certain products. However, for optimum broad-spectrum weed control and dollar value, use products that contain combinations of these three herbicides rather than a product with a single herbicide (refer to weed susceptibility table). These herbicides are available under several PRODUCT names. When purchasing, look for the actual herbicide(s) name in small print in the active ingredients at or near the bottom of the front label, or in the use information contained on the back of the package.			
	2,4-D amine -LAWN WEED KILLER (*Eliminator)* -WEED-KILLER (*Ortho)* -WEED STOP (*Spectracide)*	3.2 to 5.2 fl. oz. Ready to Use Ready to Use	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Zoysia	Apply to well-established grasses listed. To newly seeded or re-seeded lawns, delay application until after at least the second mowing (apply only if weeds are present). Delay re-seeding for 2 weeks after last application. Do not apply to newly over-seeded warm season grasses
	MCPP or MCPA -CHICKWEED and CLOVER CONTROL (*Ortho)*	3.3 fl. oz.		

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	PRODUCT RATE per 1,000 sq. ft.	LAWNGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
Broadleaf Weeds POST	dicamba -BANVEL (*BASF*)	0.09 to 0.37 fl. oz.	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Zoysia	Apply to well-established grasses listed. To newly seeded or re-seeded lawns, delay application until after at least the second mowing (apply only if weeds are present). Delay re-seeding for 2 weeks after last application. Do not apply to newly over-seeded warm season grasses
	2,4-D plus MCPA or MCPP plus dicamba -WEED-B-GON -WEED-B-GON *(Ortho)* -LAWN WEED KILLER *(Spectracide)* -LAWN WEED KILLER -BROADLEAF KILLER *(Super K-Grow)* -BROADLEAF KILLER	2.5 to 5 fl. oz. Ready to Use 2 to 4 fl. oz. Ready to Use 2 to 4 fl. oz. Ready to Use		
	clopyralid plus triclopyr -CONFRONT *	0.37 to 0.74 fl. oz.	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysia	Apply only to well-established lawngrasses listed. Do not re-seed within three weeks after application. In addition to other broadleaf weeds, provides activity towards clovers and thistles.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	PRODUCT RATE per 1,000 sq. ft.	LAWNGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
Wild Onion or Garlic (Broadleaf Weeds) POST	Wild onions or wild garlic are perennials requiring repeat applications of the listed herbicides. Target fall application after the first hard frost, and after re-growth has occurred. Optimum control should be achieved with fall and early spring applications, repeated annually. If sufficient regrowth occurs within the spring or fall, a second application will aid in long-term control.			
	2,4-D amine -Various, see previous listing	Product dependent	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Zoysia	Note: Use products containing 2,4-D alone or in combinations. MCPP or MCPA alone will not control or is weak on wild onions or wild garlic. 2,4-D and dicamba have activity towards these weeds.
	2,4-D plus MCPP or MCPA plus dicamba -Various, see previous listing	Product dependent		
	imazaquin -IMAGE 1.5 LC	0.5 to 1 fl. oz.	Bermudagrass Centipedegrass Zoysia	Apply only to well-established warm season grasses listed. Do not apply to warm-season grasses over-seeded with perennial ryegrass. In addition to POST activity towards wild onions or garlic, will provide additional POST activity towards sedges and PRE and POST control of certain broadleaf weeds.

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

Overall Comments: The following table lists post-emergence (POST) herbicide options for controlling sedges. In choosing an option, a weed must be identified as a sedge. 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 weeds have three to eight leaves.
- Make second or third application when weeds have sufficient re-growth (approximately 14 to 21 days after last application).
- Infestations of these weeds are often localized, thus treatment can be a spot spray or treatment of localized infested area.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	PRODUCT RATE per 1,000 sq. ft.	LAWNGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
* Note: * Next to product name, indicates a speciality product that may not be normally sold at common retail garden centers. Product may be available at or require order from agricultural chemical distributor. * or ** Next to a lawngrass type indicates a specific use precaution in the adjacent use directions and precautions.				
Yellow nutsedge and annual sedge POST	bentazon -BASAGRAN T/O -LESCOGRAN	 0.75 fl. oz. 0.75 to 1.5 fl. oz.	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysia	Apply only to well-established lawngrasses listed. Does not control grass weeds. Will provide limited broadleaf weed control. For optimum control, do not mow within 5 days of application and do not apply if rain is anticipated within 48 hours. May require addition of surfactant or non-phytoxic crop oil (refer to product label).

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	PRODUCT RATE per 1,000 sq. ft.	LAWNGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
Purple nutsedge and Kyllinga (in addition to annual sedge and yellow nutsedge) POST	MSMA -MSMA 6.6 L -912 Herbicide -CRABGRASS KILLER *(Green Light)* -CRABGRASS KILLER II *(Ortho)* -CRABGRASS and NUTGRASS KILLER *(Ortho)*	1 fl. oz. 1.5 fl. oz. 1 to 2 fl. oz. 3 fl. oz. Ready to Use (Spot Treatment)	Ky. Bluegrass Fine Fescue * Tall Fescue * Bermudagrass Zoysia **	Bermudagrass is tolerant. * Injury to well-established cool season grasses listed can be severe. ** Well established Zoysia is slightly sensitive. Injury will be temporary when properly applied. Apply when air temperature is 80 to 90 F. Rainfall or irrigation within 24 hours will decrease effectiveness. For control of sedges, repeat applications will be required when sufficent regrowth has occurred (or approximately, 14 to 21 days later). Do not re-seed for at least 2 weeks after last application. May require addition of surfactant or crop oil (refer to product label). In addition to sedges, has activity towards broadleaf weeds and established grass weeds.
	imazaquin -IMAGE 1.5 LC -IMAGE CONSUMER CONCENTRATE	0.5 to 1 fl. oz. 0.6 fl. oz.	Bermudagrass Centipedegrass Zoysia	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 warm season grasses over-seeded with perennial ryegrass. Do not re-seed or over-seed for at least 45 days after application IMAGE 1.5 LC requires addition of non-ionic surfactant at 0.25% volume/ volume. Provides partial control of wild onions or garlic with limited activity towards other broadleaf and grass weeds.
	halosulfuron -MANAGE 75 DF*	0.02 to 0.03 oz.	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysia	Apply only to well established lawngrasses listed. Do not make more than two applications per year. Requires addition of nonionic surfactant at 0.25% volume/ volume. For optimum control, do not mow within two days before or after application.

WEED SUSCEPTIBILITY TO HERBICIDES

BROADLEAF 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 control (G). Fair to poor 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 CALENDAR and the HERBICIDE OPTIONS FOR CONTROLLING LAWN WEEDS.

BROADLEAF WEEDS (from seed)	benefin BALAN	benefin + oryzalin XL2G	benefin + trifluralin TEAM 2G	bensulide BETASAN	napropamide DEVRINOL	dithiopyr DIMENSION	oryzalin SURFLAN	pendimethalin PENDULUM	siduron TUPERSAN	simazine PRINCEP	metolachlor PENNANT	prodiamine BARRICADE	isoxaben GALLERY
Bedstraw	- -	- -	- -	F	- -	- -	- -	- -	N	F	- -	- -	G
Bittercress	- -	G	- -	F	- -	G	G	P	N	F	- -	- -	G
Black medic	- -	- -	- -	- -	- -	G	- -	- -	N	F	- -	- -	G
Buttercup	- -	N	- -	- -	- -	- -	- -	- -	N	P	- -	- -	G
Carolina geranium	- -	N	- -	- -	G	G	G	- -	N	G	G	G	G
Carpetweed	- -	G	G	G	G	G	G	G	N	G	G	G	F
Chickweed, common	N	G	G	G	G	G	G	G	N	G	- -	G	G
Chickweed, mouse-ear	N	P	- -	G	P	G	P	G	N	G	- -	G	G
Clover, hop	N	N	- -	G	- -	- -	N	G	N	G	- -	- -	G
Clover, white	N	N	- -	G	- -	- -	N	P	N	G	- -	- -	G
Dandelion	N	F	- -	- -	- -	- -	G	P	N	P	- -	- -	G
Deadnettle	N	G	G	G	- -	- -	G	G	N	G	P	- -	G
Docks	N	N	- -	G	- -	- -	N	P	N	G	- -	- -	F
Ground ivy	N	N	- -	P	- -	- -	N	P	N	- -	- -	- -	- -
Henbit	N	E	G	G	G	G	G	G	N	G	- -	G	G
Knawel	N	N	- -	- -	G	- -	N	- -	N	G	- -	- -	- -

BROADLEAF 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 control (G). Fair to poor 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 CALENDAR and the HERBICIDE OPTIONS FOR CONTROLLING LAWN WEEDS.

BROADLEAF WEEDS (from seed)	benefin BALAN	benefin + oryzalin XL2G	benefin + trifluralin TEAM 2G	bensulide BETASAN	napropamide DEVRINOL	dithiopyr DIMENSION	oryzalin SURFLAN	pendimethalin PENDULUM	siduron TUPERSAN	simazine PRINCEP	metolachlor PENNANT	prodiamine BARRICADE	isoxaben GALLERY
Knotweed	N	G	G	- -	F	P	G	G	N	F	- -	G	G
Lespedeza	N	N	- -	- -	- -	G	N	- -	N	- -	- -	- -	- -
Mugwort	N	N	N	N	N	N	N	N	N	N	- -	- -	N
Mustards	- -	N	- -	- -	F	G	F	G	N	G	P	- -	G
Pennycress	- -	- -	- -	- -	F	- -	- -	G	N	G	- -	- -	G
Pepperweed	- -	G	- -	- -	G	- -	G	G	N	G	- -	--	G
Plantain	- -	P	- -	- -	P	P	G	P	N	P	G	- -	G
Purslane	- -	G	G	F	G	G	G	G	N	G	G	G	G
Red sorrel	- -	- -	- -	- -	P	- -	N	- -	N	P	- -	- -	G
Redstem filaree	- -	- -	- -	- -	G	- -	G	G	N	G	- -	- -	G
Shepherds-purse	- -	G	- -	G	G	G	G	G	N	G	- -	G	G
Speedwell	- -	N	- -	- -	P	G	N	G	N	G	- -	G	G
Spurge, prostrate	- -	G	- -	- -	P	G	G	G	N	F	F	G	G
Wild carrot	- -	G	- -	- -	P	- -	P	G	N	- -	- -	- -	G
Wild onion or wild garlic	- -	- -	- -	- -	N	- -	N	P	N	- -	- -	- -	- -
Wild strawberry	- -	- -	- -	- -	- -	- -	N	- -	N	- -	- -	- -	- -

BROADLEAF 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 control (G). Fair to poor 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 CALENDAR and the HERBICIDE OPTIONS FOR CONTROLLING LAWN WEEDS.

BROADLEAF WEEDS (from seed)	benefin BALAN	benefin + oryzalin XL2G	benefin + trifluralin TEAM 2G	bensulide BETASAN	napropamide DEVRINOL	dithiopyr DIMENSION	oryzalin SURFLAN	pendimethalin PENDULUM	siduron TUPERSAN	simazine PRINCEP	metolachlor PENNANT	prodiamine BARRICADE	isoxaben GALLERY
Wild violet	- -	- -	- -	- -	- -	- -	N	- -	N	- -	- -	- -	- -
Yarrow	- -	- -	- -	- -	P	- -	N	G	N	- -	- -	G	- -
Yellow woodsorrel (oxalis)	- -	G	- -	G	P	G	G	G	N	P	P	G	G

GRASS AND SEDGE 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; Blank Space = Lack of Information.

For a specific target weed(s) choose an appropriate herbicide that provides excellent (E) to good control (G). Fair to poor 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 CALENDAR and the HERBICIDE OPTIONS FOR CONTROLLING LAWN WEEDS.

GRASS WEEDS (fromseed)	benefin BALAN	benefin + oryzalin XL2G	benefin + trifluralin TEAM 2G	bensulide BETASAN	napropamide DEVRINOL	dithiopyr DIMENSION	oryzalin SURFLAN	pendimethalin PENDULUM	siduron TUPERSAN	simazine PRINCEP	metolachlor PENNANT	prodiamine BARRICADE	isoxaben GALLERY
Common Bermuda	- -	- -	P	P	- -	- -	P	P	- -	F	P	- -	N
Bluegrass, annual	E	E	E	E	G	E	E	E	N	E	G	E	N
Crabgrass	E	E	E	E	E	E	E	E	G	E	G	G	N
Dallisgrass	G	G	F	F	- -	E	F	F	- -	F	G	G	N
Goosegrass	G	E	E	E	G	E	E	E	- -	G	G	G	N
Jewgrass, annual	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	N
Nimblewill	- -	- -	- -	- -	- -	- -	- -	- -	- -	F	- -	- -	N
Orchardgrass	- -	- -	G	- -	G	G	G	G	G	F	- -	G	N
Smutgrass	- -	- -	- -	- -	- -	G	- -	- -	- -	- -	- -	- -	N
SEDGES													
Ann. Sedge	N	N	N	N	N	N	N	N	N	N	G	N	N
Nutsedge, yellow	N	N	N	N	N	N	N	N	N	N	G	N	N
Nutsedge, purple	N	N	N	N	N	N	N	N	N	N	N	N	N
Kyllinga	N	N	N	N	N	N	N	N	N	N	N	N	N

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; Blank Space = Lack of Information.

For a specific target weed(s) choose an appropriate herbicide that provides excellent (E) to good control (G). Fair to poor 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 CALENDAR and the HERBICIDE OPTIONS FOR CONTROLLING LAWN WEEDS.

WEEDS	clopyralid + triclopyr CONFRONT	fluazifop FUSILADE	sethoxydim VANTAGE	2,4-D VARIOUS	MCPP VARIOUS	dicamba VARIOUS	2,4-D+ MCPP+ dicamba VARIOUS	glyphosate ROUNDUP	bentazon BASAGRAN	DSMA or MSMA VARIOUS	imazaquin IMAGE	halosulfuron MANAGE
BROADLEAF SEEDLINGS												
Bedstraw	G	N	N	F	P	E	E	G	P	P	- -	- -
Bittercress	G	N	N	G	P	E	E	G	F	F	G	- -
Black medic	E	N	N	P	P	F	E	G	P	- -	G	- -
Buttercup	G	N	N	G	P	F	E	G	P	P	G	- -
Carolina geranium	G	N	N	P	P	E	E	G	P	P	G	- -
Carpetweed	G	N	N	G	P	E	E	G	P	F	- -	- -
Chickweed, common	P	N	N	G	P	E	E	G	F	G	G	P
Chickweed, mouse-ear	P	N	N	P	G	E	G	G	P	P	G	- -
Clover, hop	E	N	N	P	G	G	G	G	P	P	- -	- -
Clover, white	E	N	N	P	G	G	G	G	P	P	G	- -
Dandelion	E	N	N	G	G	E	E	G	P	P	F	- -
Deadnettle	E	N	N	F	P	E	E	G	P	P	G	- -
Docks	E	N	N	G	P	G	E	G	P	P	- -	- -
Ground ivy	G	N	N	P	F	G	E	G	P	P	- -	- -
Henbit	E	N	N	P	G	G	E	G	P	F	G	- -
Knawel	E	N	N	F	P	G	G	G	P	P	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; Blank Space = Lack of Information.

For a specific target weed(s) choose an appropriate herbicide that provides excellent (E) to good control (G). Fair to poor 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 CALENDAR and the HERBICIDE OPTIONS FOR CONTROLLING LAWN WEEDS.

WEEDS	clopyralid + triclopyr CONFRONT	fluazifop FUSILADE	sethoxydim VANTAGE	2,4-D VARIOUS	MCPP VARIOUS	dicamba VARIOUS	2,4-D+ MCPP+ dicamba VARIOUS	glyphosate ROUNDUP	bentazon BASAGRAN	DSMA or MSMA VARIOUS	imazaquin IMAGE	halosulfuron MANAGE
Knotweed	E	N	N	P	E	G	G	G	P	F	- -	- -
Lespedeza	E	N	N	P	P	G	G	G	P	P	- -	- -
Mugwort	G	N	N	N	N	P	G	F	P	P	- -	- -
Mustards	G	N	N	G	G	G	E	G	G	F	- -	- -
Pennycress	G	N	N	G	G	G	E	G	F	P	- -	- -
Pepperweed	G	N	N	G	G	G	E	G	F	P	- -	- -
Plantain	E	N	N	G	G	G	E	G	P	P	- -	- -
Purslane	G	N	N	G	G	G	E	G	G	P	- -	G
Red sorrel	E	N	N	P	P	G	F	G	P	P	G	- -
Redstem filaree	- -	N	N	P	P	G	G	G	P	P	- -	- -
Shepherds-purse	- -	N	N	G	G	G	E	G	G	P	- -	- -
Speedwell	P	N	N	P	P	G	G	G	F	P	- -	- -
Spurge, prostrate	G	N	N	P	P	G	E	G	- -	F	- -	- -
Wild carrot	- -	N	N	P	P	F	E	G	- -	P	- -	F
Wild onion or wild garlic	N	N	N	G	P	G	G	P	P	P	- -	- -
Wild strawberry	E	N	N	P	- -	G	E	G	P	P	- -	- -

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; Blank Space = Lack of Information.

For a specific target weed(s) choose an appropriate herbicide that provides excellent (E) to good control (G). Fair to poor 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 CALENDAR and the HERBICIDE OPTIONS FOR CONTROLLING LAWN WEEDS.

WEEDS	clopyralid + triclopyr CONFRONT	fluazifop FUSILADE	sethoxydim VANTAGE	2,4-D VARIOUS	MCPP VARIOUS	dicamba VARIOUS	2,4-D+ MCPP+ dicamba VARIOUS	glyphosate ROUNDUP	bentazon BASAGRAN	DSMA or MSMA VARIOUS	imazaquin IMAGE	halosulfuron MANAGE
Wild violet	E	N	N	P	- -	G	E	G	P	P	G	- -
Yarrow	G	N	N	P	- -	G	E	G	P	P	- -	- -
Yellow woodsorrel (oxalis)	F	N	N	P	- -	G	E	F	P	G	- -	F
GRASSES												
Common Bermuda	N	G	G	N	N	N	N	G	N	P	N	N
Bluegrass, annual	N	G	G	N	N	N	N	G	N	P	F	N
Crabgrass	N	G	G	N	N	N	N	G	N	G	F	N
Dallisgrass	N	G	G	N	N	N	N	G	N	G	P	N
Goosegrass	N	G	G	N	N	N	N	G	N	F	P	N
Jewgrass, annual	N	G	G	N	N	N	N	G	N	G	- -	- -
Nimblewill	N	G	G	N	N	N	N	G	N	F	- -	N
Orchardgrass	N	G	G	N	N	N	N	G	N	P	- -	N
Smutgrass	N	G	G	N	N	N	N	F	N	F	- -	- -
SEDGES												
Ann. Sedge	N	N	N	N	N	N	N	G	G	F	F	E

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; Blank Space = Lack of Information.

For a specific target weed(s) choose an appropriate herbicide that provides excellent (E) to good control (G). Fair to poor 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 CALENDAR and the HERBICIDE OPTIONS FOR CONTROLLING LAWN WEEDS.

WEEDS	clopyralid + triclopyr CONFRONT	fluazifop FUSILADE	sethoxydim VANTAGE	2,4-D VARIOUS	MCPP VARIOUS	dicamba VARIOUS	2,4-D+ MCPP+ dicamba VARIOUS	glyphosate ROUNDUP	bentazon BASAGRAN	DSMA or MSMA VARIOUS	imazaquin IMAGE	halosulfuron MANAGE
Yellow nutsedge	N	N	N	N	N	N	N	G	G	F	G	E
Purple nutsedge	N	N	N	N	N	N	N	F	N	F	G	E
Kyllinga	N	N	N	N	N	N	N	F	N	F	G	G

Overall Comments: In lawns, the presence of moss and algae is an indicator of one or more of the following conditions: poor drainage; compacted soil; acid soil (high acidity or low pH); low soil fertility, and/or heavy or intense shading (restricted light for optimum grass growth). Thus, chemical treatment will only provide temporary control.

Before applying control treatment, assess soil condition for these factors, including a soil test for fertility and pH. Make corrective treatments to encourage turf growth and to help prevent recurrence.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	PRODUCT RATE per 1,000 sq. ft.	LAWNGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
Moss POST	copper sulfate iron sulfate ferrous sulfate (VARIOUS)	3 to 5 fl. oz. 2 to 3 fl. oz. 2 to 3 fl. oz.	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysia	Add appropriate amount in 5 gallons of water using a garden-type liquid sprayer.
	sulfate of ammonia (VARIOUS)	10 lbs.		Apply when moss is damp from dew or sprinkler irrigate.
Algae POST	copper sulfate (VARIOUS)	1 to 2 oz.		Apply in 4 gallons of water using a garden type liquid sprayer.
	hydrated lime	3 to 5 lbs.		Make application evenly to the problem area.

HONEYSUCKLE, SUMAC, KUDZU and POISON IVY: HERBICIDE OPTIONS

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	PRODUCT RATE per gallon (Spot Spray)	LAWNGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
Honeysuckle, Sumac, Kudzu, Poison Ivy and other woody weeds POST	Control of these weeds is difficult, as they are aggressive perennials and plants are often entangled with desired trees and shrubs. For control of these weeds there are three application techniques; 1. Spray application directly to foliage when not entangled in desired vegetation. 2. Spot application directly to the foliage with paint brush, rag or sponge (when desired vegetation present). 3. Cut stem near soil surface, and spot apply to newly cut stump with paint brush, rag or sponge (when desired vegetation present). Use concentrated form - see label for instructions. CAUTION: Avoid contact with desired vegetation. Misapplication may result in loss of desired vegetation.			
	Glyphosate -VARIOUS e.g. ROUNDUP	5 to 10%	NON-TOLERANT	Mix with water at 5 to 10 percent for spot spray or spot treatment. For optimum activity, apply when weeds are in flowering stage.
	triclopyr -BRUSH-B-GON CONCENTRATE -BRUSH B-GON *(Ortho)* -ENFORCER BRUSH KILLER	Ready to Use 3% or 4 fl. oz. See Label		This herbicide is effective towards these weeds. Exercise caution to avoid contact with soil and desired foliage. Root uptake by desired plants is possible when soil is contacted.
	2,4-D plus MCPP plus dicamba -BRUSH KILLER CONCENTRATE -BRUSH KILLER *(Spectracide)*	Ready to Use 3 to 5%	Ky. Bluegrass Fine Fescue Tall Fescue Bermudagrass Centipedegrass Zoysia	CAUTION: Application of products containing these herbicides could result in damage or death of desired vegetation when present. These products are meant for use when desired ornamentals are not present. Wet foliage to cover but do not spray to runoff.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	PRODUCT RATE per gallon (Spot Spray)	LAWNGRASS TOLERANCE: Cool-Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
Common Bermuda and other grass weeds POST	sethoxydim -VANTAGE fluazifop -FUSILADE II glyphosate (VARIOUS) -ROUNDUP	1.5% 1.5% 2 to 5%	NON-TOLERANT	CAUTION: Application will result in damage or death of desired grasses. Common bermudagrass (and other perennial grasses) will require repeat applications. VANTAGE or FUSILADE II will not control sedges or broadleaf weeds. Fusilade or Roundup may require a surfactant.

Overall Comments: This section suggests herbicides for spot treatment of areas free of desirable vegetation (e.g. control of weeds in cracks in sidewalks and driveways, and around structures where no desired vegetation is present). These are non-selective herbicides providing activity towards all plants. Thus, they are not intended for use in or around desired vegetation. If desired vegetation is contacted, immediately wash treated foliage with water.

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	PRODUCT RATE per gallon (spot spray)	LAWNGRASS TOLERANCE: Cool -Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
All Weeds including perennials POST (Spot Treatment)	<u>Systemic Herbicides</u>. The following products contain herbicides with systemic activity. These products will move within the plant 'systemically' from the point of contact to shoots and roots not contacted in the initial application. These products provide activity towards all plants including desired and undesired (grass, broadleaf and grass-like weeds). For control of perennial weeds, systemic herbicides are preferred.			
	glyphosate -WEED AND GRASS KILLER *(Eliminator)* -ROUNDUP	3.5 fl. oz. 3.2 fl. oz.	NON-TOLERANT	
	diquat plus fluazifop -SYSTEMIC GRASS AND WEED KILLER *-SYSTEMIC GRASS AND WEED KILLER* *(Spectracide)*	8 to 12 fl. oz. Ready to Use		Note: Diquat is not systemic (contact only). Fluazifop is systemic in grasses only (with no activity towards broadleaf weeds when used alone).

Target Weeds and APPLICATION TYPE	Herbicide and PRODUCT (examples)	PRODUCT RATE per gallon (spot spray)	LAWNGRASS TOLERANCE: Cool -Season Warm-Season	USE DIRECTIONS AND PRECAUTIONS
All Weeds (limited activity towards perennials) POST	Non-systemic (contact) herbicides. The following products contain herbicides that do not provide systemic activity. These herbicides generally have little movement to other plant parts not contacted by the initial application. Thus, use is best suited towards non-perennial plants. These herbicides are preferred for making applications to reduce the risk of detrimental injury resulting from misapplication to desired plants (e.g. edging of walkways and roadside curbs).			
	diquat -LIQUID EDGER *(Real Kill)*	Ready to Use	NON-TOLERANT	
	$NaClO_3$ plus diquat -LIQUID EDGER *(Security)*	Ready to Use		
	glufosinate -FINALE	3 to 8 fl. oz.		
	prometon -TOTAL VEGETATION KILLER *(Spectricide)*	8 fl. oz.		Do not apply where roots of desirable trees or shrubbery may be present.