W 1068

Lawn and Landscape Weed Control for Homeowners

Gregory Breeden, Extension Specialist
Jim Brosnan, Professor and Director
Tom Samples, Professor
Natalie Bumgarner, Associate Professor

Department of Plant Sciences

Introduction

Weeds found throughout lawns and landscapes can be challenging to control. For example, stolons (i.e., "runners") from a bermudagrass (*Cynodon* spp.) lawn can encroach into a plant bed, making bermudagrass a weed in one spot but not the other. There can also be a wide array of plant materials in lawns and landscapes — including desirable turfgrass, flowers and shrubs, as well as weeds. This diversity can make herbicide selection difficult as some products used to control weeds in lawns may be injurious to flowering plants in landscape beds, and vice-versa. Often, selection of plant materials for the landscape is dictated by aesthetic attributes to showcase a property (Image 1) while maintenance of weeds (and other pests) after installation is not considered. This publication is intended to guide homeowners with decisions pertaining to weed control in lawn and landscape areas and provide suggestions for balancing the management of these areas within residential spaces.

Image 1: Plant selection can enhance residential landscapes. Photo credit: J. Brosnan.

Cultural Practices for Lawns

Lawns across Tennessee can be established using cool-season (i.e., grasses that remain green throughout much of the year) or warm-season (i.e., grasses that are brown in winter during dormancy) turfgrasses. The most common cool-season turfgrass used to establish lawns in Tennessee is tall fescue *(Festuca arundinacea)* while the most common warm-season turfgrass is bermudagrass. Whether it's cool- or warm-season, the best defense against any weed infestation is maintaining a dense, vigorous stand of turfgrass.

Selecting the proper species for a lawn is a critical first step to limiting weeds in the landscape. For example, warm-season species such as bermudagrass require sunlight to grow optimally and will struggle in shaded landscapes. Conversely, to grow vigorously through the summer, tall fescue lawns will require supplemental irrigation as well as timely applications of fungicide to control summer diseases. More information on the attributes of different turfgrass species can be found here: https://ag.tennessee.edu/turf/Pages/Turfgrass-Selection.aspx.

Mowing

Mowing Height. Bermudagrass, zoysiagrass (*Zoysia* spp.), and several other turfgrass species are classified as sod-forming grasses due to their ability to grow laterally by way of stolons and/or rhizomes. Generally, these sod forming species can be maintained at a slightly lower mowing height than turfgrasses such as chewings, hard and tall fescues which have a bunch-type growth habit. Mowing height affects root growth with lawns maintained at higher mowing heights producing deeper roots than those mowed lower.

Optimum mowing height ranges vary among turfgrass species and according to weather conditions. For example, when it is cool (60 F to 75 F), improved, turf-type tall fescues usually perform well at a mowing height from 2 inches to 3 inches (Table 1). However, it is advisable to increase the mowing height of this cool-season species in advance of hot, dry weather (Image 2). Warm-season turfgrasses can be mowed a bit lower during favorable growing conditions than during cold and dry weather. For example, hybrid bermudagrass *(C. dactylon* x. *C. transvaalensis)* varieties (e.g., Tifway, etc.) usually perform well at a mowing height from 0.75 to 1.5 inches when air temperatures are warm (greater than 80 F) and the soil is moist. Increasing the mowing height of hybrid bermudagrass by one-half inch or more in early fall may help plants survive extremely cold and dry periods during winter dormancy.

Table 1. Optimum Mowing Height (Inches) of Several Turfgrasses in Residential Landscapes.

	Weather Conditions	
Species	Cool, Humid	Hot, Dry
Cool Season		
Fescues		
Chewings	1 – 2	1½ - 3
Creeping Red	1 – 2	1½ - 3
Hard	1 – 2	1½ - 3
Tall	2 – 3	2½ - 3½
Kentucky Bluegrass	1½ - 2¼	2¼ - 3
Perennial Ryegrass	1½ - 2	2 – 3
	Weather Conditions	
Species	Warm, Moist	Cold, Dry
Warm Season		
Bermudagrasses		
Common Types	1 – 2	1¾ - 3
Hybrid	¾ - 1½	1¼ - 2
Centipedegrass	1 – 2	1½ - 3
St. Augustinegrass	2- 3	3 – 4
Zoysiagrass	¾ - 1½	1¼ - 2

Image 2: Wheel adjustments on rotary mowers can raise or lower mowing height. Photo credit: J. Brosnan.

Mowing Frequency. To reduce mowing damage and prevent large amounts of clippings from being returned to the surface, no more than one-third of each leaf should be removed as the lawn is mowed. If turfgrass plants are routinely "scalped," stored carbohydrates in roots are mobilized to support leaf growth and recovery, and may not be replenished, resulting in a shallow and very sparse root system. Mowing frequency will likely vary throughout the season. For example, a tall fescue lawn might require mowing once a week in April compared to only once per month in July.

Mower Maintenance. Routine mowing dulls the cutting edges of mower blades, reels and bedknives. It is possible to reduce leaf damage and the potential for disease by sharpening blades and bedknives when its apparent cut quality has diminished as indicated by a ragged appearance on cut ends of grass blades (Image 3). Additionally, thoroughly rinsing mowers (e.g., blades/bedknives, mower body, wheels, etc.) free of debris after use can prevent movement of unwanted weed seeds throughout the landscape.

Mowing Direction. Changing direction from one mowing to the next will limit soil compaction caused by mower wheels while encouraging turfgrass plants to grow upright (Image 4).

Clippings. Turfgrass leaves contain nitrogen (N), phosphorus (P) and potassium (K) along with 11 more essential mineral nutrients. Research suggests that nitrogen fertilizer application rates can be reduced by as much as 50 percent when clippings are returned to the lawn as it is mowed (i.e., not collected during mowing). When mowing lawns that contain numerous weeds that are flowering and producing seed, consider collecting clippings to prevent weed seed from being deposited back into the soil profile.

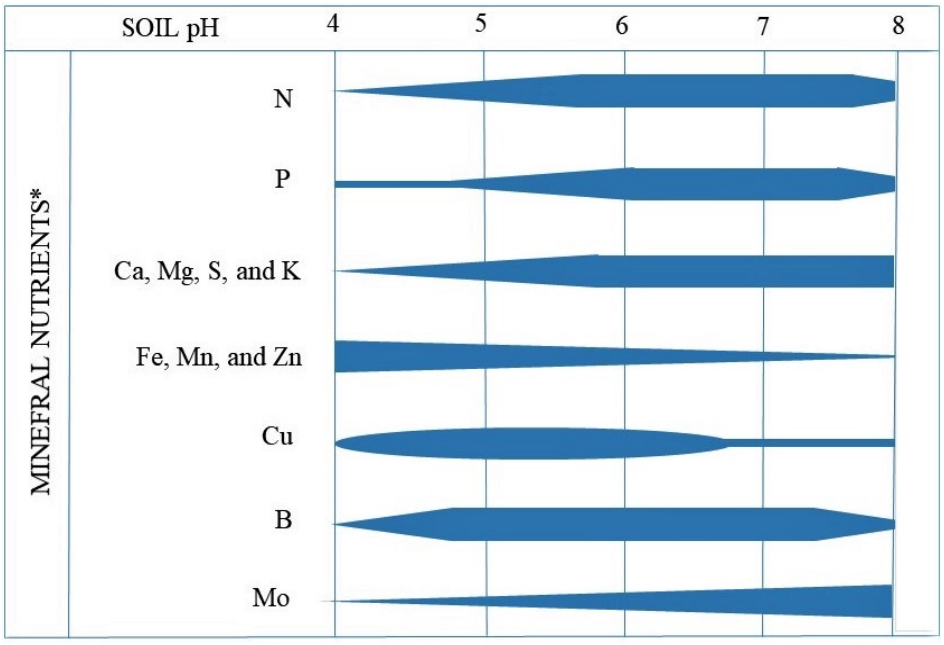
Image 3: Ragged leaf blades after being mowed with dull mower blades. Photo credit: J. Brosnan.

Image 4: Changing mowing direction is recommended. Photo credit: J. Brosnan.

Fertilizing and Liming

Soil pH. Of the nutrients essential for turfgrass growth and survival, three (carbon, hydrogen and oxygen) are not minerals, and are supplied by water or carbon dioxide. The remaining nutrients are minerals supplied by the soil. These essential mineral nutrients are available for uptake by turfgrasses when the soil is slightly acidic (pH = 6.0 to 6.9; Table 2).

Table 2. General Nutrient Availability Across Soil pH.



* N (nitrogen), P (phosphorus), Ca (calcium), Mg (magnesium), S (sulfur), K (potassium), Fe (iron), Mn (manganese), Zn (zinc), Cu (copper), B (boron) and Mo (molybdenum)

Soil Testing. A basic soil nutrient test is recommended to determine the soil pH. Based on the soil test results, limestone can be applied to raise the soil pH, and sulfur can be applied if the soil pH needs to be lowered. In addition to information regarding the soil's pH, a nutrient test conducted in the UT Extension Soil Testing Laboratory in Nashville includes an estimate of the levels of plant-available phosphorus, potassium, calcium, magnesium, zinc, manganese, iron, sodium and boron.

Nitrogen Fertilization

Cool-season Turfgrasses. Cool-season turfgrasses grow best when air temperatures range from 60 F to 75 F. As a result, their nutritional need rises in both spring and fall. The fertilization schedule for cool-season turfgrasses depends on the level of maintenance provided annually. Example nitrogen (N) fertilization schedules are presented in Table 3.

Warm-season Turfgrasses. Since they grow best at air temperatures from 80 F to 95 F, warm-season turfgrasses require more nutrition in late spring, summer and early fall than during other times of the year. The fertilization schedule for warm-season turfgrasses, like that of the cool-season turfgrasses, depends on the intensity level at which the lawn is being maintained. Greater inputs of nitrogen will result in the need for more intensive maintenance, particularly greater mowing and irrigation requirements. Example fertilization schedules for bermudagrass lawns are presented in Table 3. Since zoysiagrass requires less N than bermudagrass, zoysiagrass lawns most often perform well when 0.75 pounds of N per 1,000 square feet rather than 1 pound of N per 1,000 square feet is applied as scheduled for bermudagrass below.

Table 3. Example nitrogen fertilization schedule for cool- and warm-season turfgrass lawns in Tennessee maintained at differing levels of intensity.

Turfgrass	Intensity of Maintenance*	Nitrogen Rate (per 1000 ft²)	Application Dates
Cool-season (e.g., tall fescue)	Low	0.5 lb N	March + September
	Medium	0.5 lb N	March + September + October
	High	0.5 – 1.0 lb N	March + April + September + October + November
Warm-season (e.g., bermudagrass)	Low	1 lb N	April + July
	Medium	1 lb N	April + July + September
	High	1 lb N	April + June + July + September

**High intensity maintenance assumes that the lawn is irrigated*

Turf Fertilizers. Nitrogen (N), phosphorus (P) and potassium (K) are each classified as a primary nutrient due to the amount required by turfgrasses. Although the recommended annual application rate of N is based on the turfgrass plant needs and level of lawn maintenance, the recommended annual amount of both P and K is dependent on turfgrass plant need, and soil test value. In general, turfgrass nutrient needs are ranked in the following order: N > K > P. As a result, granular fertilizers marketed for use in lawns often contain more N than either phosphate (which contains P) or potash (which contains K), and more potash than phosphate (Image 5).

Image 5: This granular turf fertilizer contains 21 percent nitrogen, 2 percent phosphate and 4 percent potash. Photo from https://partners.simplot.com/product/Nitra-King-2124.

Irrigation

An actively growing turfgrass plant usually contains more than 70 percent water.

Depending on the species, variety, and growing conditions, turfgrasses may use from one-tenth to three-tenths inch of water or more per day. Irrigation is an essential practice for maintaining a healthy lawn. However, when irrigating, it is critically important to ***conserve water*** which will limit costs associated with irrigation and reduce the potential for disease and weeds to invade the lawn. Irrigation recommendations include:

- Moisten the soil beneath the lawn without applying too much water. Runoff of irrigation water or surface ponding are indicators of excessive watering.
- Conserve water by irrigating in the morning, but do not increase the potential for spreading disease by irrigating while dew is present. For example, activate the irrigation system from 3:00 a.m. to 6:00 a.m. and 10:00 a.m. to no later than 1:00 p.m.
- Do not irrigate at sunset; turfgrass leaves that remain moist overnight are susceptible to disease.
- Have a rain sensor installed if there is none.

In addition to primary cultural practices (i.e., mowing, fertilizing, irrigating), several supplemental practices can be used to promote optimal growth and stand density of warm- or cool-season turfgrass lawns, which helps to prevent weed encroachment.

Dethatching. Thatch is an intermingled layer of dead and living leaves, stems and roots located between the aerial shoots and the soil surface that forms as turfgrasses grow (Image 6). When organic matter is produced faster than it is decomposed, a thatch layer develops. Thatch helps insulate crowns and growing points of the turfgrass plant against rapid changes in temperature. It is also resilient, providing a shock-absorbing cushion from foot and maintenance equipment traffic. However, too much thatch can restrict the movement of air, water and fertilizer into the turfgrass root zone. Excessive thatch often accumulates in lawns that are over-fertilized and/or over-irrigated; that production is also typically greater in warm-season lawns compared to those composed of cool-season turfgrass. Turfgrass plants rooted in thatch are prone to drought stress and disease. The depth of the thatch layer can be measured with a ruler. Lawns with more than one-half inch of thatch usually benefit from dethatching. Dethatch while plants are actively growing so that the soil below the slicing blades does not remain exposed for a long period of time, thereby allowing weed seeds to germinate (Image 7). As a general rule, warm-season grasses like bermudagrass can be dethatched more aggressively than cool-season grasses like tall fescue.

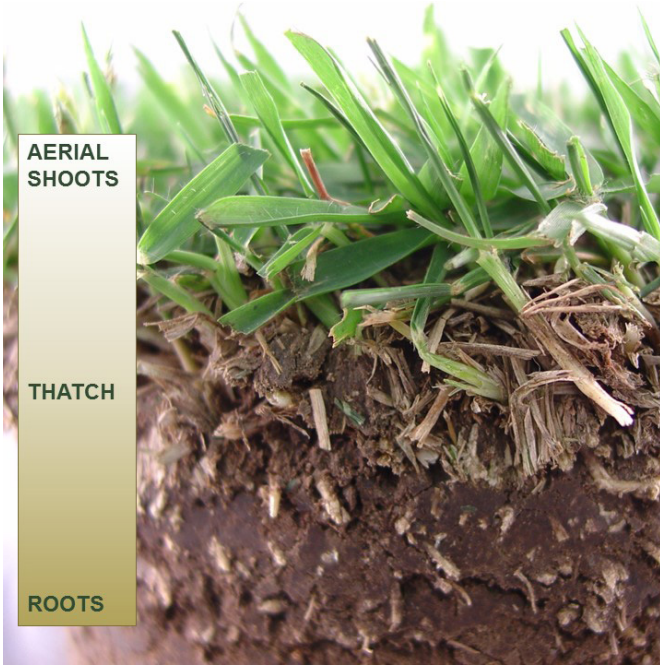


Image 6: A thatch layer forms on the soil surface as turfgrasses grow. Photo credit: T. Samples.

Image 7: Mechanical dethatchers are engineered to slice into the lawn and lift thatch. Photo credit: T. Samples.

Core Aerification. Soils in which turfgrasses grow often compress, or compact, as the lawn receives foot and maintenance equipment traffic each year. The amount of pore space in a soil is reduced as it is compacted. A lack of oxygen and moisture in compacted soil near the surface of the turfgrass root zone leads to very poor root growth. Walk-behind, rotary-motion core aerifiers can be used to selectively cultivate a lawn and relieve soil compaction (Image 8). Topdressing with high-quality compost immediately after aerification can improve the quality and performance of the lawn.

Image 8: Walk-behind core aerifiers equipped with hollow coring tines pull out small plugs, and deposit them on the surface as the lawn is aerated. Photo credit: T. Samples.

Cultural Practices for Landscape Beds

Site Preparation. Landscape beds can provide aesthetic, environmental and economic benefits to residences when installed and maintained properly. Weed control in landscape beds actually begins with proper planning and cultural practices even before plants are installed. First, areas selected for landscape beds should be well prepared. Site preparation can and should include a focus on amending soil if needed to increase organic matter as well as controlling existing weeds. Whether via mechanical or manual cultivation and/or herbicides, proper control of weeds in landscape beds prior to planting is critical.

Plant Selection. Focusing on species and cultivars that are well suited to the site can support weed control through the growth of healthy landscape plants. Optimize light and moisture conditions within a landscape bed so that selected plants can grow and thrive. Plant placement that provides as much ground coverage as possible (without overplanting, which can lead to poor health and performance) can reduce weeds in landscape beds by blocking light that induces germination of many annual weed species. Many ground cover species can also be effective in suppressing weed growth, but care should be taken to not install groundcovers with invasive tendencies. Additionally, some landscape plants can also reseed and naturalize over time to expand coverage in the landscape bed.

Mulching. Providing good soil cover through mulching is the foundation for effective weed control in landscape beds. Mulching functions to support plants through soil stabilization, water holding, and temperature moderation, in addition to suppressing weeds. Mulch serves to block light required for weed seed germination in addition to providing a physical barrier against weed growth. Research has shown that for organic mulches, a depth of at least 2 to 3 inches is required for weed suppression. In general, organic mulches made of coarser materials provide better weed suppression as they dry out faster and do not provide a site for weed germination. Too much mulch can have a negative effect on desirable landscape plants by blocking water and air movement. This contributes to plant decline (such as volcano mulching trees; Image 9) and potentially provides habitat for damaging wildlife, such as voles. On the other hand, too little mulch will not provide a lasting barrier against weeds, so proper depth is critical. The addition of a preemergence (PRE) herbicide to the mulch barrier can aid with weed control in landscape beds.

Image 9: Improper (i.e., volcano) mulching of trees. Photo credit: L. Rumble.

Inorganic mulches are also commonly used in residential landscapes, but homeowners should be cautious because landscape fabrics or geotextiles have variable and even negative impacts. Impermeable materials are not recommended due to their potential negative effects on water, air and nutrients in the soil. Permeable landscape fabrics can sometimes be an asset in weed control but are not recommended in Tennessee landscapes. While permeable landscape fabrics can provide short-term suppression of annual weeds, these materials often fail over time when subjected to pressure from perennial weeds. Additionally, these landscape fabrics (as well as rock and other inorganic options) do not degrade or provide benefits to the soil via addition of organic matter. Because of the valuable role organic mulches play in supporting both soil quality and plant growth when properly used, they are an excellent and sustainable material to support long-term health and performance in landscape beds.

Mechanical Weed Control Methods. Hand weeding is an effective cultural control in landscape beds. It can be less damaging to existing plants and soil structure than mechanical tillage, which is most appropriate for initial bed preparation. Placing irrigation sources in proximity to root systems, such as through individual drippers, instead of spreading broadly over the bed can also reduce weed growth of some species.

These cultural practices implemented both before and after landscape bed planting are essential for plant success as well as effective weed control. Because many landscape beds contain a range of plant material, herbicide options are often limited in established planting beds. So, the proper use of preventative cultural practices is critical whether used alone or in combination with chemical control options.

Chemical Weed Control for Lawns and Landscapes

Many hardware and landscape supply stores offer an array of herbicides to control weeds in lawns and landscape beds (Image 10). It is important to understand the attributes of different herbicides in order to select the best option for use in a lawn or landscape area. An overview of how herbicides are broadly categorized is presented in Image 11.

Selectivity — Selective herbicides are used to remove unwanted plants (i.e., weeds) from those species that are desirable (i.e., tall fescue plants in a lawn). These herbicides "select" for a target weed amongst the other desirable species that exist within the lawn or landscape. Examples of selective herbicides include 2,4-D, MCPP, dicamba and quinclorac. ***It is important to note that selectivity is predicated on the herbicide being applied in accordance with label directions.***

On the contrary, non-selective herbicides will affect all plant species to which they are applied — including both weeds and those that are desired. Examples of non-selective herbicides include glyphosate, glufosinate and diquat. Many herbicides marketed as "natural products" contain high concentrations of vinegar, fatty acids or oils that are non-selective and will therefore injure both weeds and desirable species.

Systemic vs. Contact — Systemic herbicides are absorbed into plant tissue and move to growing points (i.e., translocate) to work properly. Many selective herbicides are classified as systemic. Contact herbicides do not move throughout plant tissue and are used for rapid foliar burndown. Several non-selective herbicides are classified as contact, particularly natural products containing vinegar, fatty acids or oils

PRE vs POST — Preemergence herbicides are applied before weeds are visible aboveground. These herbicides are selective and typically target annual weeds germinating from seed. Preemergence herbicides have activity in soil for several weeks after application and must be watered in after application to be effective.

Postemergence (POST) herbicides are applied after weeds are visible aboveground. They are optimally applied to young plants that are actively growing. Environmental conditions can affect efficacy of POST herbicides. For example, rainfall or irrigation immediately following an application of POST herbicide could prevent proper absorption into leaf tissue.

Image 10: Many stores offer an array of different herbicides to chemically control weeds in lawns and landscapes. Photo credit: J. Brosnan.

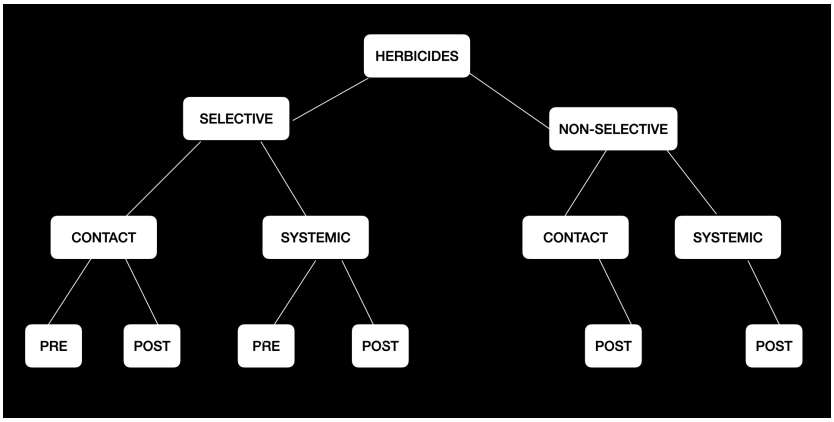


Image 11: Classification of different herbicides used for weed control. Photo credit: J. Brosnan.

What are the most common weed species in the Tennessee lawns and landscapes?

There are three types of weeds commonly found in Tennessee lawns and landscapes: grasses, broadleaves, and sedges.

- Grasses are referred to as monocots in that they produce one leaf (e.g., cotyledon) when germinating from seed (Image 12). Grass leaves are linear in shape and often have parallel veins spanning the length of the leaf.
- Broadleaves are referred to as dicots in that they produce two leaves (e.g., cotyledons) when germinating from seed (Image 13). Broadleaf weeds can produce leaves with an array of different shapes from oval to oblong with veins that are often webbed in appearance.
- Sedges look similar to grasses in that they are monocots; however, leaves lack characteristics found on most grasses (i.e., collars, auricles, ligules, etc.). Moreover, sedge weeds often have triangular stems (Image 14) and produce leaves in groups of three. Some sedge weeds grow from underground tubers making them very difficult to eradicate.

Understanding the life cycle of the weed species requiring control will dictate the best control strategy in lawns and landscapes across Tennessee.

Image 12: Monocotyledon (i.e., grass) weed germinating from seed. Photo credit: J. Brosnan.

Image 13: Dicotyledon (i.e., broadleaf) weed germinating from seed. Photo credit: J. Vargas.

Image 14: Triangular stem of yellow nutsedge *(Cyperus esculentus)*. Photo credit: J. Brosnan.

Annual Weeds

Many common weeds found in Tennessee landscapes are considered annuals, plants that germinate and produce seeds within a year. Common annual species include grass and broadleaf weeds such as crabgrass (*Digitaria* spp., Image 15), annual bluegrass (*Poa annua,* Image 16), prostrate spurge (*Euphorbia maculate,* Image 17), yellow woodsorrel (*Oxalis stricta,* Image 18), henbit (*Lamium amplexicaule,* Image 19), purple deadnettle (*Lamium purpureum,* Image 20) and hairy bittercress (*Cardamine hirsute,* Image 21).

Summer annuals germinate in the spring, grow throughout the summer, and often die following the first frost in autumn. Summer annual species will flower and produce seed during summer that facilitates their return the following season. Common summer annual weeds found in lawns and landscape beds include crabgrass, goosegrass (*Eleusine indica,* Image 22), yellow woodsorrel and prostrate spurge.

Winter annuals germinate in late summer and grow during winter and early spring. These weeds produce flowers and seed in spring before dying in early summer when temperatures increase. Common winter annual weeds found in lawns and landscape beds include annual bluegrass, common chickweed (*Stellaria media,* Image 23), henbit and purple deadnettle.

Image 15: Smooth crabgrass *(Digitaria ischaemum).* Photo credit: J. Brosnan.

Image 16: Annual bluegrass *(Poa annua).* Photo credit: J. Brosnan.

Image 17: Prostrate spurge *(Euphorbia maculata).* Photo credit: J. Brosnan.

Image 18: Yellow woodsorrel *(Oxalis stricta).* Photo credit: J. Brosnan.

Image 19: Henbit *(Lamium amplexicaule).* Photo credit: J. Brosnan.

Image 20: Purple deadnettle *(Lamium purpureum).* Photo credit: J. Brosnan.

Image 21: Hairy bittercress *(Cardamine hirsuta).* Photo credit: J. Brosnan.

Image 22: Goosegrass *(Eleusine indica).* Photo credit: J Brosnan.

Image 23: Common chickweed *(Stellaria media).* Photo credit: J. Brosnan.

Annual weeds are best managed via a properly timed PRE herbicide application. These herbicides are designed to control seedling plants before they have emerged from soil. It is critically important to apply PRE herbicides before weed seed has germinated; if plants are visible (i.e., have emerged) the application is too late and control will be compromised. Many hardware and landscape supply stores offer PRE herbicides on granular carriers that can be spread easily across lawn and landscape sites. Always be sure to follow all label directions before application. To be effective, PRE herbicides must be watered into the soil (via irrigation or rainfall) within 24 to 48 hours after application. Labels provide guidance on how much water to apply for maximum effectiveness. Most PRE herbicides interfere with the establishment and root growth of recently planted or soon-to-be planted desirable species. Always read and follow label instructions as they relate to application timing both before and after planting desirable species, particularly in landscape beds or when attempting to overseed a lawn.

Generally, PRE herbicides will provide weed control for 12-16 weeks after application depending on the product selected and application rate. However, the level of control provided will dissipate over time. Using a split application strategy where an herbicide is applied twice at a lower rate can extend the length of residual control provided by a preemergence herbicide. For example, when targeting summer annual weeds in lawns, split applications of PRE herbicides are recommended. Initial applications are made in spring when (24-hour) soil temperatures average 55 F (in the upper 2 inches of the soil) for several consecutive days. These initial treatments are typically and followed by another application eight weeks later.

Perennial Weeds

Perennial weeds live for multiple seasons and are often more difficult to control than annual species. Preemergence herbicides will not control established perennial weeds, as these species form underground structures, such as rhizomes and tubers, that allow them to overwinter in Tennessee. Ground ivy (*Glechoma hederacea,* Image 24) and wild violet (*Viola* spp., Image 25) are difficult-to-control perennial broadleaf weed species in many lawns across Tennessee. Sedges and bermudagrass are also perennial weeds that can be troublesome both in lawns and landscape beds.

Perennial Broadleaf Weeds

Given their perennial nature, there are no PRE herbicides that can be used to control established stands of perennial broadleaf weeds like ground ivy or wild violets in lawns. These species are difficult to control and often require sequential applications of POST herbicides such as 2,4-D, MCPP or dicamba. Applications should be made according to label directions when desirable turfgrass is actively growing. For example, use of POST herbicides to control ground ivy when a tall fescue lawn is subjected to summer stress would not be recommended. University of Tennessee Extension has several publications on broadleaf weed control in lawns including:

- W266 – Ground Ivy extension.tennessee.edu/publications/Documents/W266.pdf
- W807 – Wild Violet Control in Turfgrass extension.tennessee.edu/publications/Documents/W807.pdf
- W205 – Controlling Winter Annual Broadleaf Weeds extension.tennessee.edu/publications/Documents/W205.pdf

Image 24: Ground ivy *(Glechoma hederacea)* in a lawn. Photo credit: J. Brosnan.

Image 25: Wild violet (*Viola* spp.). Photo credit: J. Brosnan.

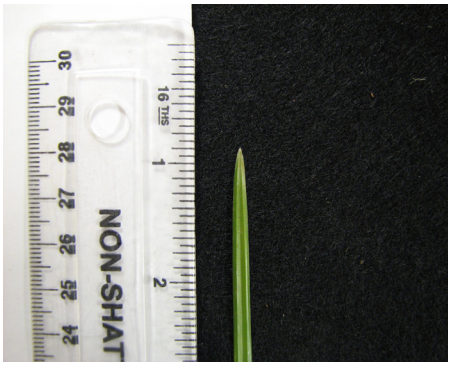


Image 26: Yellow nutsedge *(Cyperus esculentus)* leaf tip. Photo credit: M. Elmore.

Perennial Sedge and Kyllinga

Yellow nutsedge *(Cyperus esculentus),* purple nutsedge *(Cyperus rotundus),* green kyllinga *(Kyllinga brevifolia)* and false-green kyllinga *(Kyllinga gracillima)* are common sedge weeds found across Tennessee lawns and landscapes. These perennial species are considered indicators of excessive irrigation and/or poor drainage, as they commonly invade sites that have been excessively moist for an extended period of time.

Sedges emerge in late spring and grow throughout the summer months in Tennessee until the first killing frost in fall. Yellow nutsedge leaves are lighter green than those of purple nutsedge and end in a direct point (Image 26). Seedheads can also help with nutsedge identification given that yellow and purple nutsedge produce distinctive yellow and purple seedheads, respectively (Image 27).

Kyllinga species have more diminutive leaves than sedges and grow prostrate, forming patches in lawn and landscape areas. Unlike sedges, kyllinga species persist under very low mowing heights (0.25 inches or less) and produce flowers even under regular mowing (Image 28). The two kyllinga species most common in Tennessee lawns and landscapes can be differentiated by flowering time; green kyllinga flowers during all summer months, while false-green kyllinga flowers only during late summer and early fall. Yellow and purple nutsedge persist from underground tubers referred to as “nutlets” whereas green- and false-green kyllinga persist via rhizomes (Image 29). In lawns, yellow and purple nutsedge exhibit more upright growth than green- or false-green kyllinga that form dense mats across the surface.

Sedge species are primarily controlled via postemergence herbicides. Glyphosate is often used for spot applications in plant beds; however, it’s only marginally effective on sedge and kyllinga species.

Image 27: Comparison of yellow nutsedge *(Cyperus esculentus)* and purple nutsedge *(Cyperus rotundus)* flowers. Photo credit: J. Vargas.

Image 28: False-green kyllinga *(Kyllinga gracillima)* flower. Photo credit: G. Breeden.

Image 29: Rhizome of false-green kyllinga *(Kyllinga gracillima).* Photo credit: J. Vargas.

Bermudagrass

Bermudagrass is a common turfgrass species used across Tennessee in that it offers aggressive growth and tolerances to heat, drought and traffic stress. It persists via an extensive network of below- (rhizomes) and aboveground (stolons) vegetative structures. These characteristics render bermudagrass an extremely difficult-to-control perennial weed in areas it is unwanted. In many instances, bermudagrass can appear completely dead only to regenerate from rhizomes over time. Additionally, aggressive aboveground growth from stolons allows bermudagrass to repeatedly advance from lawns into landscape beds, sidewalks and other areas throughout the summer.

Controlling bermudagrass is difficult in any situation. In lawns and landscape beds where undesirable bermudagrass covers a large percentage of the site, complete renovation should be considered over selective removal.

Option 1 — Selective Removal: Selective removal of undesirable bermudagrass is often the best choice for eradication within an established tall fescue lawn (Image 30). Selective herbicides target a weed (i.e., undesirable bermudagrass) without inducing injury to a desirable species (i.e., tall fescue). Selective herbicides chosen to control bermudagrass include active ingredients such as fenoxaprop or fluazifop. Keep in mind that multiple applications will be needed (typically on four-week intervals in autumn) for complete eradication. Coupling herbicide applications with interseeding of new turfgrass can improve performance.

Selective herbicides can also be used to control bermudagrass in landscape beds, principally clethodim, sethoxydim and fluazifop. These are selective herbicides that target bermudagrass within ornamental shrubs and flowering plants. It is recommended that these products be applied directly to bermudagrass (i.e., post-directed) rather than over-the-top of established ornamental plantings.

Option 2 — Nonselective Removal: Non-selective herbicides such as glyphosate (Roundup or similar) or glufosinate (Finale XL, Cheetah Pro) can be used to control bermudagrass in both lawns and landscape beds. These are typically applied as spot treatments directly to the undesirable bermudagrass (Image 31). Precision is required as these nonselective herbicides will injure any plant material to which they are applied. Be careful to avoid walking through areas sprayed with these materials before they have dried as they can be tracked into non-treated areas on shoes, with damage presenting as footprints. In lawns, bare areas present after application will need to be established with new turfgrass to prevent future weed infestations and improve the overall aesthetic quality.

Concerns have developed over the use of glyphosate due to some recent reports and litigation. UT Extension has information on the safe use of glyphosate available at extension.tennessee.edu/publications/Documents/W827.pdf

Option 3 — Renovation: Sometimes weeds like bermudagrass can become so problematic that the best option is to start over. Continuing to apply selective (or non-selective) herbicides to control bermudagrass can simply become too costly and time consuming. Renovating allows for a more aggressive approach implementing herbicides, tillage and other practices to make the growing environment more favorable for desirable plants and less hospitable for weeds. For more information on lawn renovation, see University of Tennessee Extension publication PB 1576 available online at: extension.tennessee.edu/publications/Documents/PB1576.pdf

Regardless of product selected, it is best to rotate among the herbicides listed in Table 4 to prevent the onset of weed populations evolving resistance to different herbicide chemistries. There are numerous cases of annual weed species that reproduce from seed evolving resistance to a particular herbicide(s) when the same application is made over multiple years without rotation or implementation of any other weed management measure.

Image 30: Tall fescue lawn treated with selective herbicide to control an infestation of bermudagrass *(C. dactylon).* Photo credit: J. Brosnan.

Image 31: Spot treatments of non-selective herbicide to control bermudagrass (*Cynodon* spp.) in a lawn. Photo credit: J. Benelli.

Table 4. Example Herbicide Options for Homeowners to Control Weeds in Lawn and Landscape Beds.

Preemergence			
Active Ingredients	**Example Trade Name**	**Labeled for Lawns**	**Labeled for Beds**
2,4-D + MCPP + Dicamba + Dithiopyr	Spectracide Weed Stop for Lawns Plus Crabgrass Preventer	Y	N
Corn Gluten	Preen Vegetable Garden Natural Weed Preventer	N	Y
Trifluralin	Preen Garden Weed Preventer	N	Y
Trifluralin + Isoxaben	Preen Garden Extended Control	N	Y
Pendimethalin	Scott's Turf Builder with Halts	Y	N
Postemergence Crabgrass			
2,4-D + Quinclorac + Dicamba	BioAdvanced All in One	Y	N
2,4-D + MCPP + Isoxaben + Dicamba	BioAdvanced Season Long Weed Control	Y	N
2,4-D + Qinclorac + Dicamba + Sulfentrazone	Spectracide Weed Stop for Lawns Plus Crabgrass Killer	Y	N
2,4-D + Dicamba + Quinclorac	Ortho Weed Clear	Y	N
MCPA + Quinclorac + Dicamba + Sulfentrazone	Roundup For Lawns	Y	N
Postemergence Sedge			
MCPA + Quinclorac + Dicamba + Sulfentrazone	Roundup For Lawns	Y	N
Sulfentrazone	Ortho Nutsedge	Y	N
Imazaquin	Image Kills Nutsedge	Y	Y
2,4-D + Qinclorac + Dicamba + Sulfentrazone	Spectracide Weed Stop for Lawns Plus Crabgrass Killer	Y	N
Postemergence Broadleaf			
2,4-D + MCPP + Isoxaben + Dicamba	BioAdvanced Season Long Weed Control	Y	N
2,4-D + MCPP + Dicamba	Ortho Weed B Gon Weed Killer for Lawns	Y	N
2,4-D + Dicamba + Quinclorac	Ortho Weed Clear	Y	N
2,4-D + MCPP + Dicamba + Dithiopyr	Spectracide Weed Stop for Lawns Plus Crabgrass Preventer	Y	N
2,4-D + Qinclorac + Dicamba + Sulfentrazone	Spectracide Weed Stop for Lawns Plus Crabgrass Killer	Y	N
2,4-D + MCPP + DCP	Scotts Liquid Turf Builder with Plus 2 Weed Control	Y	N
MCPA + Quinclorac + Dicamba + Sulfentrazone	Roundup For Lawns	Y	N
Triclopyr	Ortho Weed B Gon	Y	N
Selective Bermudagrass			
Fluazifop	Ortho Grass B Gon	N	Y
Fenoxaprop	BioAdvanced Bermuda Control for Lawns	Y	N
Nonselective Herbicides			
Glyphosate	Roundup	Y	Y
Glyphosate + Diquat	Roundup Plus Concentrate	Y	Y
Ammonium Nonanoate	Ortho Groundclear Weed & Grass Killer	N	Y
Vinegar	Harris 20% Vinegar Weed Killer	N	Y
Ammoniated Soap of Fatty Acids	Natria	N	Y

Final Thoughts

The use of proper maintenance practices throughout the year will help prevent weed encroachment into lawns and landscapes. Control measures should be implemented before weeds produce seed that can be deposited into the soil seed-bank. Local Extension Offices can assist with weed control strategies for both lawns and landscapes. A complete list of University of Tennessee Extension offices can be found at: utextension.tennessee.edu/office-locations-departments-centers/.

Always refer to the product label for specific information on proper product use, tank-mix compatibility and turfgrass tolerance. Mention of trade names or commercial products in this publication is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the University of Tennessee Institute of Agriculture. For more information on turfgrass weed control, visit the University of Tennessee's turfgrass weed science website, tnturfgrassweeds.org.

For more information on herbicide selection, please visit University of Tennessee Mobile Weed Manual (MWM) at mobileweedmanual.com. The manual was developed by UT Extension professionals to assist green industry professionals in selecting herbicides for use in turf and ornamentals. The site provides users with weed control efficacy information for 100 different herbicides, tolerance information for over 2,300 turf and ornamental species, as well as direct links to label and safety data sheet information on herbicides used for turf and ornamental weed management. MWM can be download as a mobile application from the Apple App Store, as well as the Google Play Store.

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