GENERAL INFORMATION SHEET

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☞ PLANT MATERIAL CENTER
WEB SITE ADDRESS http://Plant-Materials.nrcs.usda.gov/ **or** http://plants.usda.gov

☞ BACKYARD CONSERVATION BOOK
DAIL: ***1 - 888 - LANDCARE*** or WEB SITE ADDRESS http://www.nrcs.usda.gov/feature/backyard/

☞ SOIL INFORMATION
WEB SITE ADDRESS http://soils.usda.gov/survey

+ LAWN CARE
WEB SITE ADDRESS
http://www.nationalgardenmonth.org/files/LandE.guidelines.pdf or http://grow.garden.org/

+ WEBSOIL SOIL SURVEY
WEB SITE ADDRESS http://websoilsurvey.nrcs.usda.gov/

☞ SOIL QUALITY INFROMATION
WEB SITE ADDRESS http://soils.usda.gov/sqi

☞ AGRICULTURE EDUCATION MATERIALS FOR KIDS
WEB SITE ADDRESS www.usda.gov then do a search for "USDA for Kids"
www.ext.vt.edu/resources/4h/virtualfarm/index.html **or**
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☞ TECHNICAL AND PROGRAM INFROMATION
WEB SITE ADDRESS www.usda.gov **or** www.nrcs.usda.gov **or** http://pubs.ext.vt.edu/

+ PEAT MOSS INFORMATION
WEB SITE ADDRESS www.peatmoss.com/pm-lawn.php

+ K-12 TEACHING RESOURCES AND ACTIVITIES BY DR. DIRT (NEW FOR THIS YEAR)
WEB SITE ADDRESS http://www.wtamu.edu/~crobinson/DrDirt.htm

+ PLANT NUTRIENTS
WEB SITE ADDRESS http://www.agr.state.nc.us/cyber/kidswrld/plant/nutrient.htm

Soil Textural Triangle

Use a textural triangle to determine textural classes of soil if given the percent of two of the soil separates

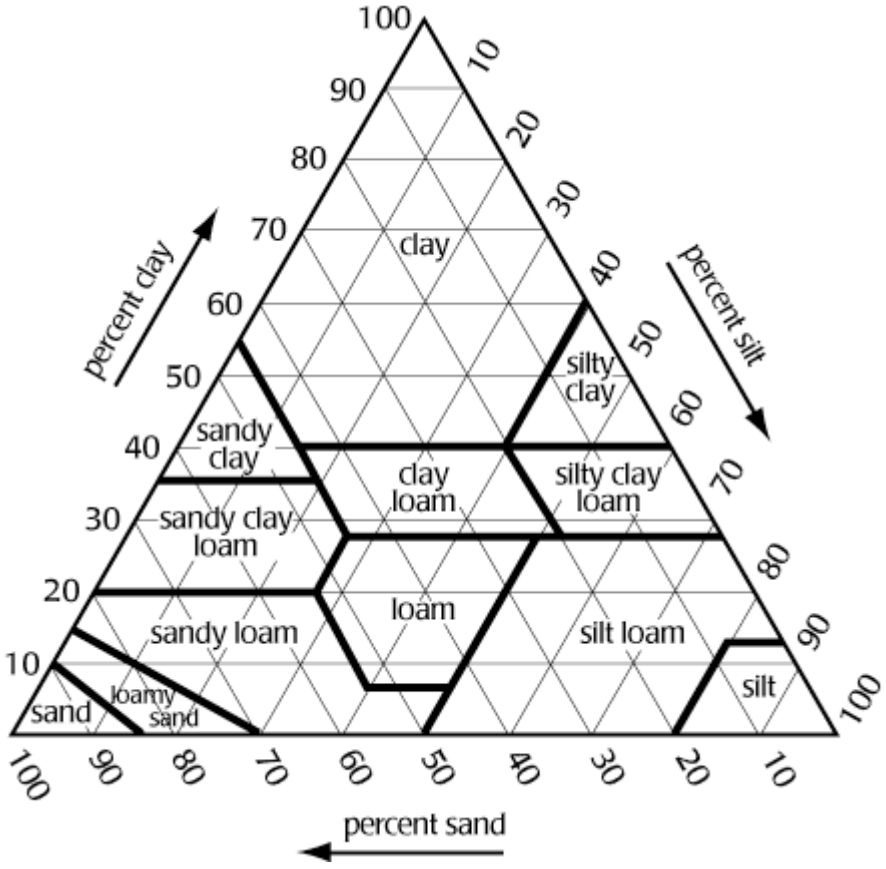
Figure 1 shows a textural triangle. The bottom of the triangle is labeled sand, the left side silt, and the right side clay. Each side is divided 100 segments. If we know the percentage of sand, silt, and clay in the soil, we can determine its texture. For example, if a soil is 40% sand, 30% silt, and 30% clay, the texture is clay loam.

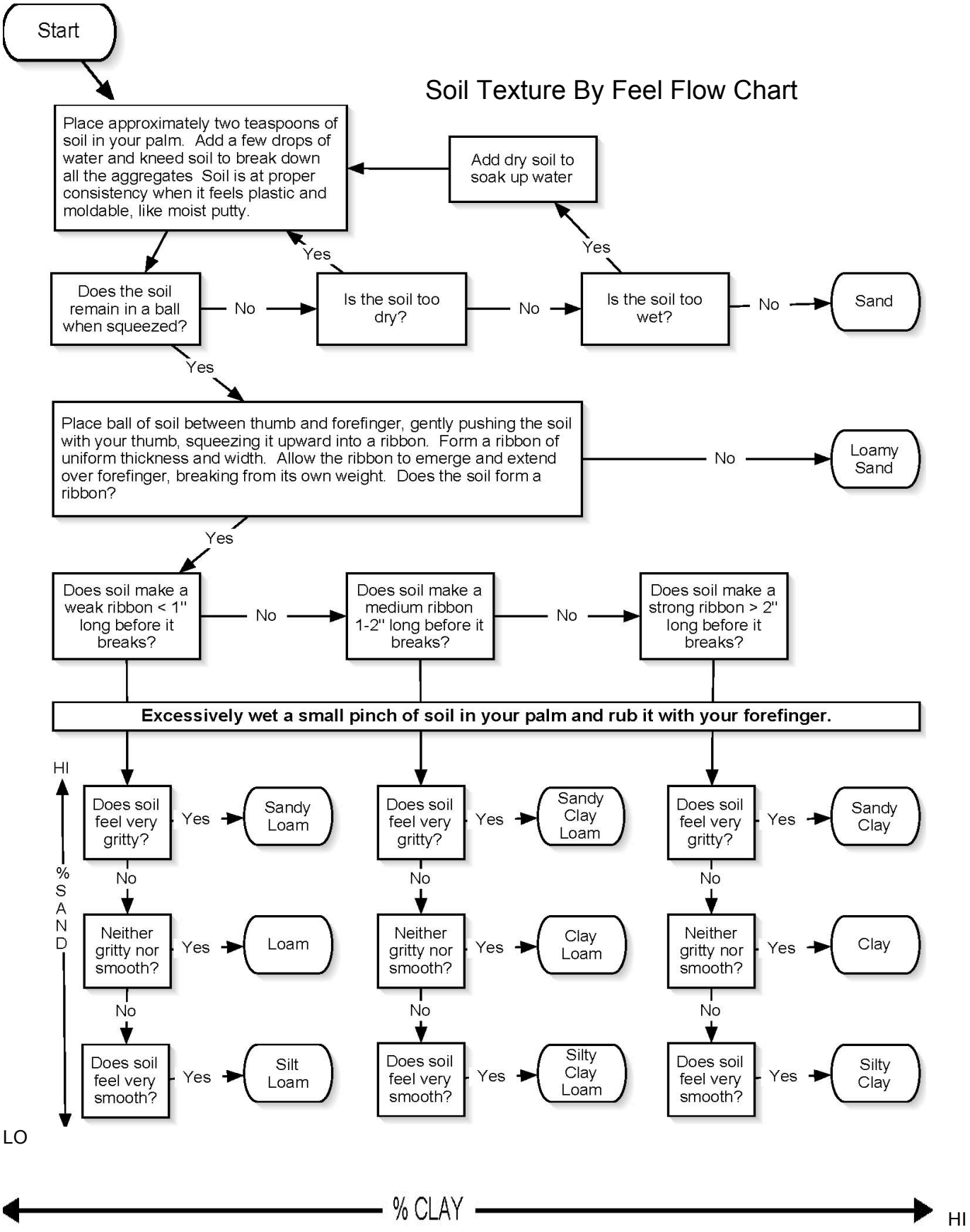
Note: To determine the texture, lines from the sides must be extended in the correct direction. The triangle is equilateral i.e., all angles are 60 degrees. Proceed as follows:

Clay extend line horizontal from the % clay
i.e., parallel with side labeled sand

Silt extend line downward from % silt at 60 degrees
i.e., parallel with side labeled clay

Sand extend line upward from % sand at 120 degrees
i.e., parallel with side labeled silt




Start
Soil Texture By Feel Flow Chart
Place approximately two teaspoons of soil in your palm. Add a few drops of water and kneed soil to break down all the aggregates Soil is at proper consistency when it feels plastic and moldable, like moist putty.
Add dry soil to soak up water
Yes
Yes
Does the soil remain in a ball when squeezed?
No
Is the soil too dry?
No
Is the soil too wet?
No
Sand
Yes
Place ball of soil between thumb and forefinger, gently pushing the soil with your thumb, squeezing it upward into a ribbon. Form a ribbon of uniform thickness and width. Allow the ribbon to emerge and extend over forefinger, breaking from its own weight. Does the soil form a ribbon?
No
Loamy Sand
Yes
Does soil make a weak ribbon < 1" long before it breaks?
No
Does soil make a medium ribbon 1-2" long before it breaks?
No
Does soil make a strong ribbon > 2" long before it breaks?
Excessively wet a small pinch of soil in your palm and rub it with your forefinger.
HI
% SAND
LO
Does soil feel very gritty?
Yes
Sandy Loam
No
Neither gritty nor smooth?
Yes
Loam
No
Does soil feel very smooth?
Yes
Silt Loam
Does soil feel very gritty?
Yes
Sandy Clay Loam
No
Neither gritty nor smooth?
Yes
Clay Loam
No
Does soil feel very smooth?
Yes
Silty Clay Loam
Does soil feel very gritty?
Yes
Sandy Clay
No
Neither gritty nor smooth?
Yes
Clay
No
Does soil feel very smooth?
Yes
Silty Clay
% CLAY
HI

FIELD GUIDE TO SOIL TEXTURE CLASSES (USDA)

Introduction – The purpose of this test is to provide a standard procedure for estimating soil texture in the field. The texture is estimate by the "feel "of moist soil. The texture of a soil cannot be estimated by "feel" if it is either dry or wet.

Definitions ----- Particle Size Classes

- ***Sand*** – has a particle size ranging from 0.05 millimeters (mm) to 2.0 millimeters (mm) in diameter. Sand imparts a gritty feel to soil due to the shape of the individual particles.
- ***Silt*** – has a particle size ranging from 0.002 millimeters (mm) to 0.05 millimeters (mm) in diameter. When moist, silt has a floury feel and does not ribbon when pressed between the thumb and forefinger due to the shape of the individual particles. When placed between the teeth, silt has a gritty feeling.
- ***Clay*** - has a particle size less than 0.002 millimeters (mm) in diameter. Clay exhibits colloidal properties, has a negative charge and is flat and plate-like in shape. Moist clay is sticky and will ribbon readily when pressed between the thumb and forefinger. When placed between the teeth, clay has a smooth slick feeling.
- ***Soil Texture*** – refers to the relative proportions of sand, silt and clay particles in a soil material that has a particle size less than two (2) millimeters (mm) in diameter. Soil texture is an indicator of infiltration capacity, permeability and degree of aeration and drainage as well as other physical characteristics of a soil material.
- ***Soil Texture Classes*** – The USDA has identified twelve (12) soil texture classes as follows: sand, loamy sand, sandy loam, sandy clay loam, loam, silt loam, silt, silty clay loam, clay, clay loam, sandy clay and silty clay. Each texture class has a distinctive characteristic(s) which can be estimated in the field by trained personnel.

Distinguishing Characteristics – The following characteristics are based on moist soil

- ***Sand*** – has a gritty feel, does not stain the fingers and does not form a ball when moist.
- ***Loamy sand*** – has a gritty feel, stains the fingers (silt & clay) and forms a weak ball but cannot be handled without breaking.
- ***Sandy loam*** - has a gritty feel, forms a ball that can be picked up with the fingers and handled with care without breaking.
- ***Loam*** - may have a slight gritty feel but does not show a finger print and forms only short ribbons of from 0.25 inch to 0.50 inch in length. Loam will form a ball that can be handled without breaking.
- ***Silt loam*** – has a floury feel when moist and will show a finger print but will not ribbon and forms only a weak ball.
- ***Silt*** – has a floury feel when moist and sticky when wet but will not ribbon forms a ball that will tolerate some handling. Silt texture has not been found in any Virginia Soils.
- ***Sandy clay loam*** – has a gritty feel but contains enough clay to form a firm ball and may ribbon to form 0.75 inch to 1 inch long ribbon.
- ***Silty clay loam*** – is sticky when moist and will ribbon from one (1) to two (2) inches. Rubbing silty clay loam with the thumbnail produces a moderate sheen. Silty clay loam produces a distant finger print.
- ***Clay loam*** – is sticky when moist. Clay loam forms a thin ribbon of one (1) to two (2) inches in length and produces a slight sheen when rubbed with the thumb nail. Clay loam produces a non-distinct finger print.
- ***Sandy clay*** – is plastic, gritty and stick when moist and both forms a firm ball and produces a thin ribbon to over two (2) inches in length.
- ***Silty clay*** – is both plastic and sticky when moist and lacks any gritty feeling. Silty clay forms a firm ball and readily ribbons to over two (2) inches in length.
- ***Clay*** - is both plastic and sticky when moist, produces a thin ribbon over two (2) inches in length, produces a high sheen when rubbed with the thumb nail and forms a strong ball resistant to breaking.

SOIL EROSION

Soil erosion is the process by which soil materials are torn loose and transported by erosive agents. Here in Virginia, the primary concern is with water as the erosive agent. Ice, wind and gravity are the erosive agents in some cases in the state.

THE FACTORS INFLUENCING EROSION

Climate – Soils – Topography – Vegetation – Surface Cover

TYPES OF EROSION

1. Raindrop erosion – The first effect of rain on the soil sometimes referred to as splash erosion.

2. Sheet erosion – The loss of shallow layers of soil as the particles of soil dislodged by raindrops are carried off by surface runoff.

3. Rill erosion – The erosion which develops as the shallow surface flow begins to concentrate. Rills are small, but well defined channels which at the most only a few inches deep.

4. Ephemeral erosion – It is the same concept as rill erosion but the channel is deeper and can cause major equipment damage.

5. Gully erosion – Occurs as the flow in the rills and ephemeral comes together in larger channels. The major difference is the size or depth of the channels.

6. Channel erosion – Occurs as the volume and velocity of flow causes movement of the stream bed and bank materials.

GEOLOGIC vs. ACCELERATED SOIL EROSION

1. Geologic erosion is a slow natural process that has been going on since the beginning of time. It usually continues as a slow process unless it is interfered with by the activities by man. Geologic erosion accounts for 30% of the total amount of sediment in the United States.

2. Accelerated erosion is where the process of erosion has been speeded up by the intervention of man. The major causes of accelerated erosion are agriculture, surface mining and construction. Accelerated erosion accounts for 70% of the total sediment in the United States.

Lime & Your Lawn

By Mac Saphir, Caroline County Extension Agent

Soon it will be time to plant and renovate cool season lawns in the Hanover/Caroline area. One of the most inexpensive, but very important, components of turf grass management is liming your lawn. In the humid southeast our annual rainfall of over 30 inches per year leaches the basic or alkaline-forming ions out of the soil. This loss of calcium and magnesium ions leaves the soil in an acidic condition, restricting the growth of turf. Over 51% of the soil samples taken from lawns in the Commonwealth tested at or below a pH of 6; many were as low as 5.5. The ideal pH for turf grass is between 6.2 and 6.5.

Lime should not be added unless pH testing indicates that it is needed. Too much lime can be just as bad as too little. The pH level governs how certain nutrients and toxins are absorbed. At low pH beneficial nutrients are not properly absorbed, but at pH's that are too high, other nutrients become limiting and some toxins, like aluminum, become deadly.

Limestone is very simple to apply with either a drop or spinner spreader. Uniform coverage is very important, as the material does not spread and tends to stay where it is put. The lime won't spread to skipped areas, and overlapped areas will have too much. The best way to get even coverage is to spread half in one direction and half in the other in a criss-cross pattern.

If the soil tests recommendation calls for more than 50 lbs. per 1000 square feet (1 ton/acre) the application should be split, with two applications six months apart. The best time to apply the lime is in the fall. This will enable the material to break down over the winter for next year's growth. The fact is, however, that lime can be applied any time a soil test shows there is a need for it. The only thing you really have to watch for is applying lime too close to an application of fertilizer. The lime will tend to deactivate the fertilizer nitrogen.

Generally speaking an application of lime sufficient to raise the pH of the soil beneath the lawn to 6.5 should last at least two to three years. This depends a great deal on the soil physiology, on the amount and type of fertilizer used, and the rainfall. Virginia rainfall has an average pH of 4.4! Nitrogen fertilizers also produce a fair amount of acid, necessitating biannual soil testing.

At about $24.00 per ton, and one ton per acre every two to three years, lime is the best bargain in lawn care!

"A Natural Fact"

By: Mike Jones, DC for NRCS

Lawns are like opinion, nearly everyone has one. Most homeowners want their lawns (known as "yards" in Virginia) to remain green, healthy and aesthetically pleasing.

Fertilization of lawns is required if these dreams are to come true. However, the improper application of nutrients to your lawn can negatively impact surface water and groundwater quality.

A soil test can provide valuable information about your lawn soil. It is the first step in preventing the over-fertilization of lawns. Soil sampling instructions can be obtained at the local Virginia Cooperative Extension Office.

The ideal pH for a lawn soil is 6.2. Our soils are naturally too acid and lime may be required every three years to maintain this ideal level. A soil test will indicate the amount of lime needed. Lime may be applied at any time of the year. Also, soil test results will indicate what other essential macro- & micro- nutrients are available for plant growth. The pH of the soil is often neglected by homeowners. But, without the proper soil pH, much of the fertilizer you apply will not be converted to a form available to plant roots (i.e. chemical reactions will not occur). Use lime as required.

A large majority of the lawns in Virginia consist of cool season grasses (CSG) such as fescues, bluegrass and rye grass. Some lawns have been established in warm season grasses (WSG) such as Bermuda grass or zoysia grass. The **WSG** require **spring fertilization**. Since CSG species are much more common in VA lawns, let's concentrate on their management. **CSG** have a growth cycle that **REQUIRES FALL FERTILIZATION.** In fact, the spring application of nitrogen is detrimental because it leads to excessive leaf growth at the expense of stored food reserves and root growth. Summer disease and drought injury will also be increased with spring fertilization. The advantages of fall fertilization include better density, better root growth, less spring mowing and better fall-to-spring color and less weed problems. Simply put – **BETTER LAWNS**. Fall lawn fertilization is most effective if applied in three separate applications. In VA, the SON (September – October - November) fertilization program is ideal. The fertilizer applications should be four weeks apart starting in September.

The typical fertilizer contains Nitrogen (N), Phosphorus (P_2O_5) and Potash (K_2O). For example, a fifty (50 lbs.) pound bag of 5-10-10 fertilizer contains 5% Nitrogen (2.5 lbs) – 10% Phosphorus (5 lbs) – 10% Potash (5 lbs) by weight. It is always listed in the order of N-P-K available. The remainder of the ingredients is only fillers that facilitate spreading.

A soil test cannot reliably evaluate Nitrogen requirements and a Nitrogen recommendation will not be included in the results. Nitrogen fertilizers will "green-up" a lawn. Uniform coverage of the lawn is a necessity (if you don't want to be the joke of the neighborhood). For even distribution, rotary type spreaders should be used with nitrogen fertilizers. Quickly available sources of Nitrogen should be applied at the maximum rate of one (1) pound of actual nitrogen per 1000 square feet (one acre is 43,560 sqft) in September, October and November. My personal favorite is ammonium nitrate. Ammonium sulfate and calcium nitrate are also quickly available sources of Nitrogen. If desired, a maximum of one half (1/2) pound of quickly available Nitrogen may also be applied once during the period of May 10^{th} – June 10^{th}.

Do not spread fertilizers on impermeable surfaces such as sidewalks or paved driveways. Storm water runoff will readily transport these nutrients. Also, remember that heavily shaded lawns may only require one half (1/2) the recommended fertilizer.

A key to the environmentally safe application of fertilizers is – DON'T APPLY MORE NUTRIENTS THAN THE AVAILABLE PLANTS CAN UTILIZE. Excess nutrient application will only degrade our water quality. Nutrients applied at the wrong time may also harm fragile aquatic life and habitats.

Easy Care Lawns & Lawn Repair Tips

Beautiful lawns:

A lush lawn is everyone's dream. However, lawn care may be the last and least favorite chore on your list. Most people find lawns time consuming because they need constant mowing, trimming, fertilizing and watering. But you can cut your lawn chores in half in one step: "garden from the ground up" by improving the soil.

Healthy grass roots need six to eight inches of soil for good growth. Without it, grass plants won't develop adequate root systems. A soil that's high in organic matter is ideal for growing grass. The best organic matter to add is Canadian sphagnum peat moss, a natural, organic soil conditioner. Its unique cell structure helps regulate moisture and air around plant roots, creating ideal growing conditions.

Peat moss:

- Aerates plant roots by loosening heavy soil.
- Adds body to sandy soil.
- Saves water by absorbing and holding moisture.
- Reduces leaching of nutrients present in or added to the soil, releasing them slowly over time.

Existing lawns:

Adding sphagnum peat moss to existing lawns is easy and pays big dividends. It saves you time and money in the long run by clearing up disease problems, thatch and the amount of water your lawn requires. You do that by "top dressing" (adding a thin layer of peat moss) to the top of the lawn, gradually conditioning the soil. If you wish, supplement peat moss with an equal portion of well-shifted compost, which adds nutrients.

Aeration:

To really improve existing lawns, aerate the lawn, and then apply a top dressing of peat moss. Aeration removes plugs of soil from the lawn, loosening compacted areas and promoting deeper grass root growth. The best time of year to aerate is mid-spring (after the ground is reasonably dry) and early fall.

Your checklist for a better existing lawn:

- Rent a power aeration machine.
- Purchase enough peat to cover lawn area (see How Much Do I Use?).
- Power aerates your lawn.
- Optional: You may choose to rake up soil plugs before top dressing.
- Top dress lawn by spreading a 1/4-to ½-inch layer of peat over entire lawn (a leaf rake works well to spread peat moss).

- Fertilize (check with your local garden retailer on amount and type of fertilizer).

New lawns:

Whether seeding or sodding, always properly prepare the soil first to ensure a healthy lawn and fewer chores in the future.

Your checklist for a better new lawn:

- Dig or rototill two inches peat moss into the top six inches of soil.
- Break up lumps and level ground.

If seeding:

- Spread high quality grass seeds, about 3 lbs. of seed per 1,000 sq. ft.
- Fertilize and water with a fine spray.
- Top dress with a 1/4 to ½-inch layer of peat moss over the seeds. Water lightly.

If sodding:

- When laying sod yourself, ask a local sod supplier for the proper application.
- After laying sod, fill the cracks with peat moss.
- Optional: Sprinkle additional grass seeds between the cracks. Water lightly.

Remember: Moisten seeded or sodded area daily (or twice daily during hot/dry periods) for two to three weeks.

Bare spots:

A number of factors cause lawn patches: disease, animal urine, soil compaction, buried construction debris and thatch. Repair is easy and you can usually see the results in five to seven days.

Your checklist for repairing bare spots:
(The following procedures are identical to "New Lawns," as described above.)

- Dig two inches of peat moss into the top six inches of affected area.
- Seed, fertilize and water with a fine spray.
- Top dress area with a 1/4 to ½-inch layer of peat moss.
- Keep the area moist until germination.

Timing for seeding/sodding:

Spring, late summer and fall are the ideal times to do general lawn chores, as the cooler temperatures enhance grass growth.

SOIL TAXONOMY

1. ***ENTISOLS*** - Soils that have little or slight development and properties that reflect their parent material. They include soils on steep slopes, flood plains and sand dunes. They occur in many environments.

2. ***GELISOLS*** - Soils that commonly have a dark organic surface layer and mineral layers underlain by permafrost. These soils are commonly in the tundra regions of Alaska.

3. ***HISTOSOLS*** - Dark sols that have slightly decomposed to well decompose organic materials derived from sedges, grasses, leaves, hydrophytic plants and woody materials. These soils dominantly are very poorly drained and occur in low-lying areas.

4. ***INCEPTICOLS*** - Soils that have altered horizons but still retain some weatherable minerals. These soils occur in a wide range of temperature and moisture environments.

5. ***ALFISOLS*** - Soils in semiarid to humid areas that have a clay and nutrient-enriched subsoil. They commonly have a mixed vegetative cover and are productive for most crops.

6. ***MOLLISOLS*** - Soils that have a dark surface horizon. These soils formed from nutrient-rich parent material and are commonly in grasslands. They are dominantly in the Great Plains and Western States.

7. ***ANDISOLS*** - Soils that commonly formed in volcanic parent material. These soils have high porosity, particle surface area, and water-holding capacity. They are common in the volcanic areas of Alaska, Hawaii, and the Pacific Northwest.

8. ***VERTICOLS*** - Clayey soils that shrink and develop cracks when they dry and swell when they become moist. The shrinking and swelling can damage buildings and roads. They are dominantly in the Central and Western States.

9. ***SPODOSOLS*** - Soils in humid areas that have a light gray eluvial horizon over a reddish, aluminum- and/or iron-enriched horizon. They are in Eastern states, Lake States, the Pacific Northwest, and Alaska. They commonly have a coniferous tree cover.

10. ***ARIDISOLS*** - Soils that are too dry to grow mesophytic plants. They may have clay enriched subsoil and/or cemented to noncemented deposits of salts or carbonates. These soils are commonly in the deserts of Western States.

11. ***OXISOLS*** - Soils in humid, tropic, or sub tropic areas that have low activity clay and few weatherable minerals. They commonly have reddish or yellowish soils that do not have distinct horizons. They are most extensive in Hawaii and Puerto Rico.

12. ***ULTISOLS*** - Soils that are in humid areas and have clay-enriched subsoil that is low in nutrients. These soils are dominantly in the southeastern United States. With soil amendments they are productive for row crops.

To figure out the available nutrient in a bag of fertilizer (50 lbs of 24 – 4 – 12):

N: 24% * 50 lbs => .24 * 50 = 12 lbs of Nitrogen
P: 4% * 50 lbs => .04 * 50 = 2 lbs of Phosphorus
K: 12% * 50 lbs => .12 * 50 = 6 lbs of Potassium

So if you add up the entire available nutrient in a 50 lbs of fertilizer (12 lbs N + 2 lbs P + 6 lbs K = 20 lbs), the rest of the materials in the bag is a filler (30 lbs of filler – no value).

Using the percentage of nitrogen from the fertilizer analysis on the bag you can accurately figure how much to apply by using the formula:

$$\frac{\text{Desired lbs. of nitrogen per 1,000 sq. ft.}}{\text{\% nitrogen in fertilizer}} \times 100 = \text{lbs. of fertilizer to apply per 1,000 sq. ft.}$$

Example

To apply 3 pound of nitrogen per 1,000 square feet using a 24 – 4 - 12 fertilizer:

3 lbs / 24 x 100 = 12.5 lbs.

12.5 lbs. of 24 – 4 - 12 is required per 1000 square feet to apply 3 pound of nitrogen

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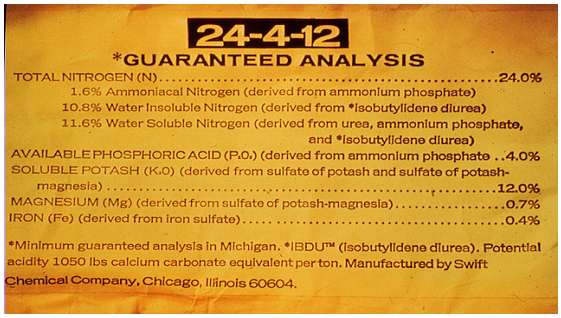
To find the % nitrogen that is WIN use the following calculation:

$$\frac{\text{\% WIN}}{\text{\% Total N}} \times 100 = \text{\% of the total nitrogen is WIN}$$

Using the label example:

10.8% / 24% X 100 = 45% of the total nitrogen is WIN



United States Department of Agriculture

NRCS Natural Resources Conservation Service

Access Web Soil Survey (WSS) for Soils Maps
and related data with only an internet connection.

WSS: http://websoilsurvey.nrcs.usda.gov/

1) Click on Start WSS button.

2) Define Area of Interest (AOI) for a particular area using AOI buttons . Navigate to specific area before defining AOI with Pan/Zoom buttons or by typing in a specific Address or County of interest.

3) Click on Soil Map tab to view soils for your area and to print or save maps.

4) Click on Soil Data Explorer tab to access soils data for AOI and to determine suitability for a particular use.

Painting With Soil

Teaching Objective

"To gain a deeper appreciation of soils -- one of our most important natural resources."

Introduction

Soils are one of our most important natural resources. They also are important for the beauty their many colors add to our landscapes. Most of us overlook this natural beauty because we see it every day. Often these colors blend with vegetation, sky, water, etc. Soil colors serve as pigments in bricks and pottery.

If you look at the works of many of the great artists, you will notice that "earth colors" are dominant. The color and texture of soil painting is fascinating and a creative opportunity for all ages of students.

Materials

* soil (dried in air)
* paper cups (4 oz.)
* paint brushes (different kinds and sizes)
* sponges and rags
* hammer or mallet
* pencils
* water color paper
* mortar and pestle (rubber-tipped)
* ink pens (black, different tip sizes)
* artist acrylic (clear gloss medium)
* masking tape

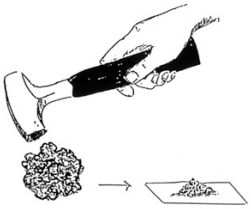
Procedure

Soils

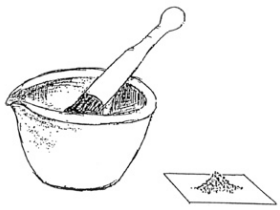
1. Gather soils of various colors.

2. Place each dried soil sample on a piece of paper and crush into pieces with hammer or mallet.

Figure, Step 1a



3. Place some of the crushed soil into a mortar. Use a rubber-tipped pestle to crush the soil into a fine powder. Repeat to crush all of the different colored soils.



Figure, Step 1b

4. Place the different soils in paper cups -- notice the colors and textures.

Artwork

1. Lightly sketch art work on water color paper with a pencil. When satisfied with composition, use ink for permanent lines.

2. With masking tape, carefully tape paper edges to table or board. This is done so that the art work will dry flat.

Figure, Step 1c

3. Pour small amounts of artist acrylic in small paper cups. Add small amounts of soil. Experiment with depth of color and mixing the different soils.

4. Use different sizes and kinds of paint brushes, sponges, and rags. Experiment and have fun.

5. Layering colors. When your art work is dry, you may apply another layer of soil paint.

6. You may want to use a black ink pen to make finishing touches on your artwork.

Activity Time

The estimated time is about 1 to 2 hours.