



Home Turf – A Healthy Virginia Lawns Program



In cooperation with



**Virginia
Cooperative
Extension**

Virginia Tech
Virginia State University

Revised 2025

Revision History
Version 1: 2018, T. Makara
Version 2: 2021, T. Makara
Version 3: 2023, J. Barbee
Version 4: 2025, A. Mason, L. Holland

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Welcome to the Home Turf, A Healthy Virginia Lawns Program

This handbook is designed to provide a simple, straight-forward approach to maintaining your lawn. The lawn care practices in this handbook will not only help you grow and maintain healthy turf in the most efficient and cost-effective manner but will help protect local water quality and that of the Chesapeake Bay.

The Home Turf, A Healthy Virginia Lawns Program, is based on the work of turf specialists at Virginia Tech. Their extensive research over many years has allowed us to formulate guidelines specifically for Northern Virginia conditions. The program is administered in Fairfax County by the Virginia Cooperative Extension and the Fairfax County Master Gardeners Association volunteers, in partnership with the Northern Virginia Soil and Water Conservation District.

Responsible lawn care gives us a big return on our efforts. The positive attributes in lawns are both recreational and functional. In addition to a pleasing appearance, a healthy lawn provides erosion control, soil stabilization, and water filtration. Actively growing turf grasses have the ability to significantly cool the surrounding environment. When lawns struggle, the natural reaction by most homeowners is to apply more water and fertilizer; rarely does this strategy work. At the homeowner level, lawns and landscapes may contribute to water pollution when homeowners apply pesticides and fertilizers carelessly. By using pesticides and fertilizers properly and only when necessary, and following recommended landscape practices, you can do your part to protect our lakes, streams, and drinking water for the future.

Producing a quality lawn in northern Virginia can be challenging. By following best practices based on unbiased and objective research, you will not only promote environmental stewardship, but will be rewarded with a healthy lawn that looks nice and requires less work in the long run. This boils down to following practices that are both good for the lawn and the environment. Growing a healthy lawn is an ongoing process. Your lawn may need two to three years to reach its full potential after you begin implementing the steps recommended in this handbook, and then you can look forward to using the knowledge and skills you've gained to continue maintaining your healthy lawn!

This handbook focuses on managing cool season lawns (fescue, bluegrass) which are best suited to the Northern Virginia environment. If your lawn consists of warm season grasses (Bermuda, zoysia) you will receive additional information.

By studying this booklet and putting this knowledge to use, with nominal effort, you can have a lawn that supports environmental sustainment and looks good too! Good luck in your efforts; we are pleased to have you as part of the program and offer our continued support.



A handwritten signature in black ink that reads "Adria C. Borda".

Adria Bordas

Extension Agent

Virginia Cooperative Extension

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The Home Turf Program

Home Turf, A Healthy Virginia Lawns Program is implemented by the Fairfax County Master Gardener Association (FCMGA), under the supervision of the Fairfax County office of the Virginia Cooperative Extension.

The Home Turf program is offered to Fairfax County residents for a small fee. During an in-person Home Turf visit, a Master Gardener team will come to your property to take soil samples, measure the lawn area, and provide a general assessment. From this visit you will receive an analysis from the soil test and a three-year Nutrient Management Plan (NMP), a general lawn assessment, and advice.

Registration generally begins in April or early May. Fairfax County residents can register on our website, <https://fairfaxgardening.org/home-turf/>

	In-Person Home Turf Visit
Soil Sample & Mailing	Done by FCMGA Home Turf team
Lawn Measurement and Calculation	Done by FCMGA Home Turf Team
Lawn Area Sketch	Done by FCMGA Home Turf Team
Administrative Documentation	Done by FCMGA Home Turf Team
Soil Sample Testing	Done by Virginia Tech Soil Testing Laboratory
Soil Test Results and 3-yr. Nutrient Management Plan (NMP)	Provided to client by e-mail following visit
Consultation / Advisory Discussion of Lawn-Related Matters	In person, at the time a soil sample and lawn measurements are taken Client can email follow-up questions.

Additional Lawn Advice

In addition to the **Home Turf** program, FCMGA offers public information to assist homeowners.

- **Weed Factsheets:** On FairfaxGardening.org, the public can find a series of factsheets about common weeds in Northern Virginia.
- **Informational References:** In the References section of FairfaxGardening.org, the public will find a series of brochures and fact sheets from the Virginia Cooperative Extension Service to assist in managing a healthy lawn.
- **Educational Videos:** Will find information on key lawn/turf topics including selecting turf grass, fertilizers, turf pests, diseases, and weeds. To view these videos, visit the VCE-Fairfax YouTube site and look for the Lunch 'n' Lawn & Turf playlist.

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Acknowledgements

The Fairfax County Master Gardeners unit of Virginia Cooperative Extension would like to acknowledge the following for their contributions to ***Home Turf, A Healthy Virginia Lawns Program***: Ms. Phyllis Ingram, editor of Prince William County's Best Lawn handbook, Mr. Ed Olson, Henrico County, Smart Lawn Program; Ms. Maria Harwood, and Mr. Scott Baron, Fairfax County Soil & Water Conservation District; Mr. David Yost, Merrifield Plant Specialist, and former Cooperative Extension Agent; Dr. Mike Goatley, Extension Turfgrass Specialist, Virginia Tech; Mr. Steve Heckendorn, Soil Sample Lab Manager, Virginia Tech; and Dr. Tom Tracy, Executive Director, Virginia Turfgrass Council.

Other sources of information for this booklet include:
Virginia Polytechnic Institute and State University
Virginia State University
Virginia Department of Conservation and Recreation
U.S. Environmental Protection Agency

Key Resources useful for growing and maintaining healthy turfgrasses and landscape plants are authored by University Extension Services. For Virginia, the Virginia Cooperative Extension Service (VCE) is our 'go to' resource. VCE is a partnership between Virginia Tech and Virginia State University. The Fairfax County Master Gardeners are volunteers in VCE.

1. Documents from the **Virginia Tech Soil Testing Laboratory** include details on taking soil samples and notes about interpreting soil sample results,
 - <https://www.soiltest.vt.edu/sampling-instructions.html>
 - <https://www.soiltest.vt.edu/report-notes.html>
2. Virginia Tech Searchable Library offers a vast library of information, which is searchable by keyword at <https://www.pubs.ext.vt.edu/>
3. For all chemical controls for plants and insects, VCE and Virginia Tech *annually* publishes **The Pest Management Guide for Home Grounds and Animals (PMG)**. The web URL changes annually; search your browser for VCE PMG or use PMG in the Virginia Tech searchable library. Always use the most current version. The 2025 PMG is accessed at <https://www.pubs.ext.vt.edu/456/456-018/456-018.html>
4. Urban Nutrient Management Handbook, Virginia Cooperative Extension Publication 430-350. https://www.pubs.ext.vt.edu/content/pubs_ext_vt_edu/en/430/430-350/430-350.html

1. Protecting Virginia's Waters

In Virginia, we rely on our reservoir systems, wells, and other sources of our freshwater. Over the years, our previously plentiful clean water supplies have been threatened not only by overuse but also by contamination. Pollutants carried in water and soil sediments threaten Virginia's waterways, and the health of the Chesapeake Bay.

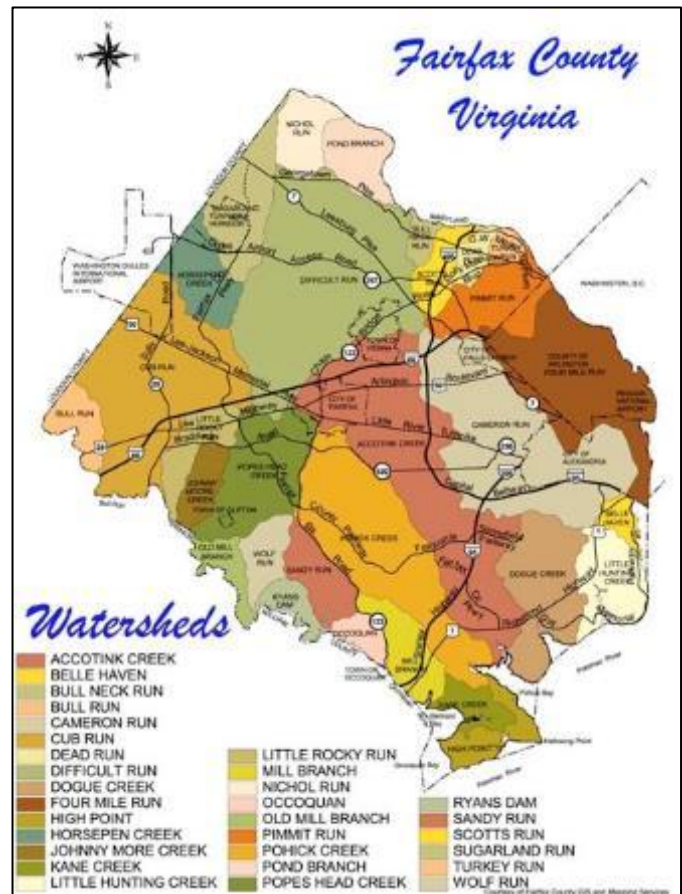
A healthy, well-maintained lawn protects our streams, lakes, and ponds from nutrient and sediment pollution. University research confirms that a healthy, vigorous stand of turfgrass is second only to forest soil in retaining nutrients such as nitrogen, phosphorus, and other environmental pollutants. Lawns serve as a water-filtration system and they anchor the soil to reduce runoff and erosion. When there is runoff (water that does not soak into the ground) it flows over the surface, often taking soil and carrying pollutants with it into lakes and streams.

1.1 Understanding Watersheds

Surrounding land that drains into a particular lake or stream is a watershed. Fairfax County has developed comprehensive watershed management plans for each of its 30 watersheds. These plans address the potential environmental issues, and serve to protect and restore the county's streams and other water resources. This is necessary to maintain an ecosystem that avoids risk to the health of plant, fish, and animal life that depend on clean water.

1.2 All Property Owners Can Support Clean Water

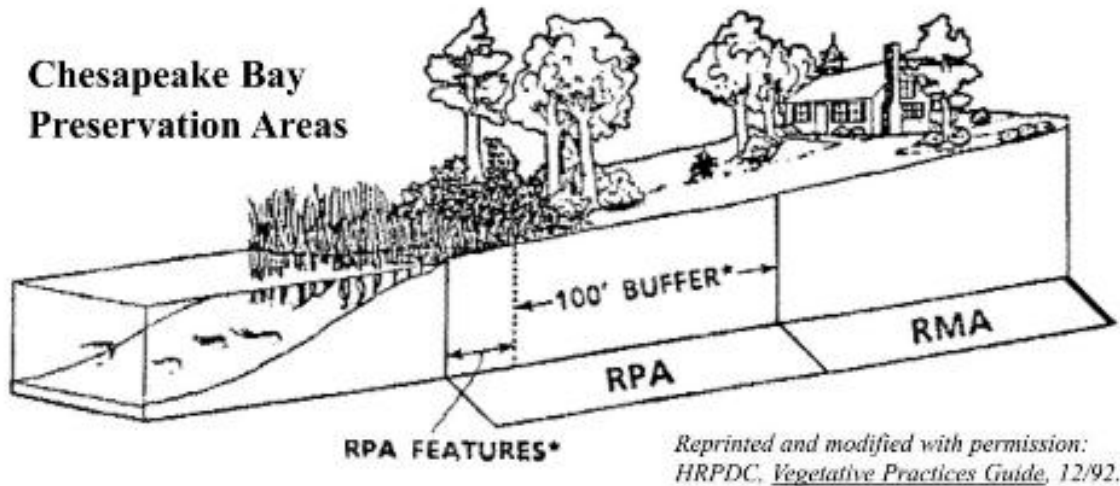
No matter where we live in Fairfax County, we are within a watershed, which means that we bear a communal responsibility to avoid practices that risk our environment, particularly water. By using pesticides and fertilizers properly, only when necessary, and following recommended landscape practices, we can do our part to protect our lakes, streams, and drinking water for the future.



<http://www.virginiaplaces.org/graphics/fairfaxwatersheds.jpg>

1.3 Resource Protection Areas (RPAs)

The Chesapeake Bay Preservation Ordinance was adopted in 2003 in Fairfax County to protect local streams from pollution due to land use and development. All of Fairfax County drains into the Potomac River, and ultimately, the Chesapeake Bay. Fairfax County lies within the Virginia-designated Chesapeake Bay Preservation Area. To promote water quality, sensitive areas along streams throughout Fairfax County have been designated as Resource Protection Areas (RPAs). The RPA includes a 100-foot buffer landward of these features, generally considered the “last barrier” to runoff by slowing or preventing erosion. A major component here is the avoidance of fertilizers and pesticides within the designated RPA buffer. Any areas within Fairfax County not identified as RPAs are Resource Management Areas (RMAs). These are lands contiguous to the inland boundary of the RPA which have a potential for degrading water quality or diminishing the functional value of the RPA, if not managed properly. Together, the RPAs and RMAs comprise the Chesapeake Bay Preservation Areas.

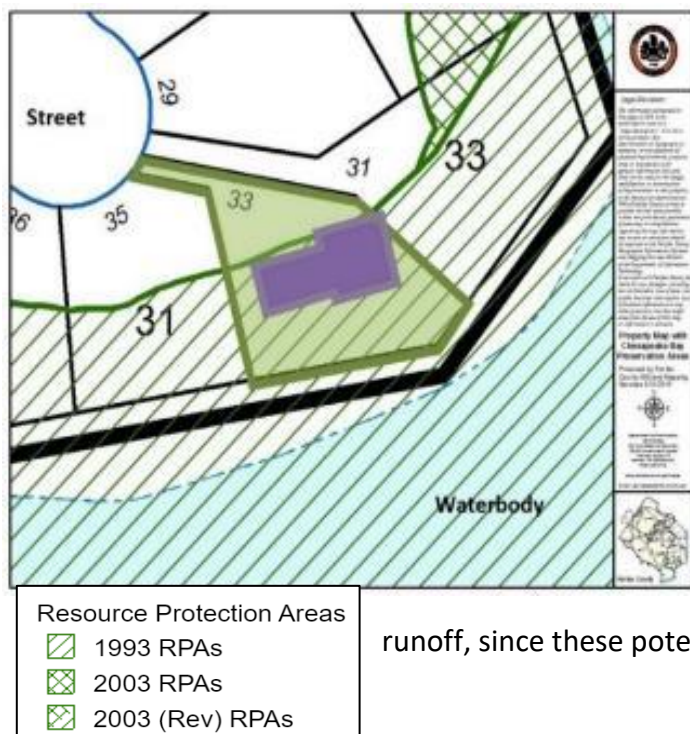


RPAs are generally designated areas containing any of the following features:

1. Tidal shorelines or wetlands
2. A water body with perennial flow (flows continuously throughout the year), including most named streams in Fairfax County
3. A non-tidal wetland connected by surface flow and contiguous to a tidal wetland or water body with perennial flow, which are often found in wooded floodplains
4. A buffer area that includes any land within a major floodplain or any land within 100 feet of a feature listed in 1-3.

1.4 Is My Property Part of a Resource Protection Area (RPA)?

In 2005, Fairfax County completed an extensive survey and mapping of the water features within each of our 30 watersheds and has mapped out the RPAs. These appear as map features that designate the corridors of environmentally sensitive land that lie alongside or near the shorelines of streams, rivers, and other waterways. These maps include the boundaries of RPAs adopted by the Department of Public Works and Environmental Services in 1993 and additional RPAs adopted in 2003.



When enrolled in the Home Turf program, your Master Gardener Team will assess your property from Fairfax County records and ascertain if it is part of an RPA. If it is, they will provide you a sketch of your property with the precise area designated as an RPA and offer to discuss it with you. For all properties containing an RPA, our Master Gardeners consult with the representatives of the Soil and Water Conservation District for Fairfax County. General advice will be that application of pesticides and fertilizer is strongly discouraged and that measures be considered to mitigate erosion and runoff, since these potentially risk clean water.

Summary

The Fairfax County office of the Virginia Cooperative Extension and the Fairfax County Master Gardeners Association volunteers have an active association with the Northern Virginia Soil and Water Conservation District (NVSWCD). They work together to continually promote healthy water through responsible environmentally-supportive practices. The NVSWCD recommends restoring the RPA with native trees, shrubs, and perennials, as these plants do not require fertilizer or pesticides. By your enrollment in the Home Turf program and following sound lawn care principles, you actively contribute to the success of this program.

You can perform a self-search to identify whether a residential property has a designated RPA. To do this, navigate the mapping program listed in the first link in the below list.

For properties with an RPA, it is best to leave them as natural as possible and avoid the application of fertilizers and pesticides to the extent practical.

Not all properties in Fairfax County have an RPA, but even if a property does not have one, we should always follow lawn care practices that enable the lawn to be an enhancement to water quality. This booklet explains practices, that when properly implemented, will obtain the realization that healthy turf supports healthy water.

Additional Information regarding clean Virginia water:

Interactive Map of Watersheds and RPAs in Fairfax County (*Search to determine if a property has an RPA.*)

<https://fairfaxcountygis.maps.arcgis.com>

"Your Lawn and the Environment" (podcast) Virginia Cooperative Extension

<https://ext.vt.edu/lawn-garden/turfandgardentips/tips/your-lawn-and-the-environment.html>

Fairfax County Soil and Water Conservation District

<https://www.fairfaxcounty.gov/soil-water-conservation/>

Fairfax County VA Public Works and Environmental Sciences: a description of the comprehensive watershed management plans for each of the county's 30 watersheds.

<https://www.fairfaxcounty.gov/publicworks/stormwater/watersheds>

FAQs: Resource Protection Areas, Fairfax County

<https://www.fairfaxcounty.gov/landdevelopment/faqs-resource-protection-areas>

Basic kinds of Turf for Virginia Lawns



Cool-season grasses

Kentucky Bluegrass

Medium-textured turfgrass best suited to well-drained soils and moderate to high levels of sunlight and management.



Perennial Ryegrass

Perform best at the higher elevations (>1,000 feet) in Virginia.



Tall Fescue

Well adapted throughout Virginia and has the deepest root system of the cool-season grasses.

Fine Fescues

Group of very closely related species (hard, chewings, creeping red, and sheep fescues) is best suited for low-maintenance areas or in partial to full shade



Warm-season grasses

Zoysiagrass

Can be used on lawns, golf course fairways, and areas that do not receive concentrated traffic.

Bermudagrass

Best adapted in Eastern Virginia, but the introduction of cold-tolerant cultivars has expanded the use of this grass pretty much statewide. It does best in open sun and is not shade tolerant.



St. Augustinegrass and centipedegrass

Both lawn grasses that grow best in the Hampton Roads area of Virginia, where they benefit from the coastal climate.

2. Basics of Cool Season Lawn Maintenance

Most of the advice that is discussed in this booklet will apply to cool season lawns. Cool season turf thrives in air temperatures that fall between 60°F and 75°F and are prone to the high heat of summer which will slow down growth and often introduce temporary dormancy. Warm season turf thrives in the summer heat of 80°F-95°F and higher but goes dormant in the colder weather. These qualities and growth habits are further explained in Chapter 9.

Some important practices are listed below and will be discussed in depth throughout this booklet. Some are continuous throughout spring into fall, while others should be done only during a prescribed period, generally spring or preferably in most cases, fall. (See Lawn Care Calendar at the end of this booklet)

The old adage, “timing is everything,” applies to lawn maintenance. If done at the wrong time of the year or during the wrong conditions, even the right practices might not provide the full benefit to your lawn and could even harm your lawn.

SOIL TEST

Test your soil every 3 years to determine the pH and nutrient needs of your lawn.

LAWN SIZE

Measure and calculate the size of your lawn. Don’t guess. This helps determine the proper amount of lime, fertilizer, or weed control agents if needed. Most importantly, it is to avoid excess application of these chemicals.

ADJUST pH

Virginia Tech experts indicate the ideal soil pH for turf grasses is around 6.2. Adjust the pH by adding lime (to raise pH) or sulfur (to lower pH) according to your soil test results.

FERTILIZER

Use the turf-type fertilizer recommended by Virginia Tech Soil Lab as indicated in your *Home Turf, A Healthy Virginia Lawns Program* Nutrient Management Plan. Fertilization times for cool season turf is primarily in the fall. Fertilization for warm season grasses is during summer (see Section 9.2).

WATER

Turfgrass needs at least **one inch** of water per week during the growing season or it will go dormant. If you water, do so early in the day to reduce disease problems.

MOWING

Cut often, so that no more than one-third of the leaf blade is removed per mowing. Mow your cool season lawn to 2½– 3 inches high during cool months; mow higher (up to 4 inches) when temperatures increase. It is not necessary to bag clippings that are less than one inch. They will

decompose quickly and return nitrogen to your soil. If you do bag, your clippings can be composted. In the fall, consider mulching your deciduous leaves directly back to the turf with your rotary or mulching mower. Multiple passes with your mower might be required to thoroughly chop leaves. Sharpen your lawn mower blades at least three times per growing season.

CORE AERATE

Core aeration of your lawn may be performed annually to improve soil structure and reduce compaction. Be sure to use a core-aerator (one that removes soil plugs and deposits them on the lawn surface) and not a spike-type aerator, which can actually increase soil compaction.

LAWN CARE CALENDAR

Most lawn care activities are best done at certain times of the year. Use the Lawn Care Calendar at the end of this booklet to plan the right activities at the right time of the year.

TOP-DRESS WITH COMPOST

Adding ¼ inch of fine textured compost improves the quality and texture of your soil.

OVERSEED

When a lawn is thin or is showing signs of wear, overseeding an established lawn is done to thicken up the turf. For best results, over-seed after aerating and top dressing between September 1 and September 30. (Typically, add 2 to 3 lbs. of tall fescue per 1,000 sq. ft. is adequate.)

BROADLEAF WEED CONTROL

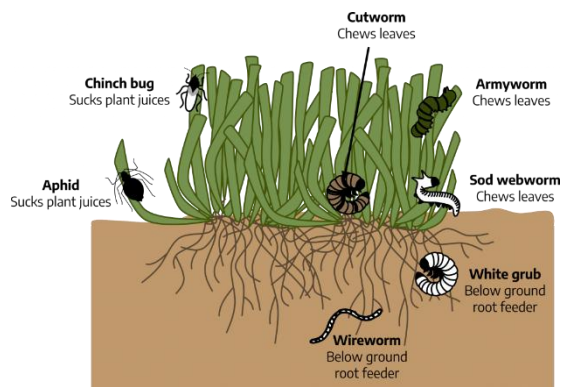
Identify the type of weed before you treat your lawn. When possible, pull or spot treat weeds rather than making broadcast applications of weed killers. Eliminating weeds before they flower is an effective control as weed seeds can be viable for several years.

CRABGRASS OR ANNUAL GRASSY-TYPE WEED CONTROL

Choose pre-emergent crabgrass herbicides that **do not** contain fertilizer. Treat in early April. Follow the directions on the bag. If needed, spot treat with a post-emergent if crabgrass is present in summer.

DISEASE & INSECT CONTROL

Generally, fungicides are not necessary in home turf. Strong turf will outgrow most disease problems. White grubs and sod webworms may damage lawns; if you have a problem, contact us for identification and current control recommendations. [Section 12 has information on white grubs and other turf pests.]



3. Testing and Correcting Your Soil

3.1 Why Test Your Soil?

Have you tried just about every fertilizer, weed killer, or soil conditioner you can find, and you are still not sure what's wrong with your lawn? It is possible your soil's pH is off and the only way to find out for certain is to have your soil tested.

Tests are performed to evaluate the soil's nutrient potential and to determine the most beneficial application rates of fertilizer and lime for optimum plant growth. Accurate soil analysis with subsequent recommendations provides a tool for making economic and ecological application decisions. Maximum benefits are realized through careful management of nutrient availability, which is why a soil test and analysis is critical.

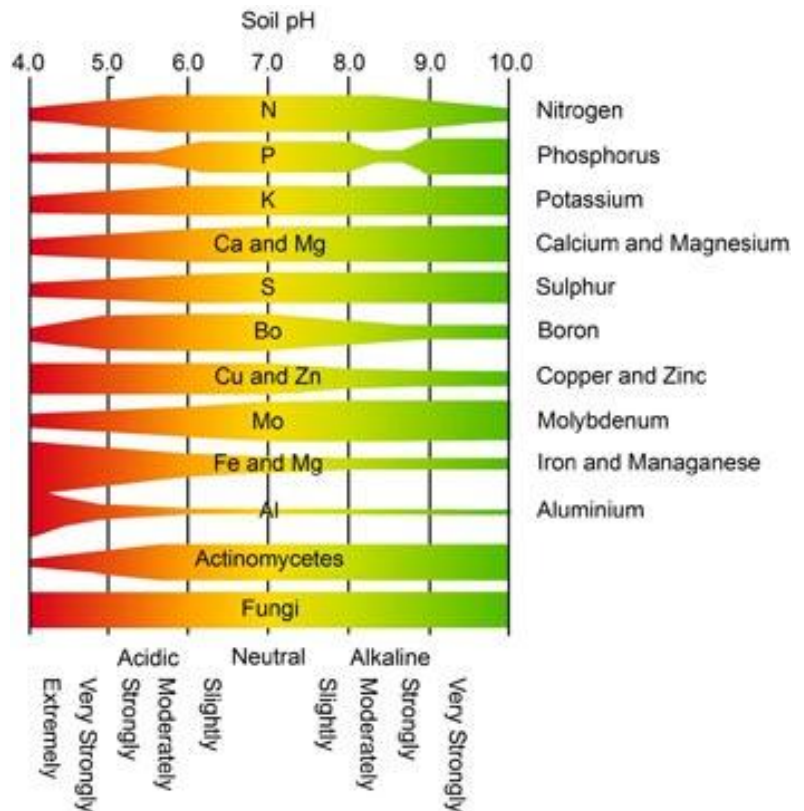
3.2 Soil pH

Having the right soil pH enables the plant to absorb nutrients from the soil. The term pH stands for Potential/Power of Hydrogen, focused on concentrations of positive hydrogen ions (H^+) as opposed to negative hydroxide ions (OH^-). The pH scale runs from 1.0 to 14.0, with 7.0 being neutral. Readings below 7.0 indicate the degree of soil acidity based on the number of hydrogen ions while above 7.0 indicates alkalinity.

A standard pH chart shows the availability of various nutrients in the soil, such as phosphorus, potassium, calcium, manganese, and iron. The same amount of nutrient is in the soil regardless of

the width of the bands on the chart, but where the bands are thick, the element in that band is water-soluble and it's an indication that the nutrient can be taken up by the plant through its roots. Where the bands are narrow, these elements are in a non-soluble status that blocks uptake by the plant's roots.

Most of the soils in Northern Virginia, and throughout the mid-Atlantic, trend toward being acidic. Mildly acid soils (6.2 to 6.8) are considered ideal for healthy turf growth. The only way to be sure of the pH is to undergo a soil test. (Instances of high soil alkalinity are less common, but if so, iron or aluminum sulfate can be applied.)



3.3 Soil Test Analysis

A soil test analysis provides recommendations for the proper ratio of nutrient amendments (fertilizer) and the rate of application for both fertilizer and lime for your lawn. When you apply only as much lime and fertilizer as the soil needs at the appropriate times, you are preventing nutrient runoff into surface and ground water, saving money and time, and optimizing the health of your lawn.

Example of Soil Test Results from VA Tech Soil Testing Lab

Lab ID: 24-19855

2024-03-21

FAIRFAX / 059

Virginia Cooperative Extension Soil Test Report

Questions? Contact:
Fairfax County Office
12011 Government Center Pkwy.
Suite 1050
Fairfax, VA 22035-1111
703-324-5369

Virginia Tech Soil Testing Laboratory
145 Smyth Hall (0465)
185 Ag Quad Ln
Blacksburg, VA 24061
www.soiltest.vt.edu

SEE NOTES:
1 18
at www.soiltest.vt.edu under Report Notes

O
W
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R

HOME TURF
FAIRFAX COUNTY MASTER GARDENER
ASSOCIATION P.O.BOX 2033
MERRIFIELD, VA 20116

Client Name

C F
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Y

SAMPLE HISTORY

Sample ID	Field ID	LAST CROP		LAST LIME APPLICATION		SOIL INFORMATION				
		Name	Yield	Months Prev.	Tons/Acre	SMU-1 %	SMU-2 %	SMU-3 %	Yield Estimate	Productivity Group
BARBK				13-18						

LAB TEST RESULTS (see Note 1)

Analysis	P (lb/A)	K (lb/A)	Ca (lb/A)	Mg (lb/A)	Zn (ppm)	Mn (ppm)	Cu (ppm)	Fe (ppm)	B (ppm)	S.Salts (ppm)
Result	31	139	1880	182	2.5	8.3	0.4	13.1	0.2	
Rating	M+	M	H	H	SUFF	SUFF	SUFF	SUFF	SUFF	

Analysis	Soil pH	Buffer Index	Est.-CEC (meq/100g)	Acidity (%)	Base Sat. (%)	Ca Sat. (%)	Mg Sat. (%)	K Sat. (%)	Organic Matter (%)
Result	6.4	6.27	6.4	12.1	87.9	73.4	11.7	2.8	

FERTILIZER AND LIMESTONE RECOMMENDATIONS

Crop: LAWN MAINTENANCE - BERMUDA, ZOYSIA (204)

619. Lime recommendations: NONE NEEDED.

991. "Explanation of Soil Tests, Note 1" and other referenced notes are viewable at www.soiltest.vt.edu under Report Notes.

206. FERTILIZER RECOMMENDATIONS: Apply a 2-1-1 ratio fertilizer (example of a grade to use is 16-8-8), according to the instructions in the note on lawn fertilization.

Additional detailed information regarding soil testing and applying lime:

Virginia Tech Soil Testing Lab; Sampling Instructions

<https://www.soiltest.vt.edu/sampling-instructions.html>

"Explanation of Soil Test," Soil Test Note #1, Publication 452-701, Virginia Cooperative Extension

<https://www.pubs.ext.vt.edu/452/452-701/452-701.html>

Example of a Nutrient Management Plan: The three-year Nutrient Management Plan provides the precise amounts of lime, fertilizer, and top dressing for the entire lawn based upon the results of the soil test.



Nutrient Management Plan

Client Name, Address

Plan coverage
3/26/24 through 3/26/27

Prepared by: Fairfax County Master Gardeners

NOTE: The chart below provides several different fertilizer formulations to allow a choice in finding one locally. Applications should be applied at least 30 days apart.

Your lawn consists of cool season grasses (fescue/bluegrass)

Area of Lawn: 4,150 SqFt Soil pH: 6.4

Your Fertilizer Recommendation: Based on a formulation of 2-1-1 ratio

Each column indicates total pounds of fertilizer required for one application to area referenced above

Total pounds of fertilizer needed	Apply in Fall (Sept-Nov)		
	1st Application	2nd Application	3rd Application
N Application Rate (lb/1000sf) -->	0.7	0.7	0.5
5-2-0 Milorganite	58	58	42
5-3-3 Espoma Plantone	58	58	42
6-4-0 Milorganite	48	48	35
10-6-4	29	29	21
11-2-2 Scotts Organic Lawn Food	26	26	19
16-8-8, 16-4-10	18	18	13
24-2-12	12	12	9
32-8-5	9	9	6

Organic

Organic

Organic

Organic

Green highlighted fertilizers are recommended for environmentally sensitive soils because of the amount of slow release nitrogen.

Note: If you purchase another fertilizer type with different nitrogen content, this calculation must be adjusted. Contact us for help recalculating.

Lime:

Soil can only absorb 50 pounds of lime per 1,000 square feet every 30 days. An excess of 50 lbs. of lime per application will damage your lawn and the surrounding watershed. Lime application is **NOT** considered annual maintenance. Retest soil in 3 years and only apply lime if results warrant lime application.

Your Lime Recommendation: 0 lbs per 1000 square feet

Application:	#1	#2	#3	#4	#5	#6	#7
Pounds of Lime Required per application	0	0					

Ideally, lawn soil should consist of 5% organic matter. We recommend you top-dress your lawn annually with 1/4 inch of fine-textured compost to enhance microbial activity and improve soil texture. To calculate the amount of compost you will need to top-dress your lawn, use the formula below:

Area to cover (square feet) x depth of compost (inches) x 0.0031 = compost needed (cubic yards)

Your lawn will need 3.2 cubic yards of compost.

www.ext.vt.edu
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3.4 Lime Application

Soil acidity results from several reasons, among them heavy seasonal rainfall, often in excess of 30 inches. This leaches out the phosphorus, calcium, and magnesium needed for healthy growth and nutritional uptake.

Applying lime according to the soil test recommendations will restore calcium and will reduce soil acidity (raise pH) and make soils more conducive to turfgrass growth.

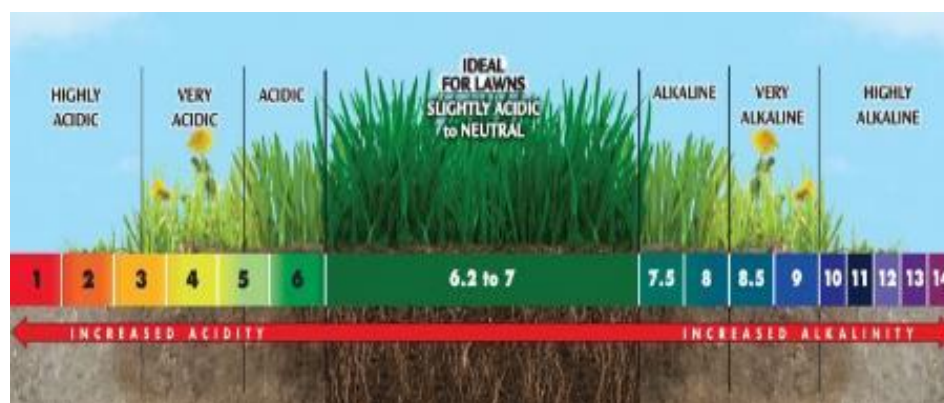


Image used with permission of Jonathan Green

*Notable point:
The pH scale is logarithmic in multiples of 10. A soil with a pH reading of 6.0 is 10 times as acidic than 7.0, and a soil with a pH of 5.0 is 100 times more acidic.*

3.5 Types of Lime

The soil test results will ordinarily advise you to apply an agricultural lime (aka “aglime”), which is ground, pulverized or pelletized. Agricultural lime is sold as two types: calcite (calcitic) or dolomitic lime.

- **Calcitic** lime contains the needed calcium
- **Dolomitic** lime contains both calcium and magnesium (Mg). It is recommended when the soil test shows a Mg reading of Low or Very Low (L, or L-)

Both are safe to use and are non-toxic to humans or grass and will not cause pollution problems.

3.6 How to Apply Lime

Agricultural lime is simple to apply with either a drop spreader or a rotary spreader. Do not hand-scatter. (See Chapter 6, Using a Lawn Spreader).

3.7 How Much Lime to Apply

Soil test results will indicate the amount of lime needed for the lawn area, in pounds per 1,000 square feet to sufficiently raise the soil pH to the proper range. The important point to remember is to apply lime singly at the rate of 50 lbs. per 1,000 square feet, in intervals of at least 30 days. Lime applied at greater than this rate will likely run off and will not be absorbed sufficiently and thus wasted. So, if the soil test results indicate that a lawn needs 100 lbs. of lime per 1,000 square

feet, the first application will be no more than 50 lbs. of that amount, with a second application of the remaining 50 lbs. Applications should be a minimum of 30 days apart.

Since all lawns, when measured, are not exactly 1,000 sq ft, the amount of lime needed will depend on the actual size of the lawn (but applied at the rate of 50 lbs./1,000 sq ft). In other words, using the Nutrient Management Plan example above, if the lawn measured 7,153 sq ft, the TOTAL amount of lime needed (and applied incrementally) would be 100 lbs. (based on the soil test results) x 7.153, or 715.3 lbs. Using the maximum applied ratio of 50 lbs. / 1000 sq ft, this would come to 358 lbs. for the first application, and a second application of the same amount.

Calcitic and Dolomitic lime is often sold in bags weighing anywhere from 30 – 50 lbs., so to calculate the number of bags needed, simply divide total weight required / weight of bag.

Note: Alternate non-agricultural lime products are marketed as “quick acting” products and indicate a much lower application rate. If applied at the 50 lb. / 1,000 sq ft rate, that could result in damage.

If enrolled in the full-service Home Turf Program, a visiting Master Gardener team will visit your property to take soil samples and measure your lawn. As a client in the Home Turf program, you will receive a Nutrient Management Plan valid for three years. It will explain the test results and provide the precise amounts of lime to apply (if needed) along with select fertilizers and rates of application.



Don't Guess....

Soil Test

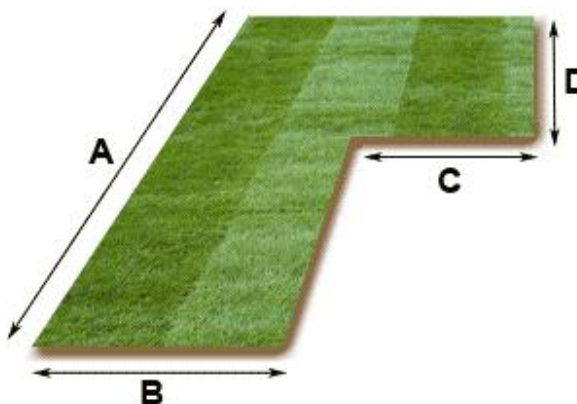
Soil Testing & Analysis at Virginia Tech

4. Lawn Area Measurement

To apply the correct amount of lime and fertilizer that the Soil Test results indicate, the size of the lawn area is needed. This is because lawn care products such as fertilizers and lime specify a typical application rate of “per thousand square feet.”

4.1 Physical Measuring

One method of measuring and calculating total square footage of your lawn is to break it up into geometric shapes such as squares, rectangles, triangles, and circles. The square footage of each individual area is calculated and then added for a total square footage of the area to be treated. Some irregular shapes can be divided into smaller geometric shapes, and their areas added together to estimate the area of the entire lawn. Remember, only measure the permeable lawn area, not non-lawn areas such as hardscapes (patios, sidewalks), ornamental beds, a buffer area around trees, etc.



When it comes to measuring shapes, use straight lines. Using curvy lines will over-estimate the area. Again, the visiting Master Gardener Team will measure and calculate the area of the lawn.

4.2 Alternative Methods of Measuring

Various mapping software using satellite imagery tools are becoming more and more common. Some are easier to use than others. Oftentimes, however, users will encounter satellite imagery where tree canopy or shadows hide the area to be measured.

Additional information regarding lawn measurement and advice on calculation methods:

“Soil Sampling for the Home Gardener” Fact Sheet, HGIC, College of Agriculture and Forestry, Clemson University

<https://hgic.clemson.edu/factsheet/measuring-the-area-of-a-home-lawn/>

“How Big is Your Lawn/” Turfgrass Science at Purdue University, College of Agriculture, Department of Horticulture and Landscape Architecture, Purdue University

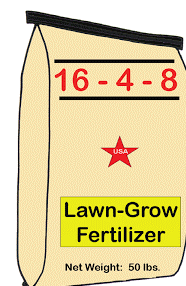
<https://turf.purdue.edu/how-big-is-your-lawn/>

5. Fertilizing Your Lawn

Replenishing nutrients is essential for all lawns and plants for healthy growth and a great look. A soil test report will recommend nutrients for you to apply. When you enroll in the Home Turf Program, a customized 3-year Nutrient Management Plan (NMP) will be issued that will give you either a specific fertilizer recommendation or a turf type fertilizer recommendation and the quantity and time to apply for best results.

Your NMP will recommend a fertilizer for you to apply and when to apply it. Fertilizers are labeled with three numbers, called the “analysis,” which refer to the percentages by weight of nitrogen (N), phosphate (P_2O_5), and potash (K_2O), respectively. Often called N, P, and K, these “big three” elements are required in fairly large quantities for maximum plant growth.

Let’s consider a fertilizer analysis of “16-4-8.” This means the fertilizer contains 16% nitrogen, 4% phosphate, and 8% potash by weight. In other words, for this fertilizer, there are 4.8 pounds of nitrogen [$16\% \times 30\text{lbs.}$], 1.2 pounds of phosphate and 2.4 pounds of potash in this 30 pound bag. The balance of the product is the “carrier” on which the N-P-K hitch a ride. The ratio of N-P-K to one another in a 16-4-8 analysis is 4-1-2. Similarly, a fertilizer labeled “12-4-8” has a ratio of 3-1-2.



5.1 How Fertilizers Work for Your Turf

Texas A&M AgriLife Extension

- **Nitrogen:** This nutrient promotes good green color and steady growth, as well as density, disease resistance, and stress tolerance. Fast growing plants and lawns require larger amounts of nitrogen than shrubs and trees, which need lower amounts. There are usually two types of Nitrogen in fertilizers:
 - Fast release or quickly available nitrogen, also called **Water Soluble Nitrogen (WSN)**, include urea, ammonium sulfate, and calcium nitrate. Virginia limits the application of these formulations to no more than 0.7 pounds of available nitrogen per active growing month per 1000 square feet cool season turfgrass and for the season up to 3.5 pounds nitrogen per 1000 square feet for cool season turfgrass and 4 pounds nitrogen for warm season turfgrass.
 - Slow release or **slowly available nitrogen (SAN)**, also called **Water Insoluble Nitrogen (WIN)**, will release nitrogen over time. Examples include urea formaldehyde, sulfur-coated urea, polymer-coated urea, isobutyraldehyde diurea, natural organics (bone meal, fish meal, dried blood, animal manures) and Class A biosolids. Virginia allows application rates of no more than 0.9 pounds per 1000 square feet for cool season turfgrass and 1.0 pounds per 1000 square feet for warm season turfgrass.
- **Phosphorus:** This nutrient is essential to good root development and found mainly in Starter Fertilizers to help new grass. Phosphorus will not be contained in Maintenance Fertilizer, used on already well-established lawns, therefore, the middle number will be zero.

- **Potassium:** This nutrient regulates physiological processes needed to help uptake water (H₂O) from the roots and allow it to be absorbed into the plant.

5.2 Types of Lawn Fertilizers

- **Maintenance Fertilizers:** Lawn maintenance fertilizers are now phosphate-free, and if a soil test indicates no phosphorus is needed, this is the type of fertilizer to select. These fertilizers are used on mature, well established lawns, which benefit from higher amounts of nitrogen.
- **Starter Fertilizers:** Designed for use on newly-seeded lawns, these fertilizers will contain an amount of all three, but the phosphorus level will be higher. Because of the need for phosphorus in strong root development, they will usually be used on a one time basis when grass seed is first planted. An example of a starter fertilizer ratio would be 18-24-12.
- **Complete Fertilizer:** A complete fertilizer will contain all three nutrients, but will have a higher amount of nitrogen and a presence of some phosphorus. A complete fertilizer is actually a maintenance fertilizer that would be used when a soil test indicated a low or medium level of phosphorus, or when over-seeding a well established lawn. An example would be 24-6-12.

5.3 Quick Release versus Slow Release Nitrogen

As the names imply, there are often two types of nitrogen in lawn fertilizers. Each perform differently in terms of whether the Nitrogen is absorbed in the soil all at once or whether it is absorbed more slowly over a longer period.

Nitrogen Type	Advantages	Disadvantages
Fast release (applied at rate of 0.7 lb/1000 sq ft). • Urea • ammonium nitrate, • ammonium sulfate	1. Quick release (greening) 2. Provide nitrogen when soils are cold 3. Relatively inexpensive	1. Might cause undesirable flush of growth 2. Likely to burn grass 3. Losses through soil (leaching) or air more likely 4. Feeds for shorter period (1-2 weeks)
Slow release (controlled release) (applied at rate of 0.9 to 1.5 lb /1,000 sq ft). • ureaform • sulfur-coated urea activated sewage sludge, IBDU • water-insoluble nitrogen (WIN)	1. More uniform grass growth 2. Not likely to burn grass 3. Losses through soil (leaching) or air less likely 4. Feeds for longer period (4-6 weeks)	1. Might not work on cold soil 2. Most are expensive 3. Might not see quick color change in grass.

The rates of nitrogen shown in the table above are state law. They were formulated after extensive review and coordination between the Virginia Turfgrass Council and the Chesapeake Bay Foundation.

5.4 How Much Fertilizer to Apply?

All bags of fertilizer will contain nitrogen in varying amounts. And in addition to that, the nitrogen will often contain a blend of **Water Soluble Nitrogen (WSN)** and **Water Insoluble Nitrogen (WIN)**.

These percentages will impact the rate and the amount that we will need to meet our lawn's needs.

- Most cool season grasses (tall fescue, Kentucky bluegrass, perennial ryegrass) usually will need between 2.0 to 3.5 lbs. of nitrogen per year (per 1,000 sq ft. turfgrass)
- Warm season grass such as zoysia will usually need between 1.0 and 2.0 lbs. Depending on the fertilizer, especially the percentage of WSN vs WIN, and the amount to be applied, it is often better to apply in increments.

5.5 When to Apply Lawn Fertilizer

Research indicates that fall, not spring, is the best time to fertilize cool season grasses. Why? Fertilizing during September, October, and November will nourish and develop a strong, vigorous root system that allows the lawn to stay greener in the winter, and green-up sooner in the spring.

Spring fertilization of cool season grasses mainly supports the new shoots which are already feeding from the food stored during the winter root growth. Therefore, any spring fertilizing for cool season grass should be limited to $\frac{1}{2}$ of the recommended amount and rate, and well before summer. Heavy spring fertilization can stimulate excessive top growth that will eventually become unsupportable by the root system, especially in the summer. Also, heavy spring fertilization often produces a flush of new tender growth that often presents an ideal home for fungal diseases. Many of these diseases won't show symptoms until summer, but by then there's usually not much that can be done.



Warm season grasses, such as zoysia, have different growing patterns. (Chapter 9) As such, the optimal time for fertilizing a warm season turf lawn such as zoysia will be in the summer, which is its greatest growth period. The calendar on page 61 provides a comprehensive guide for the timing of fertilization.

5.6 Calculation of Amount of Nitrogen

Knowing how to calculate the contents of the fertilizer will help provide the basis for determining

Guaranteed Analysis

Total Nitrogen	16%
5.6% Water Insoluble Nitrogen	
Available Phosphoric Acid (P_2O_5).....	4%
Soluble Potash (K_2O)	8%

the proper application rate, and amount. **A good rule of thumb is the higher the nitrogen level, especially WSN, the lower the application rate.**

First, determine the ratio of WIN vs WSN. Using this label as an example, we see that the full amount of nitrogen fertilizer in this product is 16%. We also see that the amount of WIN is 5.6%. The rest of the

fertilizer is assumed to be WSN (16% - 5.6% is 10.4%.)

If there is no listing for Water Insoluble Nitrogen, VT recommends that you assume all the nitrogen is water soluble or quickly available nitrogen.

We then figure how much of the total **nitrogen** is WIN. To do that we simply calculate the percentage of nitrogen to be WIN. Using the formula in the chart shown here, we can see that the amount is 35%. By referring to the table of application rates for WSN, we see that we would need to plan to apply 0.9 lb. of nitrogen per application. **A lawn fertilizer should have at least 15% WIN to be applied at the 0.9 pounds N rate.**

Slow Release Nitrogen				
%WIN / % N = % WIN				
5.6 / 16 x 100 = 35%				
Amount of WSN		Rate /1000 sq ft		
<15% WIN		0.7 lb		
15-49% WIN		0.9 lb		
> 50% WIN		1.0 - 1.5 lb		

Lawn fertilizers with less than 15% WIN are applied at lower rates, but they are not as common. Fertilizers with greater than 50% WIN usually cost more but using slow-release nitrogen helps protect water quality as it is not as susceptible to runoff or leaching.

Most cool season lawns will require 2.0 – 3.5 lbs. of nitrogen per 1,000 square feet over the course of the season. Rather than apply a full amount at one time, it is best to apply fertilizers in several increments. Virginia Cooperative Extension has summarized its recommendations for fall fertilization of cool season grasses with the acronym “SON.” Make three fertilizer applications, applying no more than 0.9 lb. of N/1,000 ft² of turfgrass, during **September, October, and November** for most lawn fertilizer products (and maybe a SMALLER, SINGLE application again in spring at ½ the rate). A plan with multiple applications might look something like this.

Nitrogen	Sep	Oct	Nov	Apr	May	Jun	Jul	Aug	Seasonal N Total
Water Soluble (<15% WIN)	0.7	0.7	0.5	0.5-0.7		0	0	0	2.0-3.5
15-49% WIN	0.9	0.9	0.5	0.5-0.9		0	0	0	2.0-3.5
≥ 50% WIN	1.0-1.5	1.0-1.5	0	0 – 1.0			0	0	2.0-2.8
	Fall			Spring		Summer			

Computing the amount of fertilizer by a specific analysis needed to deliver 0.9 pounds of N per 1,000 ft² can seem tricky at first but actually is quite simple. Options include calculating the answers through the formulas below, but another choice is to use the on-line calculation tool from the Virginia Dept of Conservation and Recreation Fertilizer Calculator (on line) <https://www.dcr.virginia.gov/soil-and-water/fertcalc>.

Or use the following formula to determine amount of nitrogen in a bag of fertilizer

$\frac{\text{Desired pounds of Nitrogen per 1000 square feet}}{\% \text{ Nitrogen in Fertilizer}} \times 100 = \text{Pounds of Fertilizer needed per 1,000 ft}^2$

Example: To apply 0.9 pounds of nitrogen per 1,000 ft² using a 16-0-8 fertilizer:

$\frac{0.9}{16} \times 100 = 5.6 \text{ pounds of 16-0-8 per 1,000 ft}^2$

If the lawn covers a total of 8,000 square feet, multiply 5.6 by 8 for a total of 44.8 (round down to 44) pounds of 16-0-8 fertilizer.

Thus, 44 pounds of 16-0-4 fertilizer would be applied to your lawn three times during the year—once in September, once in October, and once in November—resulting in a grand total of 132 pounds of 16-0-4 fertilizer per year.

5.7 How Much Does 0.9 Pounds of Nitrogen Cost?

The price for a bag of fertilizer will vary from analysis to analysis. It is difficult to determine the “best buy” based on bag weight alone. When price shopping, consider how many pounds of a particular fertilizer are required to deliver 0.9 pounds of nitrogen when comparing costs.

Other factors that determine the value of a fertilizer are how much phosphorus and/or potassium is included, and what percentage of the total nitrogen is being supplied in a slowly-available form (WIN). As previously stated, the higher the rate of WIN, the more expensive it will likely be.

Consumers who want to compare fertilizers can set up a table to evaluate several types and weights of fertilizer and bag sizes that are available on the commercial market. Full-service garden centers usually offer a good selection of fertilizers. Below is a template to start the table.

	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6	COLUMN 7
Product Name	Price/bag	Pounds/bag	Price/pound	SAN or WIN at % Total N	Lbs. Fertilizer to deliver 0.9 lb N	Cost/0.9 lb N
	From store	Bag size	= Column 2 divided by Column 3	Read on Fertilizer bag	Calculate see 5.6 above	= Column 4 divided by Column 6

The following chart shows various types and weights of fertilizer and bag sizes that are available on the commercial market; however, the prices are out of date. Full-service garden centers usually offer a good selection of fertilizers. Use the table above to develop your own comparison table.

Product	Price/ bag	Pounds/ bag	Price/ pound	SAN as % Total N	Lbs. Fertilizer to deliver 0.9 lb N	Cost/0.9 lb N
Conventional Product 1 32-0-4	\$15.99	14 lbs	\$1.14	28%	2.8	\$3.19
Conventional Product 2 10-20-15	\$21.90	40 lbs	\$0.55	15%	9	\$4.95
Organic Product 1 5-2-0	\$12.99	36 lbs	\$0.36	70%	18	\$6.48
Organic Product 2 10-2-8	\$38.70	50 lbs	\$0.77	90%	9	\$6.93
Organic Product 3 18-0-3	\$42.99	20 lbs	\$2.15	80%	5	\$10.75
Organic Product 4 5-3-2	\$21.99	40 lbs	\$0.55	60%	18	\$9.90

5.8 Alternate Fertilizers

5.8.1 Corn Gluten Meal

Corn gluten meal is often used as a weed preventative. Many find it a favorable alternative to chemical weed prevention products because of its organic qualities. It also contains at least 9% nitrogen, which then serves as a fertilizer. Since weed prevention measures are done in early through mid-spring, be careful to not apply fertilizer too late or risk the problems of over-applying nitrogen at the wrong time of the year. **NOTE:** Corn gluten is a source of nitrogen. Applying it at the recommended amount to control weeds may exceed the amount of nitrogen recommended by your NMP.

5.8.2 Weed and Feed Products

As with corn gluten, these products serve a dual purpose: 1) weed prevention and 2) fertilization. Depending on the turfgrass, the time of year an herbicide should be applied might not coincide with the time of year that a fertilizer should be applied. The nutrient of greatest concern is nitrogen. Weed and feed products are often applied in spring, whereas for cool season grasses, lawn fertilizer is mainly applied in the fall. If using a weed and feed product, the timing of the application is critical to ensure the effectiveness of the weed product without over-stimulating new turf growth, especially just before the coming hot summer weather. One can purchase fertilizer and if desired, a separate product for weeds.

Summary

With so much relevant information regarding the types of lawn fertilizer, application rates, and timing, this can appear somewhat daunting. Having a soil test and working with the results makes

for better-informed practices. As always, the purpose of a healthy lawn is not to have a perfect-looking lawn, but rather one that adds to your enjoyment and home's value while being maintained responsibly so that it is a benefit to our waterways and our overall environment and well-being.

Additional Information from the Virginia Cooperative Extension:

"Lawn Fertilization in Virginia" Publication CSES-135P, Virginia Cooperative Extension
https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/CSES/CSES-135/CSES-135-pdf.pdf

VCE Fairfax Presentation – "Lunch n' Lawn" (video)
<https://www.youtube.com/watch?v=bNhRzUthxs4>

Virginia Dept of Conservation and Recreation Fertilizer Calculator (on line)
<https://www.dcr.virginia.gov/soil-and-water/fertcalc>

Lawn Fertilizer in Virginia, Virginia Cooperation Extension, Publication 430-011,
[https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/430/430-011/SPES-334%20\(1\).pdf](https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/430/430-011/SPES-334%20(1).pdf)

6. Using the Lawn Spreader

The two basic types of lawn spreaders used to apply lime, fertilizer or grass seed are the drop spreader and the broadcast spreader.

6.1 Drop Spreader

The drop type spreader "drops" a set rate of product directly under the machine, between the wheels. This type is best suited for narrow or small spaces. The amount of product that is spread depends on the opening setting, the type of product, and the speed at which the spreader is pushed. This type of spreader usually makes it easier to avoid dispersing or spilling fertilizer onto sidewalks or driveways.



Images from University of California, Agricultural and Natural Resources

6.2 Broadcast Spreader

The broadcast type, also called the rotary or cyclone spreader, has a rotating disc that "throws out" fertilizer in a circular pattern as it is pushed. The broadcast spreader covers a wider swath of lawn, which makes it more suitable for larger lawns.



6.3 Hand-held Spreader

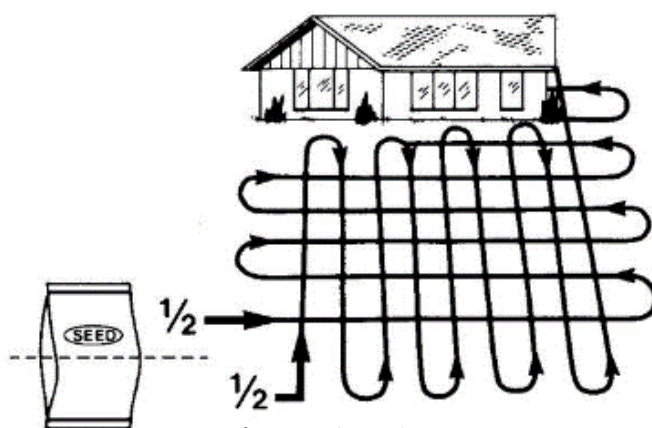
For small areas, of several 100 square feet, a hand-held spreader is optional. Cranked by hand, it operates as a broadcast spreader but is manually operated while holding it.

6.4 Calibration

Both drop and broadcast spreaders have opening settings for different rates of application. The settings are only approximate at best, and it is important to calibrate the spreaders before they are used. Many lime or fertilizer products will include a recommended rate of application setting for some of the more popular commercial spreaders.

6.5 Application Technique

To ensure an even application of fertilizer, lime or seed, a recommendation is to cover the area being treated by making two passes. To do this properly, apply $\frac{1}{2}$ of the product at your calibrated delivery rate in a horizontal walking pattern, followed by a perpendicular, or vertical walking pattern using the remaining $\frac{1}{2}$ of the product and same delivery rate. This requires a careful “eye” so that overlaps and underlaps are avoided in the process. Follow this technique whether using the drop spreader or the broadcast spreader.



Also, when rounding the corner to begin the parallel pass, close the spreader output to avoid applying excess product.

Additional Information on using your lawn spreader:

“Calibrating Your Lawn Spreader” VCE Publications /430 / 430-017

<https://www.pubs.ext.vt.edu/430/430-017/430-017.html>

7. Watering Your Lawn Effectively & Responsibly

7.1 Irrigation is an all or nothing proposition

To keep your lawn green during a hot, dry summer, you need to water deeply, consistently, and regularly as conditions require.

The other option is to not water at all and let the grass go dormant. It should recover and turn green again in the fall (or with cooler temperatures and adequate rainfall).



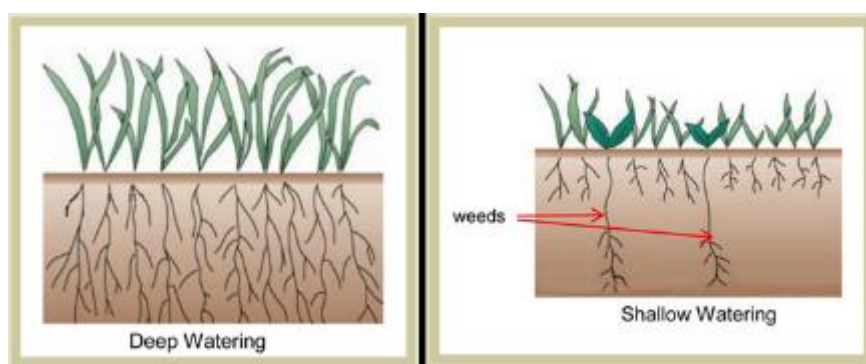
Do not fertilize or mow a dormant or moisture-stressed lawn.

In general, **applying one inch of water per week** is the recommendation when there is insufficient rainfall during summer drought.

7.2 Tips for better watering

Deep, infrequent irrigation that wets the entire rootzone (generally 4-6 inches in depth) leads to the healthiest turfgrass plants. Plants develop deep, strong root systems that can extract water from a large volume of soil. Turfgrass plants with deep root systems are better able to withstand environmental and mechanical stress and have increased recuperative capacity.

Light, frequent irrigations produce shallow, weak root systems. The shallow root system prevents efficient use of plant nutrients and water in the soil. Roots generally grow where the soil is moist, and some turfgrass roots do seek out water deeper in the soil as the surface moisture is depleted. The illustrations below show how deep, infrequent watering (once or twice a week) encourages healthy root growth, whereas shallow, frequent watering encourages shallow turf roots and may even encourage some weeds.



University of California, Agriculture & Natural Resources, "The UC Guide to Healthy Lawns"

One word of caution: Applying one inch of water is sometimes difficult to achieve in a single watering given the slow infiltration rate on most Virginia soils. Therefore, smaller amounts of water applied every three to four days may be required to allow water to enter the soil without causing runoff. (See references to Aeration.)

7.3 When to Water

Water is best applied early in the day (5:00 a.m. to 10:00 a.m.) when evaporation loss is lowest. Afternoon watering is acceptable but wind may affect uniformity. Night watering minimizes evaporation, but may increase fungal diseases.



Image from National Weather Service – Goodland, KS

7.4 Sprinkler Systems

Automatic Sprinkler Systems: These provide a reliable means for delivery of water at the proper time and duration. Advances in home technology are even resulting in “smart” sprinklers with weather-sensitive technology that can sense recent rainfall and even gauge upcoming rain and adjust output on these factors.

Portable, Standard Sprinklers: When using portable, above-ground sprinklers, look for sprinklers that keep water close to the ground rather than sending a fine mist or spray high into the air. This will help reduce evaporation as well as keep the water on the lawn.

If using an automated or portable sprinkler system, be sure to calibrate the heads and sprinkler placement so water goes solely to the lawn, and not driveways, sidewalks, or roads.

Additional detailed information regarding watering of lawns:

“Lawn Management During Heat and Drought” Virginia Cooperative Extension
<https://ext.vt.edu/lawn-garden/turfandgardentips/tips/lawn-managment-during-drought.html>

“Summer Lawn Management: Watering the Lawn” Publication 430-010 Virginia Cooperative Extension
<https://www.pubs.ext.vt.edu/430/430-010/430-010.html>

8. Core Aeration

Under certain conditions, such as high clay content or heavy traffic, soil can become compacted making it difficult for turfgrass roots to thrive. Under compacted conditions, the mineral particles that make up the soil are pressed tightly together, preventing oxygen, water, and nutrients from reaching the roots. The effects of soil compaction can be reduced greatly by core aerating.

8.1 How Core Aeration Works

A core aerating machine pulls plugs of soil out of the ground and deposits them on top of the lawn. This allows oxygen and water to penetrate to the root zone of the turf, greatly stimulating the growth of new roots.

Aerating Your Lawn

If you suspect something is wrong with your lawn, **get a soil test!**

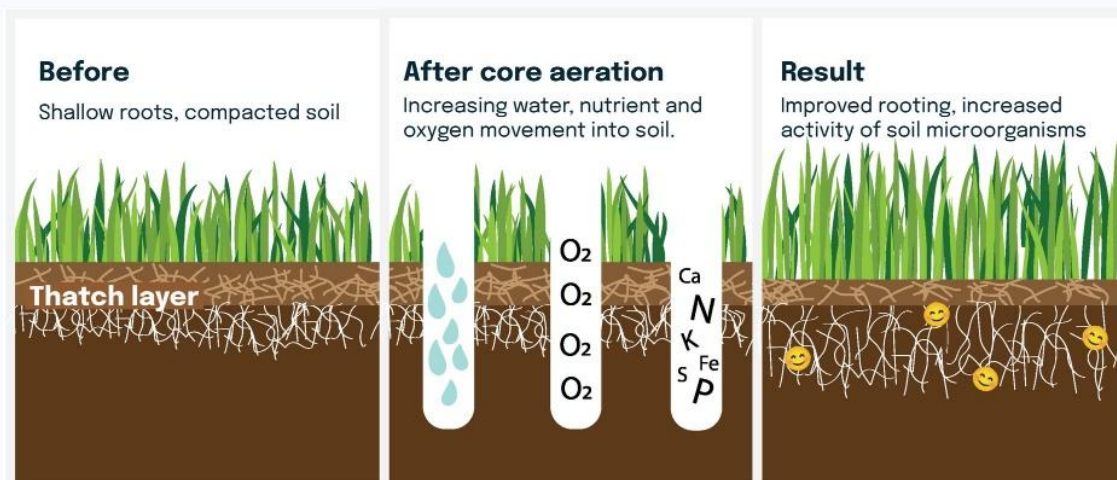


Why aerate?

- Increase the activity of soil microorganisms that decompose thatch.
- Increase water, nutrient and oxygen movement into the soil.
- Improve rooting.
- Enhance infiltration of rainfall or irrigation.
- Help prevent fertilizer and pesticide run-off from overly compacted areas.

How to aerate:

- Use a mechanical core aerator
- Soil should be moist but not wet.
- Thoroughly water (1 inch of water) two days prior to aerating.
- If aerating after prolonged rainfall, wait until the soil has dried somewhat.
- Aerate the lawn in at least two different directions to ensure good coverage.



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Master Gardener Program

8.2 Key Benefits of Aeration

The resulting soil disturbance allows enables the water and oxygen to reach the roots of the turf, and thus stimulate the growth of new roots. This allows them to grow deeper, making for a healthier plant. Besides relieving the compaction, it is a great way to break up any heavy layers of thatch that might have been allowed to build up at the soil surface. The aerated lawn also lets fertilizer infiltrate to root level, rather than risk runoff.

8.3 Optimal Time to Aerate

Core aeration should not be done after temperatures warm to temperatures that cause grass to stress. **Fall is the best time to aerate a cool season lawn, especially if over-seeding.**

The soil should be moist, but not wet. If rainfall has not been adequate, irrigate the lawn (applying one inch of water) a couple of days before aerating. After aerating, the resulting soil plugs will break up after several days.

8.4 The Aerator Machine

Aerators can be rented at equipment rental businesses and some garden centers. Some core aerator machines are bulky and somewhat heavy, and might prove a challenge to transport in a passenger car. Alternatively, many lawn services will perform this as a separate service, even if you don't have a lawn maintenance service with the company.

If you have a small lawn and you have the time, another option is to use a foot-powered manual aerator with tines that you yourself press into the earth. However, do some product research on durability beforehand. Avoid devices or special “spikey” type shoes that press holes into the earth without removing cores. Oftentimes this just results in more soil compaction, which is the opposite of aeration.



Image: University of Idaho

Summary

Aeration is one of the most beneficial ways to enable water, air, and oxygen to reach the roots, and to improve the soil. Aerated lawns respond well to fertilization, top dressing application of ¼ inch of fine compost, or overseeding, which can be done immediately after aerating.

Additional detailed information regarding core aeration:

“A Lawn to Dye For,” Video (2:59), Virginia Tech

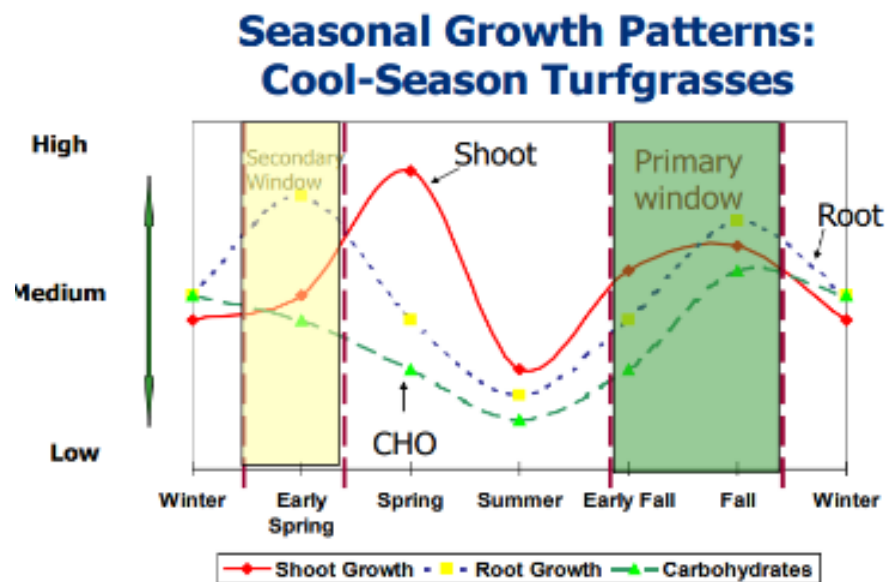
<https://www.youtube.com/watch?v=ygg8T8TZMYM&feature=youtu.be>

9. Cool Season Grass? Warm Season Grass? What's the Difference?

9.1 Cool Season Turfgrasses

Most lawns in Fairfax County consist of cool season turfgrass. The roots of these grasses grow best in soil temperatures of 50°F – 65°F and are the first to emerge in the spring. Major top growth (shoots) emerge early spring to early summer when air temperatures are between 60°F - 75°F. The image below illustrates the growth pattern of cool season turfgrasses.

- The red curves illustrate that top (shoot) has two heavy growth periods: spring and early fall.
- The root growth (dotted curve) also occurs primarily in the fall and again in early spring.
- Carbohydrates (green dashed line) are sugars built up in the fall to feed the turf through the coming year. For this reason, the best time of the year to fertilize, plant, or replenish cool season grasses is in the fall (shaded green area.)



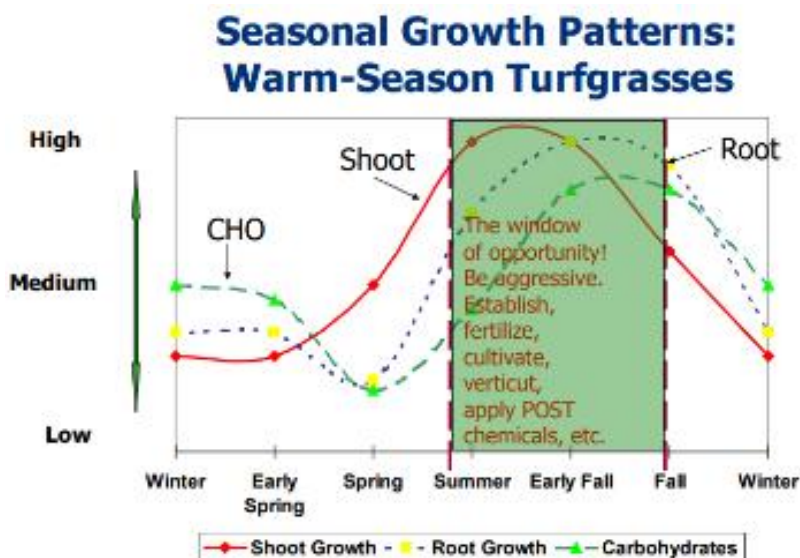
Typical Cool Season grasses found in Northern Virginia include:

Tall Fescue	Sun loving turf with average shade tolerance (but not deep shade). Good overall performance in Northern Virginia. Very deep root system that grows singularly as a “bunch” and does not have expanding rhizomes. Good choice for low to moderate maintenance lawns.
Kentucky Bluegrass	Sun-loving, with a dark green color. Need at least 6 hours of full sun a day and does not tolerate shade. Grows in a spreading fashion via rhizomes to form a dense sod. Grows best during cool, moist weather on well-drained, fertile soils. More prone to turf diseases. Very slow germinating from seed.
Fine Fescue	For general use in low maintenance areas or in partial to full shade (< 4 hours of sunlight per day.) Blade is much thinner than other cool season grasses; almost needle-like and appears to “flop” rather than maintain vertical rigidity.
Perennial Ryegrass	Normally not very cold hardy. Germinates very quickly, so it is often sold with other seed blends to show some “early green.” Performs best at higher elevations (> 1000 feet), and so a pure perennial ryegrass lawn is not recommended. (An “Annual Ryegrass” seed is often included in Kentucky Bluegrass based on its rapid germination, but it is temporary grass that will not live beyond a year.)

9.2 Warm Season Grasses

These grasses perform best in the heat of summer when the air temperature is 80°F-95°F. Greenup begins when soil temperatures reach ~50°F. While Cool Season grasses are slowing down in the intense heat of summer; Warm Season grasses are doing their major growth.

- Red curve shows that major shoot growth is all summer.
- Dotted blue line illustrates that root growth occurs in tandem with shoot growth.
- Dashed green illustrates that carbohydrate stores are built up beginning in summer and into fall.
- Feed and replenish warm season turfgrasses in early summer.



Warm season grasses go into winter dormancy after the first hard frost, and lose their green color, taking on a light brown, straw-like appearance. When the soil sufficiently warms again in late May, new growth begins.

Some of the more common Warm Season grasses in Virginia include:

Zoysia	Full sun. A dense, high-quality lawn with excellent heat and drought tolerance. Slow growth rate and handles traffic well when actively growing in hot summer months. Has better shade tolerance than Bermudagrass. Has minimal pest vulnerability. Holds up well to foot traffic. Good water use efficiency. Because of dormancy after first frost, it will appear brown throughout the winter and into spring.
Bermudagrass	The most aggressively spreading warm season grass; often seen as a troublesome weed if growing in a cool season lawn . Aggressive growth through rhizomes (underground roots) and stolons (above ground roots.) Does not tolerate shade.
St. Augustine grass	Of all warm season grasses, this one will do the best in shade. It does not tolerate cold temperatures and is suitable mainly for the Tidewater area and points south. It has more problems with insects and diseases than other Warm Season grasses.
Centipede grass	Have a naturally yellow-green color and is unusually slow growing with average shade tolerance and tolerance to acid soil conditions. Has fewer pest problems but does not stand up well to traffic. Mainly suitable for Tidewater region.

9.3 Additional “Turf” Alternatives for Problem Shade Situations

In addition, there are several alternate grasses that are neither cool nor warm season turf *per se* but offer alternative choices for shady areas. Also, consider groundcovers that will do well in the Mid-Atlantic heat and soil conditions. The Virginia Native Plant Society and NovaNatives, <https://www.plantnovanatives.org/>, have great information for the gardener.

Poverty Oat Grass (<i>Danthonia spicata</i>)	Short-leaved, light green, tufted perennial found on poor sandy or gravelly soils.
Parasol Sedge (<i>Carex umbellata</i>)	Grass-like perennial; suitable for damp sites.
Pennsylvania Sedge (<i>Carex pensylvanica</i>)	Shade-loving perennial sedge that spreads by rhizomes & stolons. Suggested for use as a ground cover, naturalize, or rain garden. Thrives in well-drained and dry soils.
Red Fescue (<i>Festuca rubra</i>)	A Cool Season grass for use in cool, shaded, mountain sites such as camps, resorts, and cabins where low input of mowing, fertilization, and irrigation is desired. Thrives in shady, dry soil, but does not do well in hot climates.

So which turf is best suited for our Northern Virginia area? It is probably a matter of weighing a variety’s qualities against personal preferences. Added to that, Virginia is among the states that are in a **Transition Zone**, where neither Cool Season nor Warm Season turf will look their best all year around.



The Transition Zone is the most challenging region in which to grow grass that is suitable year-round.

Source: Texas A&M Agrilife Extension

9.4 Can I Mix Cool Season and Warm Season Grasses Together to Get the “Best of Both” Choices for My Lawn?

Some might ask whether warm and cool season grasses can grow together; the idea being that warm season grasses tolerate the heat and drought of the hot summer, while the cool season grasses can stay green throughout the period when the warm season grasses go dormant and appear straw-like. In most cases, **this does not work well** because each will require different maintenance and fertilizer periods or cutting heights. Adhering to the best practices for one will work to the detriment of the other.

Research has been ongoing as to whether certain cultivars of cool season and warm season grasses can be offered. Certain Kentucky bluegrass varieties have combined with Bermudagrass



Warm season grass (Zoysia) and Cool Season turf growing in the same yard in January.

as an option for athletic fields. Generally, though, these usually require a higher level of specialized full-time maintenance and are not yet available for the general market.

So, for the average homeowner, it is not a good idea to have a lawn consisting of both warm and cool season grasses in the same area. Warm season turf such as Zoysia, is certainly nice to have, but it spreads rapidly and can encroach in areas where cool season grasses are trying to grow. The same is even more true for Bermudagrass (aka Wiregrass).

Summary

Most Northern Virginia lawns tend to be of the cool season variety, with tall fescue among the most popular. With nominal care these grasses will do very well. On the other hand, a warm season lawn with Zoysia does very well and provides a thick, lush carpet during the summer growing season. If hotter and longer summers become the norm, we could one day be more acclimatized to more warm season turf lawns. Knowing the differences in growth habit and needs between cool and warm season turfgrasses is a must to practice good environmental stewardship, set the conditions for healthy and proper growth, and achieve the look you want.

Additional detailed information regarding cool season and warm season turfgrass:

“ ‘Fall’ Into Your Cool Season Lawn: Selecting the Best Grass.” Virginia Cooperative Extension
https://ext.vt.edu/lawn-garden/turfandgardentips/tips/Cool-season_Lawn_Selecting_the_Best_Grass.html

“Choosing and Establishing Warm Season Turfgrasses for Virginia Lawns” Virginia Cooperative Extension
<https://ext.vt.edu/lawn-garden/turfandgardentips/tips/warm-season-lawns.html>

Turfgrass Varieties for Mid-Atlantic Lawns (podcast) Virginia Cooperative Extension
<https://ext.vt.edu/lawn-garden/turfandgardentips/tips/turfgrass-varieties-mid-atlantic-lawns-2008.html>

“2024-25 Virginia Turfgrass Variety Recommendations,” Virginia Cooperative Extension
<https://www.pubs.ext.vt.edu/SPES/spes-617/spes-617.html>. Note: VCE annually recommends turfgrass varieties; this link changes annually. Use your browser to access the most current year’s recommendations.

10. Top-Dressing with Compost

After aerating, it is a good idea to top-dress your lawn with a layer of fine-textured compost, about a quarter of an inch (1/4 inch) deep over the entire lawn.

As a “top dressing” to the lawn, compost works to:

- Improve soil texture and structure
- Enhance microbial activity for a healthy ecosystem
- Help soil retain moisture and nutrients
- Help soil resist compaction



Penn State Extension “Using Composts to Improve Turf Performance”

10.1 Use Fine-Textured Compost

Start with good, fine-textured compost. All garden centers carry good, bagged compost that is ready to use. Compost can also be bought in bulk if you have a large lawn. Homemade compost may be used as long as it is fine-textured so it will rake out evenly without leaving clumps.

10.2 Spread the Compost

To apply the compost, use a shovel or just start dumping small piles of the compost out around your lawn. Do not use a lawn spreader since the texture of compost is not compatible with the spreader openings.

10.3 Rake It Out Evenly

With a flexible garden rake, distribute the compost out over your lawn to about ¼ inch thick. It should be a fairly thin, even layer. Do not apply a thicker layer thinking that more is better; thick compost can cause problems such as smothering your grass. A thin layer will break down quickly releasing its nutrients into the lawn.

Additional detailed information regarding applying top dressing to turf:

“Using Compost to Improve Turf Performance” Penn State Extension
<https://extension.psu.edu/using-composts-to-improve-turf-performance>

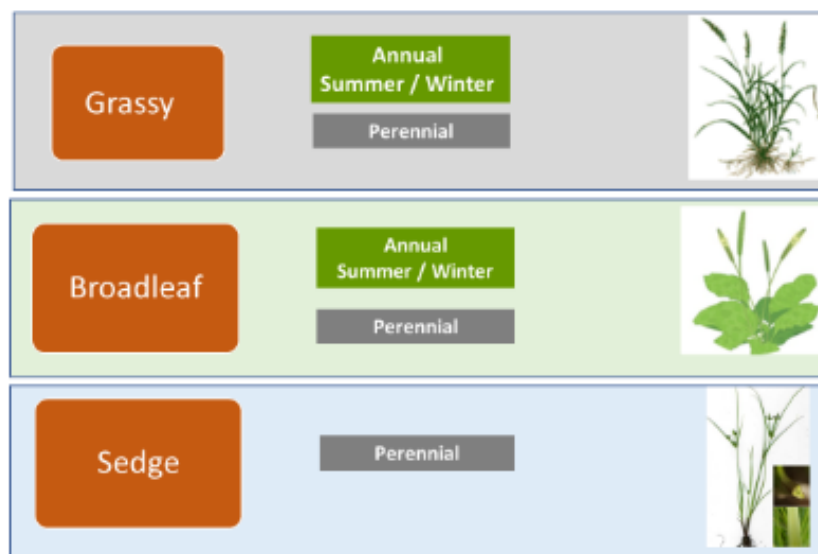
11. Lawn Weed Control

Your healthy turf is always competing with weeds for water, oxygen, nutrients, and sunlight. Left to their own, weeds are remarkably resilient plants and will constantly look for opportunities to thrive. Such opportunities occur in lawns where turf has begun to thin out, have bare patches, become weakened by disease, or are in poor soil. Maintaining a healthy lawn is the greatest defense in minimizing weeds.

11.1 Weed Types

Lawn weeds can be divided into three classes: grassy weeds (e.g., crabgrass) and broadleaf weeds (weeds with leaves). A third class, sedges, is also evident in many lawns though it is often mistaken for a grassy weed. The grassy and broadleaf weeds can be further divided into annual and perennial weeds. The annual weeds germinate, grow, and die in one season, and are of two varieties: those that appear in late winter, and those that occur in summer. Perennial weeds return season after season, as do sedges.

Types - Grasses, Broadleaves & Sedges



11.1.1 Summer Annual Weeds

- Germinate during early spring and grow until early fall.
- May be grassy or broadleaf.
- When they die after one season, they leave behind many seeds that will germinate early in the following spring.
- Typical summer annual weeds include crabgrass, spurge, or Japanese stiltgrass.

11.1.2 Winter Annual Weeds

- Germinate in the fall or late winter and grow throughout the spring.
- Begin to die around early May, after which seeds will be left behind in the lawn to begin the cycle all over again in the fall.

- Typical winter annual weeds include chickweed, henbit, speedwell, and deadnettle.

11.1.3 Perennial Weeds

- Same weed plants that return year after year.
- Can be single plants or plants that spread.
- Usually harder to deal with because of their establishment.
- Typical perennial weeds include dandelion, ground ivy, aka creeping charlie, wild violets, and plantain.

11.2 Breaking the Weed Growth Cycle

Although maintaining a healthy lawn is by far the best step in keeping weeds at bay, there will always be weeds that will manage to gain a foothold in your lawn. Since the various types of weeds have different growing habits, it's important to know the weeds or class of weeds you're dealing with as you work to break the growing cycle. Your approach will depend on the type and amount of weeds present in your lawn. The use of herbicides is always a last resort.

11.2.1 Prevention

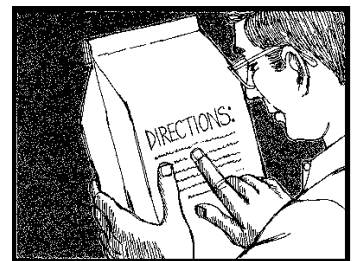
Keeping weeds from growing in the first place makes sense but inevitably even healthy lawns need some help. Besides the maintenance of a healthy lawn, another option for prevention is to use pre-emergent products to prevent the germination of seeds that were left in the lawn from the previous growing season. Think of pre-emergent products as the equivalent of landscape fabric; it establishes an invisible barrier which germinating weed seedlings are unable to penetrate. For summer annual weeds the pre-emergent is applied during late March or early April. For winter annual weeds, the pre-emergent is applied in the fall or early winter. Pre-emergents may be granular or liquid, and will require a lawn spreader or liquid applicator.

11.2.2 Once Weeds Are Established

The most effective, and environmentally sound methods for weed removal is the simple act of hand-pulling. Standard, inexpensive tools will facilitate the weed-pulling process. Removing weeds is best done when they are young. Depending on the amount of weeds, their maturity, and the size of the lawn, this can be hard work and in severe cases, impractical.

11.2.3 Herbicides (Also, see Chapter 15 of this publication)

If considering using herbicides to kill weeds, this should be a last resort. Each weed killer product has explicit instructions in terms of how they are to be applied. These instructions are binding by law. In most instances these instructions are found in a multi-page attachment found on the reverse side of the product container.



11.2.3.1 Selective Herbicides

Many herbicides are formulated to act only on certain classes of weeds without impacting others, for example, broadleaf versus grassy weeds, or annuals versus perennials. That is why you want to know the weed you are treating. Certain classes of these herbicides can be used without impact on the turfgrass itself.

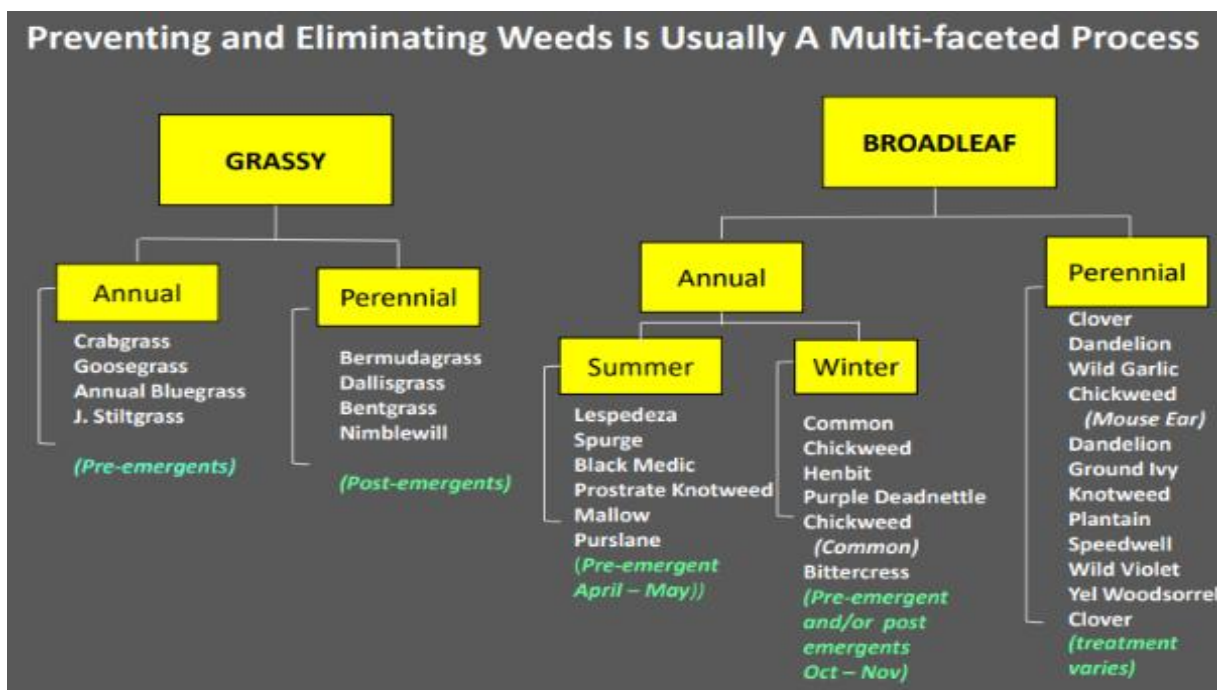
11.2.3 2 Non-Selective Herbicides

These products will kill all plants when applied, including ALL types of weeds and turfgrass.

11.2.3 3 Liquid Concentrate vs Ready-to-Apply Liquid Herbicides

Weed killers will often be sold as a liquid concentrate, which after a specified ratio of dilution with water can then be applied with a pressure sprayer. This process requires careful measurement and the knowledge of how they work. Other products may be sold ready-mixed and ready to spray.

If opting for herbicides, there is always potential for damage through off-target movement via wind or volatilization. Never spray weeds on a windy day since doing so can easily cause the spray to drift onto shrubs and flowers or vegetables and cause them damage. **Remember, safety above all else!**



Source: "Smart Lawns" A Residential Lawn Care Program to Protect Water Quality – VCE Henrico County, VA

11.2.4 To Control Our Weeds, We Must Know Our Weeds

An effective weed management program depends on our ability to identify weeds, and to understand their life cycles. In most lawns, there are probably about a dozen or two common weeds that we are most likely to be dealing with, oftentimes fewer. Many university based Cooperative Extension websites offer helpful pictorials and descriptions of weeds likely found in

the Mid-Atlantic area. Several sources are cited at the end of this chapter.

11.3 Weed Wisdom and Perspective

The question is sometimes asked: is there an acceptable level of weeds that an otherwise healthy lawn can withstand? There is no absolute answer, and it will largely vary on many factors, including the severity and the weed's growth habits. Two factors might immediately be considered: 1) what is acceptable weed presence to the lawn owner, and 2) what measures, or how much effort is the lawn owner willing to expend on an overall program of best practices. Another important factor is whether the weeds themselves are contributing to property erosion, runoff, or other irregularities impacting the environment.

When promoting and supporting a healthy turf program, a weed presence of 20% or less is considered acceptable to maintain a healthy lawn. For a lawn owner looking to over-seed or start a new lawn, this becomes a bigger factor. A weed presence of 50% or more is usually considered the tipping point to consider the complete killing of all growth (turf and weeds.)

Additional detailed information regarding common turf weeds:

Weed Identification (Site that lists over 700 common weeds, with descriptions and photos) Virginia Cooperative Extension

<https://weedid.cals.vt.edu/>

Glyphosate: Health Controversy, Benefits and Continuing Debate, VCE Publications / SPES /SPES-63

<https://vtechworks.lib.vt.edu/items/76b93dd6-ef75-4760-bee5-cb1c5d6518b9>



CRABGRASS



BERMUDAGRASS



JAPANESE STILTGRASS



SPOTTED SPURGE



WILD VIOLET



SMOOTH PIGWEED



COMMON PURSLANE



JIMSONWEED



JAPANESE KNOTWEED

12. Managing Lawn Insects

Insects can cause serious damage to lawns in a variety of ways. Added to that, insect damage can sometimes be mistaken for lawn disease caused by fungal pathogens, drought, or other conditions. Knowing a little about which insects are likely to cause damage, their life cycles, the period when damage is likely to be evident, and some distinguishing characteristics of lawn damage will allow us to determine the action to be taken, if any.

12.1 Common Lawn Insects

Several insects are likely to be problems, causing their damage either below-ground and/or above-ground. The following table summarizes some of these insects, and their impacts on turf.

INSECT	DAMAGE THEY CAN DO	POSSIBLE SIGNS OF DAMAGE
Chinch Bugs	Surface feeder. Sucks the juices from the grass blade.	Yellow patches that turn brown and then die. Usually in hot, dry summers.
Greenbug Aphids	Surface feeder. Sucks the juices from the grass blade and injects a toxin.	Causes barely detectible spots in early stages but later expands to large, round discolored patches under shade trees, or in the shade along buildings or under shrubbery.
Fall Armyworm	Occur in large populations. Chews the grass leaves, stripping foliage.	Torn, ragged appearance to grass blades from foliar feeding. Damaged areas will originate around a site where egg masses can be easily laid (signposts, buildings) and radiate outward. Newly installed sod is particularly susceptible.
Sod Webworm	Chews the grass leaves.	Small brown patches of grass. Leaves often "clipped" off at ground level; silk-lined tunnels containing larvae. Most severe damage in fall.
Cutworm	Chews the grass leaves.	Leaves often clipped at ground level; no silk-lined tunnels.
Grubs	Underground feeders. Chew the roots of grass. Various sizes.	Spotty patches of pale, dying grass; turf root system severed. Can pull up like a carpet if infestation is severe. If holes are noticed, it could be grub feeding by birds, skunks, or raccoons.

12.2 Grubs

White grubs are among those insects that likely cause the most damage to our lawns through feeding on grass roots. Grubs are the larvae of several beetles. Most common is the Japanese Beetle, but also, the Asiatic Garden Beetle, the Masked Chafer Beetle, and the Green June Bug. They are recognizable as small,



Japanese Beetle life stages season grass. (Photo by Dave Shetler, OSU) (from Michigan State University Extension)

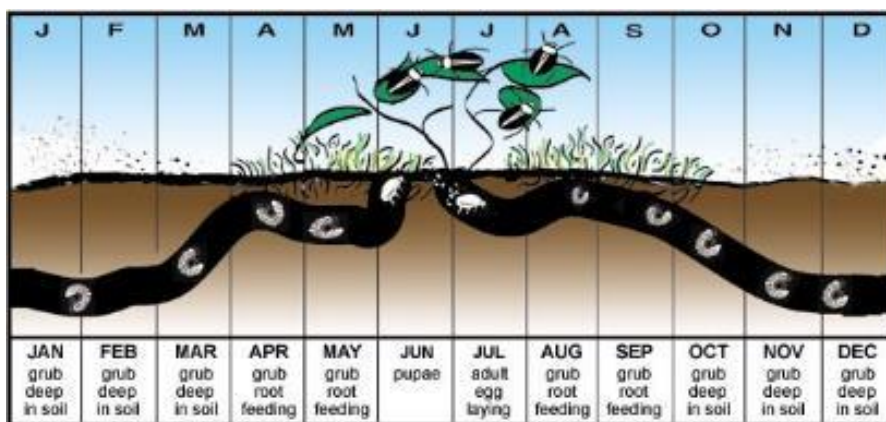
soft-bodied whitish C-shaped larva, less than an inch in length, though their sizes vary slightly.

Lawn areas affected by grubs can feel spongy when walked on, and can be pulled back like a carpet as a result of chewed roots. Since skunks, raccoons, and moles consider grubs as food, another sign of grubs can be holes throughout the infected area.



University of Nebraska, Department of Entomology.

Grub damage to lawns will be most evident in late July through August. Viewing the grub life cycle chart from left to right, the previous year's grubs (beetle larvae) have over-wintered in the soil through March. They begin to emerge from the ground in April and May. At this stage there is some root feeding, but this ceases as the pupae form the beetles that will emerge from the surface as beetles in June and July. The beetles then lay eggs in July, which then form new larvae that do heavy feeding of roots throughout August and September. This is when most of the damage to turf roots is likely to be evident on the surface, and also the best time to treat grubs. By September, once the soils cool, the grubs move deeper and become larger. They over-winter until the following spring, where the life cycle repeats.



University of Minnesota Extension.

If grubs are the suspect, consider the following actions:

- In at least four locations across the lawn, cut three sides of a 1-foot square portion of sod with a spade to a depth of three inches.
- Roll back the cut out portion, loosen the soil around the exposed roots, and count the number of grubs.
- Healthy turfgrass not under stress can tolerate 5-7 grubs per square foot, *e.g.*, no treatment is needed. However, stressed lawns and poorly managed turfgrass, may show grub damage at this or lower number of grubs per square foot; and these lawns might benefit from treatment with products primarily designed to target grubs.

12.3 Treatment Considerations for Insects, and Precautions

Often no pesticide is required for proper control; in fact, there is absolutely no need for the routine applications of lawn insecticides. This saves you time, money, and helps protect the environment. That is not to say, however, that you will never experience the occasional insect problem, especially if the recommended cultural practices are not in place. Here are some general considerations about pest management:

- Always identify insects and diseases before attempting to control them.
- Physically remove pests when possible.
- When an insecticide is necessary, choose the least toxic one available.

Keep in mind that most problems are not caused by insects or disease. Poor growing conditions can make a plant more susceptible to pests and are often the cause of "pest" problems. Severe cold or heat, waterlogging or drought, and lawn mower damage frequently injure plants. Insecticides will be useless for these kinds of plant damage and will often kill "good" insects that serve as pollinators or predators for destructive insects. Sometimes the original source of damage to your plant might no longer even be present.

Beneficial insects are very sensitive to insecticides, so whenever a general insecticide is applied to control a pest species, the material will sometimes have a detrimental affect on the population



Earwigs feed upon lawn insect pests such as chinch bugs and sod webworms. (NC State Extension)

of beneficial organisms. Consider using alternate methods of pest management, such as biological control agents (if available and suitable) or providing optimum cultural conditions so that the lawn can tolerate higher levels of pest activity without visible loss of vigor. If an insecticide application is deemed necessary, make spot treatments rather than broad scale applications if at all possible.

Summary:

Remember that the statement, "The only good bug is a dead bug," could *NOT* be further from the truth. Be sure you have an accurate identification of the insects in question and only attempt to control those which really warrant attention. There are in fact many "good bugs" out there! Let them help.

Additional assistance in problem identification (insect, weed or disease) can be obtained by using the array of references and advice from the Virginia Cooperative Extension.

Additional Information regarding lawn insects:

“Economic Pests of Turfgrass – Identification Guide” – VCE Publication ENTO-237; Virginia Cooperative Extension; Virginia Turfgrass Foundation

<https://www.pubs.ext.vt.edu/ENTO/ENTO-237/ENTO-237.html>

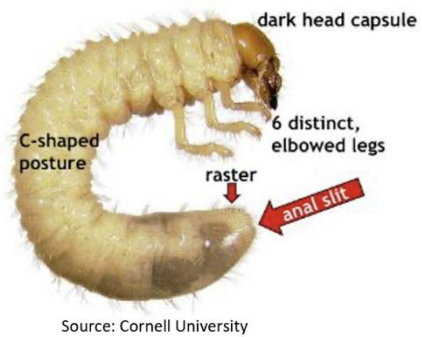
Resources for Garden Insect Pests, Virginia Cooperative Extension

https://www.pubs.ext.vt.edu/tags.resource.html/pubs_ext_vt_edu:garden-insects-pests

“What’s ‘Bugging’ My Lawn?” YouTube Presentation, Fairfax County Office of the Virginia Cooperative Extension

<https://www.youtube.com/watch?v=XTVh4duRpis>

White grub larvae may be identified by the characteristic markings of the hairs on the grubs’ raster, the anal end of the grub. A 10x hand lens is needed to see the pattern



From FairfaxGardening.org at

<https://www.fairfaxgardening.org/wp-content/webdocs/hometurf/Grubs.pdf>

ADULT GRUBS



Japanese Beetle
Popillia japonica



May/June Beetle
Phyllophaga sp.



Masked Chafer
Cyclocephala sp.



Green June Beetle, *Cotinus nitida*,

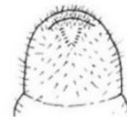


Asiatic Garden Beetle, *Maladera castanea*,

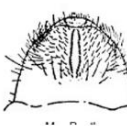
LARVAE



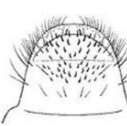
RASTERS



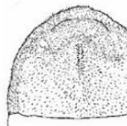
Japanese Beetle Raster (~9X)



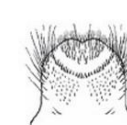
May/June Beetle Raster (~6X)



Masked Chafer Raster (~8X)



Green June Beetle Raster (~5X)



Asiatic Garden Beetle Raster (~8X)

13. Turf Diseases

13.1 General

Lawn disease pathogens have a variety of visible symptoms in our lawns. Some of the common signs could be discoloration or straw-colored patterns and shapes of various sizes, leaf spotting, or root deterioration. Most lawn disease cases result when pathogens react to other factors such as nutrient deficiencies, water, humidity, and temperature variations.

13.2 Common Cool Season Turf Diseases

There are many turf diseases that occur in the cool season lawns. Several of the diseases commonly found in the Mid-Atlantic area are listed below, but these are by far not the only diseases that can affect the lawn.

Disease	Symptoms	Typical Causes
Brown patch <i>Rhizoctonia solani</i>	(Foliar disease). Circular/crescent shaped patches; up to three feet in diameter; brown or straw-colored.	Rainy, hot weather. Warm, humid weather. Applications of water-soluble nitrogen (WSN) fertilizer.
Dollar Spot <i>Sclerotinia homeocarpe</i>	(Foliar Disease) From a distance, small, blighted areas; two- to six-inches. Up close, hour-glass lesion along blade. Colored band on lesion edge.	Drought, thatch, compacted soil. Under-fertilized turf.
Summer Patch <i>Magnaporthae poa</i>	(Root disease) Roughly circular/crescent shaped patches.	Full sun; excess heat and moisture. Over-fertilization, especially in the spring. Thatch.
Red Thread <i>Laetisaria fuciformis</i>	(Foliar disease) From a distance, appear as tannish or pinkish turf. Up close, recognized by the appearance of pink, thread-like growth on turf blades.	Cool, wet, overcast weather in the spring or fall.
Pythium Blight <i>Pythium aphanidermatum</i>	(Root & crown disease) Small, sunken, circular patches. Water-soaked, slimy leaves. Unlike other fungus diseases, Pythium is a water mold and spreads by free water (may follow a drainage pattern).	Hot, humid weather, abundant moisture, poor air circulation. Thrives in wet conditions. Spreads quickly.

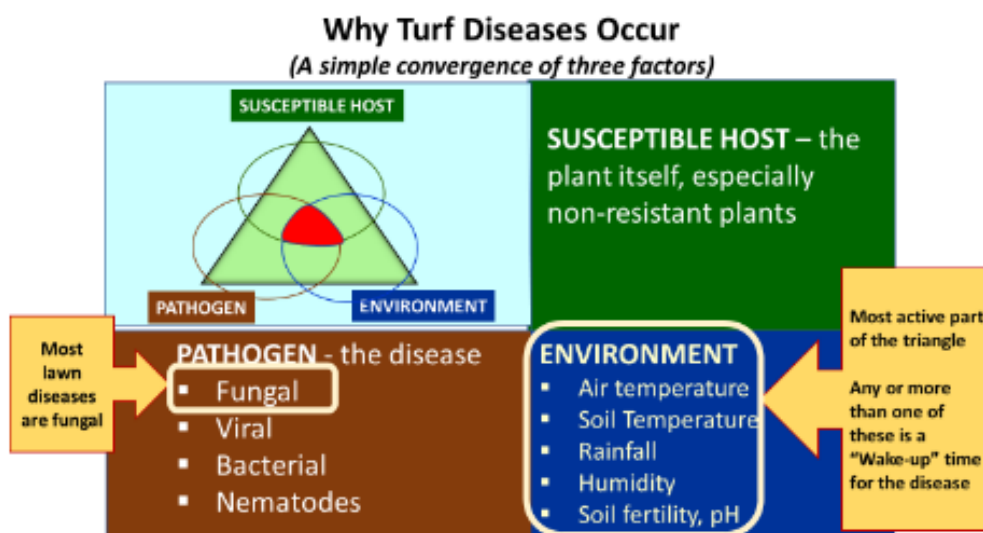
13.3 A brief look at the visible symptoms of some common turf diseases



Photos: Extension Offices at North Carolina State University, Kansas State University, and Penn State University

13.4 Why Turf Diseases Occur

Disease pathogens are present in most lawns. Turf diseases, or rather their symptoms, occur when conditions are ripe for pathogens to become increasingly active and thrive. Another factor needed for the disease to thrive is the host, or our turf itself. Cool



Virginia Cooperative Extension, Master Gardener Handbook, Ch 6 Plant Pathology

season turf varieties have varying degrees of resistance to certain diseases: Kentucky bluegrass might be particularly vulnerable to Summer Patch, but Tall Fescue will have more resistance. No grass is completely immune to all such fungal diseases.

13.5 Preventative Measures

Preventing or mitigating a turf disease is usually easier than expending efforts to try to eliminate it when symptoms are present. While fungicides can be applied to stop further spread of a disease, they are not curative and will not eliminate existing symptoms. This is an expensive option and often requires repeated applications at 30-day intervals.

Nitrogen is a culprit of many diseases. Too little nitrogen can promote diseases such as Dollar Spot. Conversely, too much nitrogen, especially in spring, can promote summer diseases such as Brown Patch and Pythium.

Consider the following disease-mitigation efforts, many supported by following the recommended lawn care practices discussed throughout this booklet.

- Avoid heavy fertilization in spring, especially quick-release, water-soluble nitrogen (WSN).
- Maintain thatch at <0.75 in (3/4 inch)
- Water in the morning, only once or twice a week. As noted previously, evening watering should be avoided entirely, since the cool wet conditions contribute to diseases.
- Sharpen the mower blade. Dull blades “tear” rather than cut the turf, and this shredded cut will take longer to heal, providing entry points for some fungal pathogens.
- Be extra careful if applying herbicides to garden or ornamental beds that can damage the lawn.

Summary

Keep in mind that diseases will vary in severity. If the disease is foliar alone, the roots will eventually produce new disease-free leaves over time, usually when the conditions that promote the disease change, such as drier, cooler weather. But when the crown and root are impacted, the matter is more severe.

Additional detailed information regarding lawn diseases:

“Diseases,” NC State Extension

<https://www.turfinfo.ncsu.edu/diseases-in-turf/>

“Turfgrass Disease Profiles – Identifying Turf Diseases,” Publication BP-124-W, Purdue University Extension

<https://www.extension.purdue.edu/extmedia/bp/bp-124-w.pdf>

14. Pet Damage to Lawns

For many dog owners, having a great-looking lawn just doesn't seem possible. Dog urine and feces are often a frustrating problem related to lawn care. Small amounts may produce a green up or fertilizer effect due to the nitrogen content in urine; while larger amounts often result in dead brown patches or lawn burn, which are frequently surrounded by a green outside ring. While most burn spots recover with time and regrowth, burns can be severe enough in some cases to require reseeding or sodding. For homeowners who are also dog lovers, this can be an ongoing challenge, especially if one family member prefers the dog and another prefers a well-manicured lawn.

14.1 Understanding the Problem

The fundamental problem with the presence of urine or feces on the lawn is related to the nitrogen content and concentration of these waste products. Urine, when produced as a waste product in animals, primarily removes excess nitrogen from the body via the kidneys. Urine is a bigger problem for lawns because it is applied all at once as a liquid fertilizer, whereas feces slowly release the waste products over time. Letting feces remain on the lawn for a period of time can smother and kill grass, providing weeds with an opportunity to establish.

The primary concern in addressing urine damage to lawns is minimizing the urine concentration added to the lawn at any single time. Female dogs, being less likely to urine-mark objects and more likely to squat, are the primary culprits of lawn damage since they will urinate anywhere on a lawn and usually all at once. This results in a concentrated nitrogen deposit confined to a small patch of grass. The brown spot that results will often have a green ring around the outside. The nitrogen overload at the center causes the burn, but as the urine is diluted out toward the periphery, it has a fertilizer effect. This characteristic brown spot, green ring pattern has been called "female dog spot disease" by some horticulturists.

14.2 What About Urine pH & Dietary Supplements?

Dr. Allard, a Colorado veterinarian, examined numerous variations in dog urine and the effects on several common lawn grasses. His results support the fact that urine concentration and volume of urine (nitrogen content) had the most harmful effects on lawns. The pH of the urine did not have any variable effect nor did common additives designed to alter the urine pH. Therefore, dietary supplements designed to alter urine pH are not recommended, as they have no known benefit to the lawn and can predispose the dog to bladder stones and infections.

14.3 Repellents

Obviously, fences can be used to keep neighboring dogs from eliminating on the lawn. Unfortunately, no repellents are universally effective although a variety of home remedies have been tried. Hot and bitter products are most likely to have repelling taste or odor properties to dogs. Most repellents function better as taste repellents than touch or odor repellents. Some odor repellents may actually encourage a dog to over-mark the strange smell with their urine.

The key to reducing lawn damage is to immediately dilute the urine with water and remove the feces promptly. If you don't have the time to follow your dog around each time it visits the lawn, you may want to consider training your dog to eliminate in a designated area of the yard.

14.4 Designating an Elimination Area

This area would be a landscaped area specifically designed for the dog. It will need a substrate like pea gravel or mulch that the dog finds acceptable and may even include a marking post like a large boulder, bird bath, lawn ornament, or even faux hydrant.

Collecting the dog's urine in a cup and using it in this area for several days can provide some odor attractant value to this area. Feces can also be collected and transported to the new, designated area. Consistency is important for at least 2-3 weeks to establish this as a routine, trained behavior; several months may be necessary in some cases.

It is very important the dog not be allowed to eliminate anywhere other than the designated place during the training process. This could be accomplished by taking the dog out on a leash to the designated spot and rewarding the pet with a food treat when it eliminates in the appropriate area. It is often easier to train a young puppy to a particular ground texture than an adult dog, but never impossible in any age dog.

Many dog owners will also find it helpful to train their dog to an elimination command during this time. A dog can be trained to eliminate on a verbal signal by simply saying the word immediately before he eliminates and rewarding him with a food treat after he finishes. Common commands might include: potty, piddle, do your business or hurry up, etc., and make it quicker to accomplish the task when inclement weather is present or time is short.

A little training effort now will pay off in the long run: preserving the looks of your lawn and saving you time in pet clean-up, perhaps even resulting in a little more time to play fetch with Fido. Information in this publication was taken from the article "'Dog-On-It' Lawn Problems, Updated," which appeared in the June 2002 web issue of *Horticulture Update*, edited by Dr. Douglas F. Welsh, and produced by Extension Horticulture, Texas Cooperative Extension, The Texas A&M University System, College Station, Texas.

Additional Information regarding pet damage:

"Animal Damage in Urine," Turfgrass Science, A joint series from Purdue University and University of Illinois, Publication AY-327-W

<https://www.extension.purdue.edu/extmedia/AY/AY-327-W.pdf>

15. Pesticides

15.1 Identify & Mitigate the Problem before Using Chemicals

As with weeds, the best way to minimize pests or diseases is to maintain a healthy, dense turf. You can achieve this by following sound management practices based on the principles previously discussed and by buying the best turfgrass for the situation. The seed of many cultivars of tall fescue and perennial ryegrass is marketed as "endophyte enhanced." This means that the seed you are purchasing contains a living fungus that is highly desirable! We most often think of disease and bad looking lawns when we think about fungi and turf, but in this case the fungus within the seed (and ultimately your turfgrass) helps reduce the likelihood of attack by insect and disease pests (reduce, not eliminate, pest attack). For situations where tall fescue or perennial ryegrass is used, it is well worth paying a few pennies more per pound to purchase "endophyte enhanced" seed.

When diagnosing a problem, remember that many problems, if not most, are not caused by insects or disease (See section 12.3).



Photo: Virginia Cooperative Extension Publication 426-718

Another reminder that many insects are beneficial. Although menacing-looking, this Assassin Bug is a "good bug." It feeds on aphids, caterpillars, Japanese beetles (which lay eggs for grubs), Colorado potato beetles, leafhoppers, and Mexican bean beetles. Avoid using pesticides around them, as they are as susceptible to insecticides as pests.

15.2 Is A Pesticide Necessary?

If you determine your problem is caused by an insect, or if planning to treat for weeds, before choosing a pesticide, try to answer the following questions:

1. Is the injury severe enough to require control? If so, what options are available? Is chemical control the best option?
2. Can the pest be controlled by a pesticide at this stage of its lifecycle?
3. Are there effective, legal, and manageable chemical control options for this site and situation?
4. Is pesticide use cost-effective? Is the plant or damage observed worth the control effort?

The occurrence of diseases and insects is usually sporadic, but it is highly likely that most lawns will have some level of pest presence. Proper identification of the pest is obviously crucial in determining how (and even if) a treatment is made. Often no pesticide is required for proper control and should be a last resort; but if needed, the right pesticide must be applied at the right time to control a particular pest. Virginia Tech and the Virginia Cooperative Extension provide

numerous resources for the identification of weeds, insects, and diseases.

15.3 How Common Pesticides and Herbicides Work

Pesticide Modes of Action - How Pesticides Work (many work in more than one way)

Contact insecticides and fungicides*	Kill pests simply by touching them.
Stomach poison insecticides*	Kill pests when swallowed, or when treated materials are eaten.
Contact herbicides*	Used for weeds. Affect only the plant parts that are touched.
Translocated herbicides*	Are absorbed and move from the point of initial application to circulate throughout the plant.
Selective pesticides*	Affect only certain kinds of plants or animals (insects). For example, 2,4-D is used for lawn weed control because it kills many broadleaf plants but does not harm most grasses.
Protectant fungicides*	Are a preventive measure against certain (lawn) diseases. You must apply protectants to the plant host before the fungus has a chance to invade.
Curative/Eradicant fungicides*	Cure fungal diseases. (note: there are few products available to the commercial consumer that perform this function.)
Pre-Emergent Products	Serve as weed preventers by introducing a temporary invisible “barrier” to prevent the germination of many annual weeds in the lawn.

***Information from Virginia Cooperative Extension Gardener Handbook, 2023, Chapter 7 “Integrated Pest Management and Pesticide Safety” <https://doi.org/10.21061/vcegardener>**

15.3 How to Read and Understand the Pesticide Label

When reading the pesticide label, look for:

1. **Poison, Danger, Warning and/or Caution.** These words indicate the level of hazard associated with the product in decreasing order of toxicity. Any product bearing one of these words poses some degree of hazard worth exercising care.
2. **Active Ingredients.** Active ingredients are chemicals and their concentrations that are responsible for its pest-controlling properties. Inert ingredients are chemicals that enhance the active ingredient's utility for stable shelf life or ease of use.
3. **Target Pests.** Target pests and application sites tell the user what pests the product controls and where it can be used. If your pest or application site don't match up, don't use the product!
4. **Hazards.** Look at hazards very closely. Language such as *toxic to fish* or *flammable* lets you know how to prevent a problem. See references at end of chapter for more information.

5. **Precautionary Statements.** This usually reinforces how to avoid the product's hazards and will indicate medical treatment or antidote. If you need to wear protective clothing or if there's a waiting period before you can safely reenter a treated area it will be noted here.
6. **How to Use, Store and Dispose.** The label gives important mixture directions for concentrates, what equipment is necessary to apply the pesticide and what conditions are required for the product to be effective. Following storage and disposal directions avoids problems after the product has been used.
7. **Days to Harvest.** This part of the label tells food gardeners how long they must wait before picking or eating fruit and vegetables.
8. **Manufacturer or Distributor.** Further Information about the product is available from this source.



*Read and know the Pesticide Label Instructions.
(University of California) Credit: Jack Kelly Clark*

15.4 Organic Pesticides

Organic pesticides are derived from naturally growing sources. When choosing to use organic products, consumers will usually cite safety as the number one concern, yet as with synthetic pesticides, organic products vary and have a broad range of toxicity levels. On the other hand, some organic products might not work as effectively on the problem at hand or take longer.

15.5 Safety First

The Virginia Cooperative Extension advises that before deciding on the use of pesticides, we consider alternative measures that might do the job. The first step is identifying the problem, and the degree of seriousness. If there are only a few weeds, why not just pull them rather than treat them with an herbicide. When dealing with insects, consider if it is a problem that you can tolerate without any insecticidal application. If it is necessary to use a pesticide, remember, take all precautions, follow instructions explicitly, and use no more than advised. More is definitely not better and is dangerous.

Summary

Even with the best management programs in place, pests will still invade turf periodically. The occurrence of diseases and insects is usually sporadic, but it is highly likely that most lawns will have some level of presence for both.

Additional detailed information regarding pesticide use for healthy turf:

“Organic vs Conventional (Synthetic) Pesticides: Advantages and Disadvantages,” VCE Publication ENTO-384, Virginia Cooperative Extension

https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/ENTO/ento-384/ENTO-384.pdf

Virginia Pesticide Safety, Virginia Dept of Agriculture and Consumer Services, Office of Pesticide Services

http://vapesticidesafety.com/pest_safety.shtml

“Understanding Pesticide Labels.” VCE Publication 426-707, Virginia Cooperative Extension

https://vtechworks.lib.vt.edu/bitstream/handle/10919/48265/426-707_pdf.pdf?sequence=1&isAllowed=y

“Plant Injury from Herbicide Residue” VCE publication PPWS-77P, Virginia Cooperative Extension

<https://www.pubs.ext.vt.edu/PPWS/PPWS-77/PPWS-77.html>

Virginia Cooperative Extension (2023). Virginia Cooperative Extension Gardener Handbook.

Blacksburg: Virginia Cooperative Extension. <https://doi.org/10.21061/vcegardener>. Licensed with CC BY-NC-SA 4.0. <https://creativecommons.org/licenses/by-nc-sa/4.0>.

What is IPM?

Integrated Pest Management (IPM) is an **ecosystem-based strategy** that focuses on long-term prevention of pests or their damage through a combination of appropriate control tactics.

An IPM program proactively seeks to determine and correct the cause of a pest problem while also minimizing risks to human health and the environment.

1. Identify

Is what you are seeing is actually a pest? Do not treat an organism as a pest until it has proven to be one. Your Virginia Cooperative Extension Office can help you correctly ID pests.

2. Prevent

Create a healthy, growing environment that limits the introduction of pests and their ability to reproduce, develop, and spread. For example, choose resistant cultivars, remove infested debris, and select plants suited for your conditions.

3. Monitor and assess

Is the pest present? Where is the pest located? How abundant is the pest? What is the severity of damage? When is the best time to implement a pest control tactic? How effective were pest control efforts?

4. Determine a threshold for action

If preventative measures fail, assess damage and set a threshold for when to initiate a control measure. Think of a threshold as a tolerance level: Is the pest population and its damage tolerable in your garden, lawn, or home?

5. Use a combination of appropriate control methods

Control methods might include cultural controls, mechanical/physical control, biological control, and chemical control.

6. Evaluate results

There is seldom a single correct solution to a pest problem. Regular monitoring will help you to determine how well you are meeting your pest management goals and if changes are needed.



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16. Lawn Moss

There are thousands of species of moss worldwide. These very simple plants lack the typical leaf, shoot, root, and seed-forming systems of most higher plants; however, they are some of the hardiest living organisms on the planet. Lawn moss can reproduce sexually (spores, etc.) or asexually (breaking off into smaller pieces that divide and multiply), and their numbers can increase rapidly under the right conditions. They are tolerant of extremely low mowing, so regular clipping of the grass will not remove them. It would seem that these plants would not offer much resistance to our efforts to manage or control them, but as Mother Nature often shows, their simplicity in design and function correlates well with their ability to colonize and persist in some of the most inhospitable growing conditions around your property: sidewalks, driveways, and yes – the lawn.

16.1 Why mosses occur

It is important to understand that mosses occur when some underlying condition allows them to out compete turfgrasses and other plants. These conditions most frequently are some combination of:

- Acidic soil conditions
- Poorly drained, persistently wet soils
- Medium to dense shade
- Repeated “scalping” of turf on uneven terrain
- Compacted soils



*University of Wisconsin-Madison,
Division of Extension*

16.2 Steps to take to reduce the competition from moss

If the problems that are limiting the turf or other plant growth are not corrected, any moss elimination or control efforts will be futile. First, identify which of the above factors is likely contributing to the occurrence of the moss. The soil pH is a key factor, and as stated throughout this booklet, it can be remediated following a soil test and remediation.

Next, is the site poorly drained? If so, install drainage or regrade the area to promote water removal. Mosses thrive in poor drainage conditions, whereas all turfgrasses struggle.

The third factor is lack of sunlight. Many species of moss are tolerant of dense shade and prefer moist soil in the shaded areas. Removing trees from the lawn would fix the shade problem but this is almost never acceptable to the average homeowner. However, simply pruning trees to remove lower limbs or thin the canopy helps the growing conditions for turfgrass. Tree pruning usually promotes healthy trees, so pruning benefits both trees and lawn.

If moss occurs in sunny spots, mower “scalp” could be the culprit. Wide mower decks reduce time on the mower but may contribute to scalping on uneven slopes. Scalping severely weakens turfgrass and allows moss to thrive. Smooth the uneven places in the lawn by topdressing with soil, regrade the area, or use a smaller mower in uneven areas.

Compacted soils also give moss a competitive advantage. Use a core aeration machine to alleviate compaction and improve turfgrass growing conditions. You can rent such machines or hire a professional to aerate the lawn for you.

16.3 Alternatives in moss control/suppression

Physically removing moss with a rake is one way to get rid of moss, but it is essentially impossible to get every single piece of this very simple but durable organism.

Remember there are plenty of spores already in the soil or that are being moved in by wind or water. Remove all vegetative material that you possibly can, scratch the soil, and reseed with a turfgrass that best fits the site.

There are no easy chemical solutions to moss, but there are some compounds that will reduce moss populations with repeated use. Such compounds suppress moss by acting as desiccants. Ground limestone (at levels of 75 to 100 pounds per 1,000 square feet) and hydrated lime (2 to 3 pounds per 1,000 square feet) are readily available and inexpensive. Other compounds specifically marketed for moss control include ferrous sulfate (commonly called iron sulfate), ferrous ammonium sulfate, and copper sulfate. These products may be found at your local hardware or full service garden center and will specifically mention moss control on the label. You also might recognize these materials as some of the lawn and landscape industry’s earliest fungicides. The iron and copper-based materials can be toxic to new turfgrass establishments, so they often must be deactivated by a lime application that counteracts the effects of the metals applied. These desiccants are ideally used winter through spring when the chances for damaging the existing turf are reduced. Carefully follow label directions in order to maximize product effectiveness and turf safety.

Remember, if the problems limiting turf growth are not solved, the moss will bounce right back following treatment. The moss is not driving out the turf, but the absence of turf vigor allows the moss to expand its area. Removing the conditions that favor moss over turf may be timely and expensive.

Additional detailed information regarding lawn moss:

“Lawn Moss: Friend or Foe?,” Publication 430-536 (SPES-566P), Virginia Cooperative Extension

<https://www.pubs.ext.vt.edu/430/430-536/430-536.html>

17. Overseeding

17.1 Why Overseed

Our cool season lawns can become “tired” over time, especially after a summer of hard use and hot weather. Thinning areas, thatch buildup, weeds, loss of turf density and soil compaction are some of the many factors that will impact the appearance and health of the lawn. When that occurs, it’s time to overseed, which is technically applying new grass seed to the existing lawn.

17.2 When to Overseed

The best time for lawn renovation to address bare spots or thinning turf is late summer to early fall (usually September 1 to October 15). Spring seeded turf often suffers from the heat and drought of summer because the roots will never develop sufficiently enough to sustain the top growth. Fall-seeded grass has the optimal soil and air temperatures to become established and develop strong roots that prepare it for the onset of the coming summer extremes and weed competition.

17.3 Select the Best Turfgrass

The primary cool season species (Kentucky bluegrass, tall fescue, fine-leaf fescues, and perennial ryegrass) are best adapted to the Middle Atlantic. A list of the best adapted cultivars for the state can be found in the publication: “*Virginia Turfgrass Variety Recommendations*” [See link to *Fall Lawn Care*, in this section’s references]. This publication provides information regarding the most current university research and test trials on turfgrass varieties tested at sites in both Virginia and Maryland.

These products, or a close match, are most likely to be found at dedicated landscape and garden centers, and might not be available at the garden centers associated with large retail stores. However most of the grasses being sold at the garden centers of large retailers are still quality grasses that will likely perform satisfactorily.

17.4 Steps in the Overseeding Process

Before over-seeding, be sure to perform a soil test and apply lime if needed. Additionally, if there are extensive weeds, try to treat them a month or more before over-seeding.

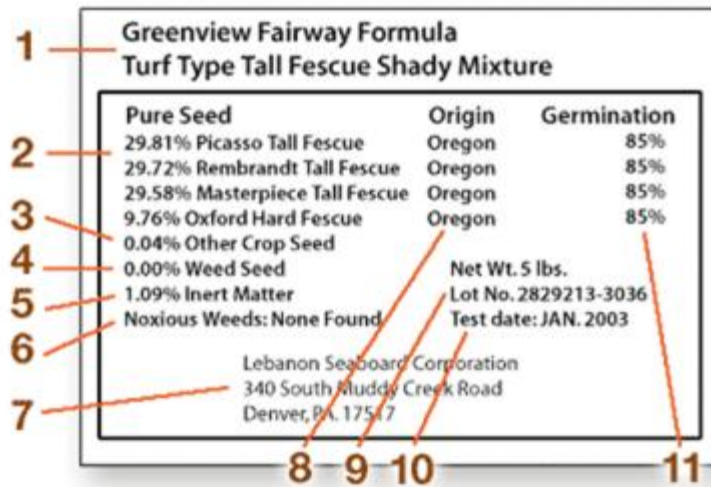
For the most effective germination rate, it is best to overseed the lawn after aerating and top-dressing with fine textured compost.

After planting seed, apply a starter fertilizer and irrigate lightly and frequently (typically daily for a week to 10 days) until seed germination is complete. Avoid excessive amounts of water because this could wash away or drown the seed. As establishment progresses, gradually cut back on the amount of water applied in order to start promoting a deep root system. Another

application of maintenance fertilizer may be applied in a 30-day period.

17.5 How to Read a Seed Label

A picture of a typical label found on a bag of grass seed is shown below.



Greenviewfertilizer.com

Key to diagram:

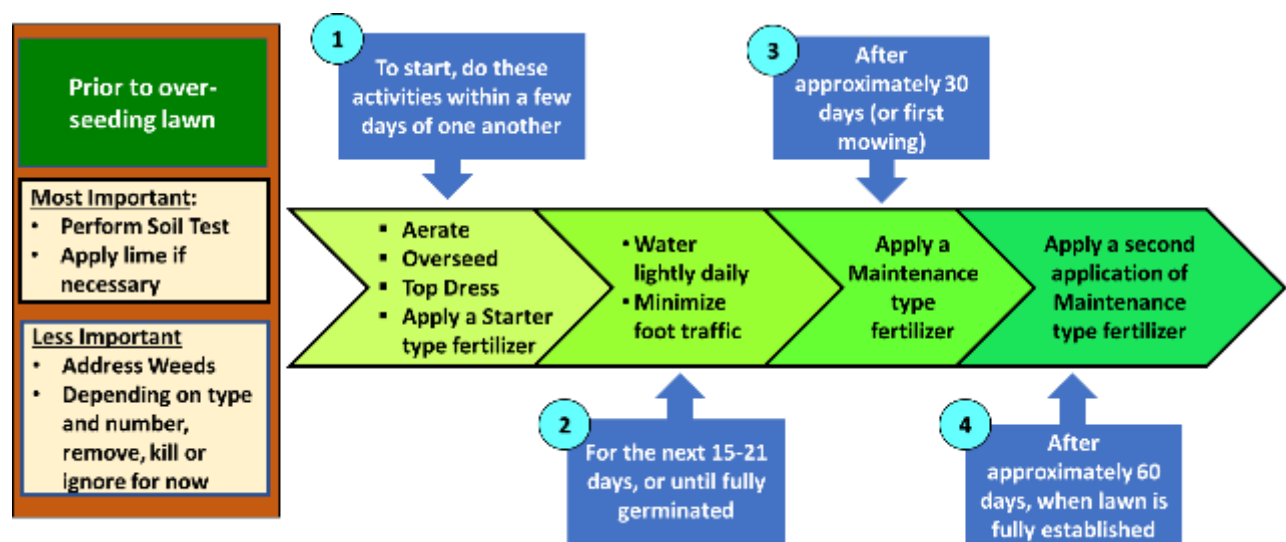
1. Grass seed product name.
2. Pure grass seed. The percentage by weight of grass seed that is in the bag.
3. Other crop seed. The percentage by weight other than the pure grass species or varieties labeled, but not considered as weed seeds. If "other crop seed" is over 5% of total weight, they must be listed by name.
4. Weed seed. The percentage by weight of weed seeds in this lot.
5. Inert matter. The percentage by weight of material that will not grow.
6. Noxious weeds. If the product contains seeds that are considered noxious weeds as defined by your state these would be listed on the tag.
7. Address. The address of the company providing the grass seed.
8. Origin. State in which the grass seed was grown.
9. Lot number. Each lot of grass seed is uniquely numbered. This number appears on all documents so that it can be traced back to its origin.
10. Test date. Actual month and year this lot of grass seed was tested for germination.
11. Germination. The percentage of pure grass seed that will germinate in a controlled lab.

17.6 What About Sod?

Seeding is less expensive but takes more time to establish a lawn. Sodding is more expensive and labor-intensive but provides instant results. Both seeding and sodding need good soil preparation.

17.7 Over-seeding a Cool Season Lawn – Fall is the Best Time

Late August through mid-October is the ideal time to rejuvenate Cool Season Lawns: new seeds germinate quickly in warm soil, grow to mature grass through fall, and promote healthy root growth and food production in Winter, ensuring a healthy spring lawn.



Summary

Most lawns will benefit from over-seeding from time to time. When done at the right time, following all recommended steps, it will result in a healthy lawn. The resulting density and growth will fight weeds and work against erosion.

Additional detailed information regarding over-seeding of lawns:

"Break the Spring Seeding Cycle," Podcast, Virginia Cooperative Extension

<https://ext.vt.edu/lawn-garden/turfandgardentips/tips/Breakspringseedcycle.html>

"Fall Lawn Care," Publication 430-520, Virginia Cooperative Extension

https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/430/430-520/SPES-223.pdf

18. Cool Season Turf Renovation

There are times when a yard, or parts of the yard, is so weedy, that starting over to plant a new lawn is an appropriate plan. Generally, turf experts suggest considering rejuvenation when the turf is over 50% weed. Rejuvenation is best tackled in the fall. [See the turf growth in Section 9.]

If one has sufficient resources, one can put down sod or one could start from seed.

Either way, soil preparation is key.

1. Get a soil test. Putting a lot of effort into building a new lawn without knowing the pH and nutrients are available to support the seed or sod.
2. Kill the weeds. Weeds thrive and can outgrow seedlings.
3. Cover the soil with a surface application, about ¼ inch depth, of fine compost free from sticks and larger items.
4. Aerate the soil and compost to mix the compost into the soil and to disrupt the soil surface to reduce compaction and enhance seed contact with the soil. Depending on the soil compaction, one may need to make several passes with the core aerator working at different angles. [See the pattern in Section 6.5.]
5. Apply high quality seeds appropriate for your region. The gardener can apply seed starting fertilizer at the same time as composting and applying seed. Seed starting fertilizer is one that has high nitrogen-phosphorus concentrations. Phosphorus is needed for healthy roots and seeding is the only time the gardener needs to add phosphorus when fertilizing. Be sure you do not apply a regular turf fertilizer that contains seed killing chemicals.

If the results of your soil sample indicates that you need a lime application, you can apply that at the same time as you compost and aerate.

6. Water lightly for several days until the grass sprouts appear. To help conserve water and prevent runoff, some gardeners like to spread straw on the newly seeded ground at depths so they can see some soil underneath. Straw will degrade into the soil and provide nutrients to the soil, so the gardener can mow the turf and leave the clippings.
7. As the seedlings sprout, reduce the frequency of the light irrigation.
8. Remember to water the lawn to the level of one inch per week when rain does not provide sufficient water.

If the gardener has the resources to install sod, then at step 5 above, roll out the sod on the aerated, composted, slightly moistened soil surface. It is important that the sod is rolled to increase the soil contact and encourage the sod roots to grow into the prepared soil.

https://www.pubs.ext.vt.edu/content/pubs_ext_vt_edu/en/SPES/SPES-353/SPES-353.html

19. Mowing the Right Way

19.1 Set the Proper Blade Height

Mow your grass at the right height during the summer. Longer grass blades increase the depth of the root system, shade the soil, and help drought tolerance (see following table).

Kentucky Bluegrass = 2" - 3 ½ "

Tall Fescue = 2 ½" - 3"

Perennial Ryegrass = 2" - 3 ½ "

Creeping Fescue = 2" - 3 ½ "

Zoysia = 0.5" - 1.5"

Bermuda = 1.5" - 2.5"

Mowing cool season turfgrasses higher (up to 4 inches) during the summer prevents your turf from drying out as easily and provides a canopy of shade to help suppress germination of weed seeds.

Regular mowing at the low end of the recommended range (2 inches) in the spring and fall promotes tillering of new stems, increasing grass density.

Remove no more than 1/3 of the leaf blade at each mowing.

19.2 Keep the Blades Sharpened

This practice is often overlooked but it results in a better-looking lawn and less stress on turfgrass plants. Dull mower blades tear and damage leaf blades, which can then lead to disease or insect attack.

On average, most homeowners in Virginia should plan on sharpening and balancing their blades at least 3 times during the growing season.

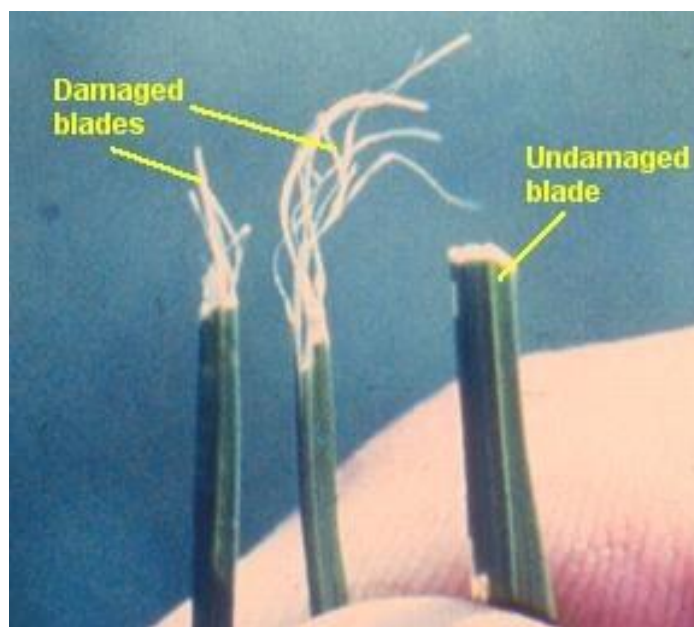


Photo from University of California, "The UC Guide to Healthy Lawns, Photo by Steve Cockerham



Cornell University College of Agriculture & Life Sciences

Mower blade sharpening kits are available for reasonable cost, but a metal file will do the job nicely. Some full-service garden or hardware outlets perform this service for a reasonable cost. Once sharpened, be sure that the blade is then balanced. A good idea is to always have a sharpened spare blade on hand to do a quick swap out.

19.3 Keep the Lawn Clippings

Consider leaving your grass clippings on your lawn. Lawn clippings are 80 to 85% water and can contain 4% N, ½% P, and 2% K. Think of grass clippings as free fertilizer. They decompose quickly and return nutrients to your lawn. Clippings that are mulched do not contribute to thatch buildup. Most importantly, as with fertilizer and pesticides, do not let clippings blow haphazardly onto the sidewalk or street.

Also consider mulching your deciduous leaves directly back to the turf with your rotary or mulching mower in the fall. Multiple passes with your mower might be required to thoroughly chop leaves (less the ½ inch pieces). If you cannot see your lawn because the leaf mulch is too thick, make a pass to bag this excess with your mower and add it to a compost pile.

Additional detailed information regarding turfgrass:

“Mow Like a Pro,” Podcast, Dr. Mike Goatley, Virginia Cooperative Extension Turfgrass Specialist, Virginia Tech

<https://ext.vt.edu/lawn-garden/turfandgardentips/tips/mowing.html>

“Cornell Turfgrass: Improving the Environment One Turf at Time” Cornell University College of Agriculture & Life Sciences

<https://turf.cals.cornell.edu/lawn/lawn-care-the-easiest-steps-to-an-attractive-environmental-asset/four-steps-to-success/make-adjustments/>

Mow like a pro

There is nothing done more frequently in landscape maintenance than mowing the lawn--and nothing that is done with a greater frequency of mistakes either!

Do:

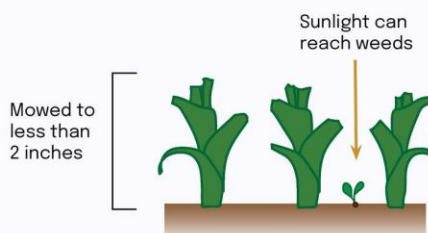
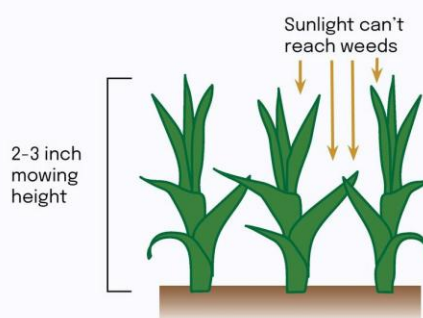
- **Keep mower blades sharp:** The quickest way to improve lawn quality AND turf health is to clip it with a sharp blade
- **Mow cool-season grasses to 2-3 inches**
- **Raise cutting height for cool-season turfgrass in late spring/early summer** to maximize tolerance to environmental and pest pressure.
- **Return clippings to your turf:** Clippings are nothing more than organic fertilizer for your lawn,

Don't:

- **Cut turf too short:** If your lawn has a white hue rather than a green color after you mow, it is a good bet that you are cutting too low.
- **Remove more than 1/3rd of the leaf blade at any mowing event.**



Don't mow too low!



20. Lawn Alternatives

At some point we might need to step back to consider whether we are satisfied with the lawn space on our property. Certain factors might influence our thoughts. Is the lawn too big and just not needed any more. Have trees grown so that the sunlight is blocked? Are there areas, such as steep slopes, that never were ideal for turf in the first place? With nominal effort or cost, we can consider alternatives that are just as enhancing and environmentally supportive as a well-cared for lawn. For such situations, we can consider expansion of ornamental beds, with appropriate shrubbery and ground-covers. When the alternatives are native plants, the decision is even smarter.

20.1 Groundcovers

Ground covers are low-growing plants that spread quickly to form a dense cover. They add beauty to the landscape and, at the same time, help prevent soil erosion and weed growth. Some are well-suited for sun, others for shade, and still others for wet or dry conditions. Many times hilly areas can be better addressed by growing ground covers, which are also great ways to keep erosion in check. Since ground covers are not meant to be walked on, it would be a safe alternative to trying to negotiate steep inclines. Ground covers can be used effectively to reduce maintenance work and to put the finishing touch on any landscaping project.

When planted under trees, shade-tolerant ground covers reduce the possibility of mower damage to the base of the tree. Some ground covers may be used to protect the roots of shallow-rooted trees. They shade the soil and keep it from drying out rapidly. Some ground covers don't require as much moisture and nutrients as grass. Therefore, they are in less competition with trees and shrubs.

Ground covers can be found to fit many conditions, but they are used most frequently for the following locations:

- Steep banks or slopes
- Shady areas under trees and next to buildings
- Under plantings in shrub borders and beds
- Where tree roots grow close to the surface and prevent grass from growing
- Very wet or very dry locations

20.2 Flowers (Annuals, Perennials), Shrubby, Ornamental Grasses, and Trees

Any combination of such plant diversity can provide an attractive landscape, require less maintenance, while promoting environmental responsibility. (Think pollinators.)

20.3 Mulched Areas

This sometimes is especially suitable where tree roots have expanded over the years, and make it difficult to grow or mow the grass.

20.4 Consider a Vegetable Garden

No one advocates turning a lawn into a cornfield, but a small vegetable garden in a suitable area will bring its own rewards.

20.5 Additional Measures to Avoid Erosion

Build terraces or a retaining wall on slopes. These can intercept runoff, giving water time to soak into the ground, and can make attractive planting beds. Be aware that altering the soil level near established trees can seriously damage their root systems. Don't leave soil bare over the winter. Plant a cover crop, such as annual rye, or place mulch on the soil.

Additional detailed information regarding lawn alternatives:

"Lawn Alternatives," University of Maryland

<https://extension.umd.edu/resource/lawn-alternatives>

Plant NOVA Natives

<https://www.plantnovanatives.org/>



21. For More Information

How to contact us

You can contact us at fairfaxhometurf@gmail.com. Since the program is comprised entirely of volunteers, we will try to get back to you as quickly as possible, hopefully by the following day.

Master Gardener Horticultural Help Desk

The Help Desk for Fairfax County residents operates all through the year. Fairfax County residents can contact us by voice mail at (703) 324-8556, or by e-mail at helpdesk@FairfaxGardening.org. Please leave a detailed message describing your question or problem; we will research your question and get back to you. Remember to leave your name and contact information. During the growing season Master Gardeners are on duty several mornings a week. Please check <https://fairfaxgardening.org/help-desk/> for specific hours.

Fairfax County Extension Office

12011 Government Center Parkway, Suite 1050
Fairfax, VA 22035-1111
(703) 324-5369

Fairfax County Master Gardeners

Fairfax County Master Gardeners have been serving the community since 1976. Fairfax County Master Gardeners Association, Inc. (FCMGA), is a nonprofit organization of volunteers who receive training under the auspices of the Virginia Cooperative Extension and Fairfax County Extension offices. We help provide research-based horticultural information, tips, techniques and advice to home gardeners in the community. We do this through our plant clinics - held in various locations throughout the county during the months of May through September - and other community service activities, such as this Home Turf program. Some services may be offered virtually.

For more information about our other public services, including our Diagnostic Lab, Speakers Bureau, and Help Desk as well as becoming a Master Gardener, please visit our website at <https://fairfaxgardening.org>

Northern Virginia Soil and Water Conservation District

Soil and Water Conservation Districts (SWCDs) were established in the 1930s to develop comprehensive programs and plans to conserve soil resources, control and prevent soil erosion, prevent floods and conserve, develop, utilize and dispose of water.

Founded in 1945 by citizens concerned about conserving natural resources, the Northern Virginia Soil and Water Conservation District is now one of 47 conservation districts in Virginia and approximately 3,000 nationwide. NVSWCD is a political subdivision of the Commonwealth of Virginia, governed by a five-member Board of Directors. Its boundaries are the same as those of Fairfax County, home to over 1.1 million people.

NVSWCD is a locally led conservation agency with a long history of responding to Fairfax County's changing rural to urban landscape, transitioning programs based on identified needs. NVSWCD is valued for its leadership in using new and emerging techniques to address traditional issues and modern challenges.

NVSWCD is not a regulatory agency. Instead, it collaborates with Fairfax County and other partners to provide conservation information, technical services, educational programs and volunteer opportunities to residents on many aspects of water quality, nonpoint source pollution and stream health and connects residents with environmental initiatives and opportunities.

SWCD Vision is an informed community working together to protect natural resources.

SWCD Mission is to lessen the impact of urban and suburban activities on our land, water, and air resources in Fairfax County –vital components of the Chesapeake Bay Watershed. We achieve this through effective leadership, technical assistance, and outreach programs in partnership with government, industry and the public.

The Northern Virginia Soil and Water Conservation District receives financial support and administrative assistance provided by Fairfax County, the Virginia Soil and Water Conservation Board and the Department of Conservation and Recreation.

Virginia Cooperative Extension Publications

Throughout this booklet are references to Virginia Tech Cooperative Extension publications. They are a great resource and provide valuable information on a variety of topics. The entire list of VCE publications can be found at: <http://pubs.ext.vt.edu/>.

For more in-depth information specific to lawns in Virginia, the list of publications can be found at: <http://pubs.ext.vt.edu/category/lawns.html>.

Another helpful resource is the Turf and Garden Tips publication, which is updated periodically and includes archived editions. <https://ext.vt.edu/lawn-garden.html>.

22. Lawn Treatment Record

Participant's Name: _____

Square Footage of Turf Area: _____ Soil pH: _____

Grass Type: Cool Season (fescue) ____ Warm Season (zoysia) ____ Mixture ____

- ✓ Please be **very** specific with weights and fertilizer analysis (three numbers that appear on the front of the bag). See example entries below.
- ✓ Timing makes a big difference! Refer to the lawn care calendar for the proper time to aerate, fertilize, seed or treat your lawn.
- ✓ To prevent run off, avoid applying fertilizers around storm drains or to sidewalks, driveways, and curbs or other hard surfaces. Sweep, do not hose, the fertilizer back into the grass.

Date	Product or Activity	Analysis	Amount Applied	Comments
3/19/19	Core Aeration	n/a	n/a	rented machine for 1/2 day
9/5/19	Fertilized	29-2-4	50 lbs.	40% W.I.N.

Additional recommended practices:

- ✓ Annual core aeration
- ✓ Annual over seeding
- ✓ Correct mowing height
- ✓ Leave grass clippings on the lawn (grass recycling)

The Role of Turfgrass in Promoting a Healthy Environment

- ✓ **Healthy turfgrass purifies and protects water.**
- ✓ **Healthy turfgrass prevents sediment, nitrogen, and phosphorus from entering Virginia's waters.**
- ✓ **Plants absorb, filter, and release water and oxygen back into the atmosphere.**
- ✓ **Turfgrass softens the urban landscape, allowing water to soak into the soil where it recharges aquifers.**

An average sized lawn with healthy turfgrass converts carbon dioxide to oxygen

23. Lawn Treatment Calendar

Lawn Care Calendar												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cool Season Grasses												
Tall Fescue, Bluegrass, Fine Fescue, Perennial Ryegrass												
Soil Test (every 2 -3 years)												
Adjust pH (lime/sulfur based on soil test results)												
Top Dress (with Fine Textured Compost)												
Core Aerate (improve soil structure)												
Fertilize - Fall (3 times @ 30 day intervals, 0.7 lb N/1000 sq ft)												
Water (deeply, 1" every 7 - 10 days, avoid runoff)												
Mow (3-4" (4" in summer), use sharp blades, and leave clippings)												
Weed Control												
Crabgrass, Goosegrass, Foxtail (pre-emergent)												
Chickweed, Dandelion, Clover, Plantain, Bittercress												
Violet, Ground Ivy, Crimson Clover, Oxalis												
Optional Maintenance												
Insects (white grubs)												
Diseases (mostly fungal, ID problem)												
Fertilize - Spring (as needed; 0.3 lb N/1000 sq ft)												
Overseed (with quality seed, keep moist)												
Sod (keep moist until established)												
Warm Season Grasses												
Zoysia, Bermudagrass (both need full sun)												
Fertilize												
Plugging or Sprigging												
Dethatching, Aerating												
Other Items: Use Cool Season Grass guidelines												
For additional information, search the Virginia Cooperative Extension Publications and Resources Library at: https://www.pubs.ext.vt.edu/												