



Selecting Turfgrass for Virginia

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Introduction

Virginia is a transition zone state noted for its hot, humid summers and cold, wet winters. When it comes to choosing grasses for lawns, the Virginia Tech Turfgrass Team likes to remind the public that “In Virginia, we can grow eight different turfgrasses, not very well!” However, if one considers location (both locally and geographically in the state), the anticipated use of the lawn, and their expectations for lawn quality, some grass choices are better than others. A quality lawn results from using the right grass species and/or variety, proper planting and establishment, and sound management. Planting the right turfgrass for your site reduces the need for pesticides and supplemental irrigation.

Cool-season vs. warm-season turfgrasses

Every turfgrass species has certain strengths and weaknesses as a lawn grass (these will be discussed in greater detail later in this publication), but the first variable for you to understand is the differences between what are called cool-season vs. warm-season turfgrasses. Cool-season grasses thrive during seasons when daytime highs are consistently in the 60- 75°F range. Common examples of the best adapted cool-season grasses for Virginia lawns are tall fescue [*Schedonorus arundinaceus* (Schreb.) Dumort., nom. cons.], Kentucky bluegrass (*Poa pratensis* L.), perennial ryegrass (*Lolium perenne* L.), and the group of fine fescues (*Festuca* spp.). Within the cool-season grasses, each of these has varying degrees of tolerance to temperature, moisture, light, traffic, and pest extremes to consider.

Warm-season grasses are adapted to consistent temperatures in the 80- 95°F range and, in general, have more drought tolerance than cool-season grasses, but less cold tolerance. The most common

warm-season grasses are bermudagrass (*Cynodon* spp.), zoysiagrass (*Zoysia* spp.), centipedegrass (*Eremochloa ophiuroides*), and St. Augustinegrass (*Stenotaphrum secundatum* Walt. Kuntze). And once again, each of these grasses has inherent advantages and disadvantages in their selection and use.

Given these differences in optimal growing temperature ranges, it follows that cool-season grasses perform their best in spring and fall in Virginia, and warm-season grasses thrive from mid-spring through mid-fall. Repeated frost events will eventually result in winter dormancy for the warm-season grasses (and a loss of green color) for 4 to 5 months from late fall to early spring (Figure 1). Dormant turf still functions as a highly effective ground cover. Still, the loss of color is an important factor in determining what one finds acceptable (or unacceptable) regarding visual lawn quality.



Figure 1. Warm-season grasses in Virginia will have 4 to 5 months of dormancy periods during a typical Virginia winter with an almost complete loss of green leaf color.

Location and site-specific factors figure in grass selection

Consider general seasonal temperature and moisture variability within each region and how those factors will affect turfgrass performance over time. A lawn is a landscape feature we expect to persist indefinitely, but weather extremes in either summer or winter are the rule rather than the exception. Is your property full sun, part sun/part shade, or mostly shaded? Are trees either planned for or a current component of the landscape, and how will their ongoing growth and development change the amount of light and water available to your lawn in the coming years? Do you have healthy soil, or is it in serious need of chemical and/or physical modifications?

Next, consider things unique to your idea of what makes the ‘best’ lawn for your location and intended lawn use/appearance. If your idea of an acceptable lawn is mixed ground cover with various grasses and ‘weeds’, then there are a lot of possibilities in basically letting Mother Nature play a significant role in determining what vegetation ultimately dominates the stand. This might not be the best-looking lawn, but it will likely have excellent stress tolerance and require less maintenance. One of the most important factors is this lawn’s ability to stabilize the soil. If it is performing that function, then the beauty is in the eye of the beholder when it comes to considering visual lawn quality.

However, if your perception of a successful lawn is uniform in its composition, regularly clipped, and valued for how it improves the appearance of your property, then you also must commit to a more intensive maintenance program that likely emphasizes regular mowing, nutrition, and pest management programs. A final factor to consider in selecting the best grass for your situation is your intended use of the lawn. A major strength of turfgrasses is their ability to tolerate clipping, withstand traffic (to a point), and constantly repair themselves. Do you have dogs or kids that will be exercising outside? Do you plan on using your lawn for regular recreation or social gatherings (Figure 2)? If so, some grasses are better adapted to withstand the traffic. Defining your intended use will help you select the best grass for your specific needs.



Figure 2. A benefit of a lawn that is often taken for granted is its use for recreation, with specific grass species being better adapted to traffic than others.

For the sake of discussion of Virginia’s primary geographic regions, Virginia has been divided into five geographic regions: the southern and northern Mountains, the southern and northern Piedmont, and the Coastal Plain (Figure 3). Considering the previous comment about transition zone challenges and opportunities in growing turfgrass, a variety of turfgrass options will be available for lawns in these regions. This publication will define the strengths and weaknesses of each grassing option in a specific region, with the understanding that there is no guarantee of a stress-free lawn (either for the grass or for you!) in this state.



Figure 3. These five geographic regions of Virginia have highly variable extremes in summer and winter temperatures, elevations, soils, and seasonal rainfall totals that result in many challenges in selecting a “best” turfgrass for lawns.

In the Northern and Southern Mountain regions, any of the cool-season turfgrasses will be adapted lawn grasses based on elevation and seasonal temperatures. Zoysiagrass has satisfactory cold tolerance, making it suitable as a lawn grass in this region. Still, the price of seed or vegetative materials (sod, plugs, or sprigs) and the slow rate of establishment are typical limiting factors in the selection of this grass in the mountains.

In the Northern Piedmont, cool-season turfgrasses and zoysiagrass will once again predominate. Still, in the Southern Piedmont, the best-adapted grassing options will be tall fescue or tall fescue/Kentucky bluegrass mixtures from the cool-season options, zoysiagrass, cold-tolerant bermudagrass cultivars, and centipedegrass in the most southern counties of this region. The Coastal Plain region is likely the warmest zone of Virginia, but the influence of the Atlantic Ocean still moderates its climate. The best adapted grasses in this region are tall fescue and tall fescue/Kentucky bluegrass mixtures from the cool-season choices, and all four of the major warm-season grasses are used in the region, with either centipedegrass or St. Augustinegrass only found in the southern-most counties near the coast.

Description, primary use, and strengths and weaknesses of the eight most used turfgrasses in Virginia

As previously described, there are numerous grassing options in pretty much any region of Virginia, so we now have to consider very specific local climatic and location situations, AND our intended use of the lawn in selecting the best-adapted grass for a particular situation. We've just discussed the general concepts of what to expect regarding the local climate where you reside and considered your site-specific goals for a lawn. Now, we will define the primary strengths and weaknesses of the various **species** of turfgrasses that can be grown in Virginia. Once again, consider sun/shade, traffic, your expectations for lawn quality, and your level of commitment to necessary lawn maintenance programs for certain species.

For cool-season grasses, it is generally recommended to plant either **blends** (two or more **cultivars** or **varieties** of the same species; these two words are used pretty much interchangeably and are defined as a specific, distinct group of a grass within a species) or **mixtures** (two or more compatible species). The primary consideration in compatibility is uniform appearance – typically a lack of patches of grasses with distinct leaf color or leaf texture. Warm-season grasses are almost always planted as monocultures of a single cultivar within a species (a distinction in these general concepts is introduced

below with a perennial two-grass system called 'bluemuda'). There is no 100% guarantee of success for any lawn grass pretty much anywhere in Virginia, but considering these factors will allow you to make the best grass selection possible for your location and situation.

Kentucky bluegrass (*Poa pratensis* L.)

Description: A fine to medium-textured grass that has aggressive creeping potential from rhizomes (below ground stems), and many of the best-performing cultivars are noted for their very dark green color (Figure 4). **Primary establishment method(s):** Many seeded cultivars are readily available, but it is difficult to find sod that is 100% Kentucky bluegrass. **Strengths:** Excellent density and cold tolerance; rapid recuperation potential in fall and spring due to aggressive lateral growth habit from rhizomes; survives periods of extreme heat and drought by entering summer dormancy; high visual mowing quality (Figure 5). **Weaknesses:** Poor shade tolerance; most cultivars will require 10-14 days for seed germination; aggressive lateral growth habit from rhizomes can make it a competitive weed in plant beds and the stems eventually are a major contributor to thatch (an organic layer primarily composed of non-decomposed stems) formation in the lawn; Kentucky bluegrass generally has higher disease and insect pressures than most other grasses when managed under intensive maintenance programs. **Overall anticipated maintenance requirements:** High.

Tall fescue

Description: The 'turf-type' varieties of tall fescue have fine to medium leaf texture and greatly enhanced density characteristics; the grass is managed as a bunch-type that produces lots of tillers (Figure 6) but newer varieties are touting short rhizomes (to date, Virginia Tech still recommends it to be managed as a non-creeping grass); it has the deepest root system of the cool-season lawn grasses grown in this area, and that is an important strength for utilizing moisture deeper in the soil. **Primary establishment method(s):** Seed readily available for many improved cultivars; sod is also available, but confirm with the producer that it is 100% tall fescue sod if you are specifically searching for this. **Strengths:** Excellent drought avoidance



Figure 4. Kentucky bluegrass has a fine-medium leaf texture and is an aggressive creeper due to its extensive rhizome system.



Figure 5. Kentucky bluegrass is a high-maintenance lawn grass that is noted for its dark green color, fine leaf texture, aggressive lateral spread, and desirable mowing quality.

characteristics; rapid (4-7 days) germination rates; early spring greening (Figure 7); moderate shade tolerance; adapted to a wide range of soils.

Weaknesses: High mowing requirement during active growing periods; limited to no recuperative potential; Rhizoctonia blight (aka Brown Patch) has been a long-time disease problem of concern, with an emerging concern from a disease called gray leaf

spot. **Overall anticipated maintenance requirements:** Low to medium. Desirable visual quality with less maintenance requirements than a Kentucky bluegrass monoculture.

Tall fescue/Kentucky bluegrass mixtures

This combination is important enough for Virginia lawns to discuss separately. Virginia's sod producers have long planted a sod crop that is 90% turf-type tall fescue and 10% Kentucky bluegrass by weight (resulting in an approximate 50/50 seed count), and this mixture has continued to do well as a perennial turf in appearance and performance across the state. Each of the grasses in the mixture provides its relative strengths for the lawn (spring greening and better drought tolerance for tall fescue, dark color and recuperative potential for Kentucky bluegrass). The mixtures have a more predictable visual quality and overall fewer pest problems. In addition to sod, seed mixtures are readily available with the percentages by weight ranging from 95:5, 90:10, and 85:15 for the tall fescue/Kentucky bluegrass combinations. However, keep in mind that the Kentucky bluegrass will likely dominate the stand over time due to its lateral growth habit. Therefore, choosing an 85:15 product will be more quickly dominated by the Kentucky bluegrass and will likely have higher maintenance requirements. **Overall anticipated maintenance requirements:** Medium.



Figure 6. Tall fescue is one of the best-adapted lawn grasses across Virginia. It is managed as a bunch-type grass, but the turf-type cultivars provide a dense, fine-textured lawn with excellent drought avoidance characteristics.



Figure 7. A notable characteristic of a tall fescue lawn is rapid spring greening as compared to other cool-season turfgrasses.

Perennial ryegrass (*Lolium perenne* L.)

Description: A bunch-type with fine to medium leaf texture and very dark green color (Figure 8); extremely glossy leaves reflect light and provide for excellent mowing quality due to its striping ability (Figure 9). **Primary uses:** This grass nearly disappeared as a lawn grass in the mid-Atlantic in the late 1990s/early 2000s due to a disease called gray leaf spot. Breeding efforts have greatly improved the tolerance of new cultivars to this disease. Still, the grass has not regained its prominence as a lawn grass in the area because it is susceptible to other pests and environmental extremes. At present, most perennial ryegrass seed in the state is sold either for winter overseeding of bermudagrass golf and sports turfs or as a component of seed mixtures with Kentucky bluegrass, where it has a similar appearance and provides a fast seed germination rate. Like tall fescue, Kentucky bluegrass mixtures are most often a 90:10 perennial ryegrass/Kentucky bluegrass seed mix by weight. **Primary establishment method(s):** Seed readily available for many improved cultivars; no sod available. **Strengths:** Mixes well with Kentucky bluegrass because of similar leaf textures; rapid (4-7 days) seed germination rates under ideal moisture and temperature conditions; exceptional mowing quality; excellent wear tolerance as a mature turf; the most popular cool-season grass to use as an ‘overseeded’ species for bermudagrass lawns, golf, and sports turfs because of its rapid establishment rate and its visual quality. It is anticipated that with the continued genetic

improvements in disease and environmental tolerances, perennial ryegrass will increase in use as a lawn grass in Virginia. **Weaknesses:** Poor drought, heat, and cold tolerance, limited recuperative potential because it is a bunch-type grass; rapid growth rate means higher mowing requirements. **Overall anticipated maintenance requirements:** High.



Figure 8. Perennial ryegrass is a bunch-type grass with glossy, fine-medium textured leaves, similar to Kentucky bluegrass in appearance.



Figure 9. Perennial ryegrass overseeded into a bermudagrass sports field for winter playability and color is noted for its distinct ability to stripe when mowed in specific patterns.

Fine-leaf fescue (*Festuca spp.*)

Description: Extremely fine leaf texture is the immediate identification feature of the fine leaf fescues (Figure 10). There are multiple species of fine fescues grown as lawn grasses in Virginia: strong creeping red (*Festuca rubra* L. ssp. *rubra*), slender creeping red (*Festuca rubra* L. ssp. *littoralis*), chewings (*Festuca rubra* L. ssp. *commutata*), and hard (*Festuca brevipila* L.). As its name implies, the creeping red species produces very short rhizomes, while the chewings and hard are both bunch-type grasses. However, given the slow spreading rate of the creeping red species, all of the fine leaf fescues grown in Virginia are managed as bunch-type grasses. **Primary uses:** As a group, these grasses have the best shade-tolerance (Figure 11) of the cool-season turfgrasses, and they are ideal for low-input, limited traffic settings. They can be mixed with Kentucky bluegrass and perennial ryegrass for sun/shade mixtures where the fine fescue will eventually predominate in the shade and the other grasses thrive in the sun.

Primary establishment method(s): Seed readily available for many improved cultivars; no sod available. **Strengths:** Better shade tolerance than other cool-season species, low fertility requirement, reduced mowing requirement, popular choice for vegetating poor quality soils. **Weaknesses:** Poor traffic tolerance, especially under heat and drought

stress; intolerant of poorly drained soils; low recuperative potential. **Overall anticipated maintenance requirements:** Low.



Figure 10. Fine-leaf fescue has a needle-like leaf texture and is managed as a bunch-type grass.



Figure 11. Shade tolerance is a strength of fine-leaf fescue compared to other cool-season turfgrasses.

Bermudagrass (*Cynodon spp.*)

Description: There are two primary species of bermudagrass grown in Virginia: common bermudagrass [*C. dactylon* L. (Pers)] and vegetative hybrid bermudagrass [*C. dactylon* (L.) Pers x *C. transvaalensis* Burt Davy]. Both grasses have rhizomes and stolons and are noted for their extremely fast lateral spread rates. The grasses have fine to medium leaf texture, with common bermudagrass typically being coarser-textured than hybrid (Figure 12). Common can be established from seed, whereas the vegetative hybrid can only be reproduced vegetatively by sprigs (stems from shredded sod), plugs, or sod. Bermudagrass thrives in full sun conditions and

establishes a very dense canopy due to its aggressive lateral growth (Figure 13). **Primary uses:** With the proper mowing equipment and commitment to regular mowing during the growing season, bermudagrass can be clipped at heights as low as 0.5 in. for golf and sports turf uses, and up to 2 inches for lawns.

Bermudagrass has great application on heavily trafficked sports fields, golf courses, and lawns where it is adapted (the warmer regions of Virginia). Specific varieties have been selected for enhanced cold tolerance. **Primary establishment method(s):** Seed is available for improved common bermudagrass cultivars, while only sprigs, plugs, or sod can be used to establish the hybrid bermudagrass cultivars.

Strengths: Rapid establishment and recuperation rates, high traffic tolerance, exceptional tolerance to heat and drought, exceptional canopy density, and very few serious pest problems. **Weaknesses:** Poor shade tolerance; high mowing requirement during summer months; aggressive lateral growth rate makes it a serious weed in landscape beds and gardens as a weed (Figure 14); cold tolerance can be an issue in some years and locations; rapid thatch producer, winter dormancy (aka loss of color) for 4-5 months. Low recuperative potential. **Overall anticipated maintenance requirements:** High (primarily because of mowing and edging requirements) during the growing season, but low to none during winter dormancy.



Figure 12. Both common and hybrid bermudagrasses are expected to provide

exceptional density when managed under full sun conditions.



Figure 13. Bermudagrass thrives in Virginia summers when other grasses might struggle from the heat and drier conditions.



Figure 14. One of the biggest challenges with a bermudagrass lawn is managing its movement into plant beds and gardens by way of its fast-growing rhizomes and stolons.

Zoysiagrass (*Zoysia* spp.)

Description: There are two primary species of zoysiagrass grown in Virginia: Japanese lawn grass [*Z. japonica* Steud.] and manilagrass [*Z. matrella* (L.) Merr.]. Both species have rhizomes and stolons, and these species are noted for their exceptional density and very slow lateral spread rates (Figure 15). Japanese

lawn grass is typically coarser-textured than manilagrass and generally has better cold tolerance. Zoysiagrass has better shade tolerance and somewhat less drought tolerance than bermudagrass. **Primary uses:** With the proper mowing equipment and commitment to regular mowing during the growing season, zoysiagrass can be clipped at heights as low as 0.5 in. for golf turf uses, and up to 3 inches for lawns. It is not used for sports fields because of its slow growth rate. It provides a very dense turf canopy that requires less maintenance than bermudagrass. **Primary establishment method(s):** Sprigs, sod, or plugs are the primary methods of establishment, with sod being the most common form of vegetative establishment due to the slow rate of spread of this grass. Limited seed is available for a few cultivars of Japanese lawn grass. **Strengths:** Exceptional density as a mature turf, often resulting in less weed pressure; excellent cold tolerance for a warm-season turfgrass (especially Japanese lawn grass cultivars); good shade tolerance; few pest problems, less stem encroachment problems into landscape and garden beds, less fertility requirement compared to bermudagrass, and lower mowing requirement than bermudagrass, making it suitable for areas where lower maintenance are desired (Figure 16). **Weaknesses:** Slow growing rate means it takes longer to cover or repair itself if damaged; more expensive to establish than bermudagrass; density of the turf is so great that it requires a mower with a strong engine to cut a dense stand properly, heavy thatch producer over time, winter dormancy (aka loss of color) for 4-5 months. More susceptible to large patch, a disease caused by the fungus *Rhizoctonia solani*, than bermudagrass. **Overall anticipated maintenance requirements:** Low (once established), either as actively-growing or dormant turf.



Figure 15. Zoysiagrass has fine to medium-textured leaves and stems that result in an exceptionally dense canopy. Its rhizomes have a characteristic 'right-angle branching' of new shoots emerging from the stem, enhancing canopy density.



Figure 16. Zoysiagrass provides one of the most dense lawns possible in Virginia, and with its slower growth rate, it is an excellent choice for sloped areas that are difficult to mow.

Centipedegrass [*Eremochloa ophiuroides* (Munro) Hack.]

Description: Centipedegrass has very large stolons with shoots emerging alternatively along the stem (Figure 17). This grass has a characteristic light-green color, average shade tolerance, and limited cold tolerance. It is primarily grown where limited maintenance inputs are desired, and traffic will be restricted (Figure 18). **Primary uses:** Low-input lawns, general-purpose turf, and cemeteries in the warmer climates of Virginia. Clipped at 1 to 2 in. and does well on more acidic soils. **Primary establishment method(s):** Sod (although none

is produced in Virginia, and it comes out of the Carolinas) and seed. There is very limited cultivar selection, as most centipedegrass is referred to as “common”. **Strengths:** Lowest input warm-season grass grown in Virginia in terms of fertility needs, supplemental irrigation, a maintenance mowing requirement, and few pests. **Weaknesses:** Poor traffic tolerance and/or recuperative potential, genetic yellow-green color, 14 to 28 days for seed germination; not especially cold tolerant, a 4 to 5 month winter dormancy period. Herbicide usage is more selective. **Overall anticipated maintenance requirements:** Low (once established), either as actively growing or dormant turf.



Figure 17. Centipedegrass has a characteristic light green leaf color and large stolons with alternating shoots emerging from the stem.



Figure 18. In the warmer regions of Virginia, centipedegrass is an excellent choice for low-input warm-season turf, such as at this cemetery in Petersburg.

St. Augustinegrass [*Stenotaphrum secundatum* (Walt.) Kuntze]

Description: St. Augustinegrass has stolons that are even larger than centipedegrass, but its shoots appear to emerge beside each other, thus giving the appearance of ‘opposite shoot arrangement’ on the stolon (Figure 19). The leaves are the widest-bladed of the warm-season turfgrass and have a blunt, rounded leaf tip. It is a fast-growing, creeping grass that is an aggressive thatch former. This grass has a desirable, dark green color and forms a very dense canopy. It is adapted primarily to southeast Virginia, where the ocean moderates the climate, but there are lawns as far west and north as the Richmond area. The primary reason to grow St. Augustinegrass in the warmer regions is its shade tolerance, its strength as a warm-season turfgrass where it is adapted (Figure 20). **Primary uses:** Shaded lawns in the most climate-moderated regions of Virginia; mowed at 2.5-3.5 in. cutting heights. **Primary establishment method(s):** Sod (although none is produced in Virginia, and it comes out of the Carolinas), plugs, or sprigs, with sod and plugs being the standard in the state. Limited cultivar selections, but producers in the southeast generally are growing the most cold-tolerant varieties possible. **Strengths:** Shade tolerance, high density, good wear tolerance. **Weaknesses:** The poorest cold tolerance of the warm-season grasses grown in Virginia, numerous insect and disease issues, heavy thatch production, fast growth that requires frequent mowing, and a 4 to 5 month winter dormancy period. Herbicide usage is more selective. **Overall anticipated maintenance requirements:** High (as an actively growing turf); low to none in dormancy phase.



Figure 19. St. Augustinegrass is an aggressive creeping grass with very large stolons and shoots that appear to emerge beside each other from the stem.



Figure 20. The strength of St. Augustinegrass is its use as a shade-tolerant warm-season turfgrass in the warmer regions of Virginia.

‘Bluemuda’, a perennial two-grass system.

Description: A combination of both warm-season bermudagrass and cool-season Kentucky bluegrass that gives the appearance of grass that is green year-round. Unlike perennial ryegrass ‘overseeding,’ which needs to be done every year, Kentucky bluegrass is established in the bermudagrass once, and each grass dominates the stand depending on the season (bluegrass during fall and winter, Figure 21; bermudagrass during the summer, Figure 22). The finer leaf texture and lateral-spreading nature of both bermudagrass and Kentucky bluegrass allow the two grasses to intermingle through transition

periods without long periods of poor aesthetics.

Primary uses: Any area where bermudagrass is typically ‘overseeded’ with perennial ryegrass.

Primary establishment method(s): Kentucky bluegrass is typically ‘overseeded’ into a stand of bermudagrass during the fall. However, bermudagrass can be seeded into an existing stand of bluegrass, but the time to full establishment is typically greater. **Strengths:** A year-round green grass system that provides the strengths of both grasses. The two-grass system also has increased sod strength due to the additional rhizomes of the Kentucky bluegrass that help sod harvest during fall and spring.

Weaknesses: Comparing bluemuda to standard perennial ryegrass overseeding into bermudagrass for temporary winter color and playability is not reasonable in the short term. The establishment time for a fully developed two-grass system can range from several months to a few years because Kentucky bluegrass is slow to develop and has poor shade tolerance. There is a high mowing requirement as grass is growing for nine months of the year. Increased fertility requirements. Lateral growth of both species can become a weed issue in adjacent landscapes. Both species are heavy thatch producers since they have lateral stems. Herbicide usage requires particular care to select products safe for both species. **Overall anticipated maintenance requirements:** High.



Figure 21. A stand of 'bluemuda' during the winter dormancy of the bermudagrass, where the Kentucky bluegrass is slowly expanding in density as a perennial grass coexisting with the bermudagrass base.



Figure 22. This is the same stand of 'bluemuda' shown in Figure 21, but it is taken during the summer when the bermudagrass is now dominating the canopy.

Summary

Given the diversity of Virginia's climate, choosing that "best" turfgrass isn't as easy as one might hope. However, by considering the uniqueness of your geographic and local location, your planned use of the turf, and your idea of what provides an acceptable lawn to meet your needs, this publication provides you with the information to identify the best grassing options available for your situation. Once you have identified the best species, consult the annually updated Virginia Turfgrass Variety Recommendations List for the latest listing of the promising and recommended turfgrass cultivars based on Virginia Tech and University of Maryland field research trials (www.pubs.ext.vt.edu). While the Virginia climate will always present challenges in turfgrass selection and maintenance, using the information presented here will give you the best opportunity to gain a turfgrass stand that will perform well as a long-lived, perennial ground cover.

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