

## Urban Horticulture Note No. 2

### **DURHAM'S SOIL**

Gardeners who are new to Durham County - or Durham County residents who are new to gardening-will discover two main challenges: our heavy clay soil and our variable weather. The Durham County Master Gardener Volunteers can provide lots of information on these and many other gardening challenges. We invite you to call the Durham County Extension Center to learn more about horticulture and home gardening in Durham. Master Gardener Volunteers are in the office daily, and our phone number is 560-0528. We welcome your calls!

### **Hey, This Soil's Awful!**

Of the many aspects of gardening in Durham, understanding our soil is probably the most important. Every "transplant" gardener to the Triangle needs a crash course on managing heavy clay soils.

We live in the Triassic Basin, a geological formation which includes parts of Orange and Chatham counties. Our soil was created from weathered sandstone and shale. Most of Durham County, especially the southern part, is comprised of the soil type called White Stores. The chief limitations of White Stores soil are poor drainage and high shrink-swell potential. (Clay swells when wet and shrinks when dry, which may cause your foundation to crack!)

Our clay soils make gardeners work a bit harder than gardeners in other parts of the country. When wet, the clay is slippery, sticky muck; when dry, it cracks and hardens into concrete.

Our soil needs organic matter, a lot of it, to overcome its sticky clay nature. Established beds will need regular additions of soil amendments, since organic matter breaks down fast in our warm climate.

Our soil is strongly acidic. The natural soil pH for this area is 4.8 to 5.3 (neutral is 7.0). Most lawns, vegetables and landscape plants prefer the 5.8 to 6.5 range; this can be achieved by applying pulverized or pelletized lime. Plants cannot use nutrients that are already present if the soil is too acid, so applying lime regularly can be just as important as fertilizing. Pulverized lime is inexpensive and probably the best garden value you will find. Always have a soil sample analyzed before applying lime.

Our soil erodes easily, so it should never stay exposed. It takes nature hundreds of years to make 1" of topsoil, but rain can erode that 1" in one week. Protect soil from erosion by planting and mulching.

### **Benefits of Organic Soil Amendments**

The top 8-10" of soil, where plants' roots live, determines the success of your gardening efforts. Plants need oxygen just as people do. Clay soil is too compact to allow roots to "breathe." Adding

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organic soil amendments to the soil (see below) lightens soil texture, discourages compaction, adds nutrients, improves drainage and aeration, moderates soil temperature, and provides pore space which is essential to plant growth. I

Clay without organic matter is like a flattened deck of playing cards. Adding organic material jumbles the cards, permitting water and oxygen to enter the soil.

Do not work in clay soil when it is wet. Mowing wet lawns or working in wet flower and vegetable beds compacts the soil and spreads fungal diseases.

### **Drainage**

Drainage in soil means the rate at which water moves through the soil. Poor drainage is responsible for many of our planting failures. Wet, sticky soil "drowns" plants because their roots don't get enough oxygen. Wet soil also fosters fungal diseases and root rot.

Test your drainage by doing a "perk test" when the soil is neither extremely dry nor extremely wet. Dig a hole in your yard about 12" deep and fill it with water. Check it regularly for the next 24 hours.

Time to empty	means...
3-4 hours	Congratulations! You have good drainage.
5-12 hours	Moderate drainage. Some plants can tolerate this situation, but most will drown,
12-24 hours	Poor drainage. Your soil definitely needs work!

Drainage can be improved by tilling or spading the soil 8-10" deep, and by adding organic soil amendments. This topic is discussed briefly below. See Durham County Extension Urban Horticulture Note 3 for more detailed information on the most effective soil amendment materials and techniques.

You may also need to plant "high", that is, set the plants in a mound of soil above the level of the surrounding grade. See Durham County Extension Urban Horticulture Note 7 for instructions on this planting technique.

### **Soil Amendments**

Soil amendments are materials that are worked into the top several inches of soil, to improve drainage and loosen the soil where plant roots grow. Organic soil amendments can make a world of difference in heavy clay soils. Organic matter breaks down fast in our warm climate, so beds will need regular additions of soil amendments to maintain good soil texture and fertility.

Well-rotted compost is an excellent organic amendment for our clay soils. Just about any plant-derived material is fine as a starting material. Well-rotted compost is black and crumbly, and smells fresh and loamy. It is decomposed enough when you can no longer tell what it used to be.

Finely ground pine bark (sold as "pine bark soil conditioner") is another excellent organic soil amendment. A pea-size grind (1/4 to 1/2") is ideal. Pine bark is a native and renewable resource.

Peat moss and sand are NOT recommended for improving clay soils.

Gypsum "clay buster" sold in garden centers is useful in alkaline clay soils, but is not effective on our type of clay.

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Purchased topsoil is frequently no better than your existing soil. Purchased topsoil is useful for creating raised beds, but for most landscaping needs, it is better to amend the existing soil with organic materials. If you do bring in topsoil, be sure to mix it thoroughly with the native soil. If new soil is just spread over clay, plants will not root into the clay, and the plants will dry out in hot weather. Also be aware that unsterilized topsoil may contain weed seeds.

See Durham County Extension Urban Horticulture Note 3 for detailed information on the most effective soil amendment materials and techniques.

Call the Solid Waste Management office of the City of Durham and ask about free compost and mulch, made from shredded and decomposed yard waste. The city's material varies - if you can tell what individual pieces use to be, it's still too fresh to be worked into the soil.

Start your own compost pile. Your environment, your plants, and your landfill will all benefit. Detailed information on composting is available from the Durham County Extension Center.

### **Don't Guess - Soil Test!**

To determine the exact amounts of lime and fertilizer your soil needs, have your soil tested. The NC Department of Agriculture & Consumer Services provides soil testing to North Carolina residents' – at no cost. The Durham County Extension Center will provide you with the materials necessary for a soil test.

### **Mulch**

A 3-4'-thick layer of mulch on top of your garden will benefit the soil in many ways. It keeps the soil surface from eroding... it prevents soil from splashing onto leaves and flowers... it keeps roots cool... it conserves moisture in the soil... it keeps the soil surface from baking into a crust... it reduces weed germination... it decays, providing a steady supply of organic material and nutrients... and it's an attractive finish for a planting area.

### **Plant Selection**

When selecting plants for the landscape, be sure they are adapted to our climate and soils (we are in USDA Hardiness Zone 7). Native plants are very worthy candidates. Many Asian plants also do well since their home climate is similar to ours. Also make sure the plants you choose are adapted for the particular place you want to plant them. A plant that naturally grows in woodland swamps probably won't do well in a sunny, dry bed. Likewise, a plant native to North Carolina's mountains won't necessarily flourish near North Carolina's coast.

See Durham County Extension Urban Horticulture Note 1 for more information on how Durham's climate affects plants. The Durham County Extension Center also has detailed information on plants adapted for our area.

### **FOR MORE INFORMATION**

Master Gardener Volunteers at the Durham County Extension Center can provide advice and helpful publications on many gardening and landscape topics.

The following are a few of the publications available from your Durham County Extension Center:

Urban Horticulture Note 1: Durham's Weather  
Urban Horticulture Note 2: Durham's Soil  
Urban Horticulture Note 3: Amending Clay Soils  
Urban Horticulture Note 4: Improving Soil Fertility  
Urban Horticulture Note 5: Submitting Samples for Soil Testing  
Urban Horticulture Note 6: Understanding the Soil Test Report  
Urban Horticulture Note 7: Planting Trees & Shrubs

Publication AG-69: Carolina Lawns  
Publication AG-467: Composting: Managing Yard Wastes Publication  
WQ1NM-151: Home Lawn Care and Water Quality  
Leaflet No. 551: Bedding Plants: Soil Preparation & Fertilization

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