

## **The Forest Foundation (Part 2)**

**By: Adam Downing, Virginia Cooperative Extension**

In Part 1 of The Forest Foundation, which appeared in the Winter 2015 edition of the Virginia Forest Landowner Update, I wrote about soil properties such as texture and pH. In addition to these two properties, soil science also explores and quantifies parameters such as depth and drainage.

Soil depth refers to the amount of soil available for downward root growth. In most soils, there is a layer under the top soil, which obstructs root growth. This barrier may consist of materials such as rocks or compacted clay, or may be water-saturated.

Drainage refers to how well water penetrates through the soil. Sandy soils are well-drained to excessively well-drained, meaning water moves through them quickly. Soils that consist of heavy clay are typically poorly drained, meaning water has a difficult time moving through them. Most plants grow best on deep, well-drained soils.

However, some plants, such as longleaf pine, grow well on excessively well-drained soils, while others, such as cattails and cypress, tolerate poorly drained soils. Northern red oaks grow best on deep soils, while chestnut oaks tolerate shallow soils.

Soils dictate the manner in which plants compete. In dry shallow soils, plants compete for moisture and nutrients. On mountain ridge tops in Virginia, soils are often dry and shallow. In these areas, plants that are adapted to shallow soils (like the aforementioned chestnut oak), have a competitive advantage. Where moisture is plentiful but drainage is poor, such as a swamp, trees and shrubs tolerant of poorly drained soils (such as the aforementioned cypress) are the best competitors.

In deep, well-drained soils, such as floodplains, where there is little competition for water, trees compete for light. Light is, in general, the most limiting resource in eastern forests. On sites like this, tall species such as tulip-poplars, sycamores, or walnuts may out-compete other species. Shorter stature species can also grow well on these soils, but only without competition from taller trees.

So what does all this mean to you and your natural area? “Right Tree, Right Place” is a mantra often heard from natural resource professionals. We can expand this to any plant, from grasses and sedges to maples and magnolias. Every species will perform best, i.e. compete best, on certain sites. So how do you know what the right tree (plant) is for your site? There are two approaches and we recommend both.



***Indicator species act as a measure of soil fertility. Species such as black cohosh indicate a site with high fertility. Phot by: Adam Downing, Virginia Cooperative Extension.***

The first, and more enjoyable approach, is to take a stroll around your land. Look down. Take note of what species are already growing there. Species that are naturally occurring in an area tend to be well-adapted to the site and will likely also perform well when planted. Certain species, such as ginseng (*Panax quinquefolium*), black cohosh (*Cimicifuga racemosa*), and blue cohosh (*Caulophyllum thalictroides*) are well-known indicators of sites with high soil fertility (i.e., deep, moist, and nutrient-rich). If you find these indicator species on your property you most likely have a productive site in that location.

During your stroll, be sure to look up as well. Typically, trees grow taller on fertile sites than on less fertile sites. For example, the height of a 100-year-old tulip-poplar may range from 80 to 125 feet, depending on the quality of the site. You can easily observe this on ridge tops which have fertile NE facing slopes on one side and usually less fertile SW facing slopes on the other. If both slopes have a similar history and soil type, the tulip-poplars, red maples, oaks, etc., will be taller on the NE facing slope.

The second approach is to consult a soil survey. These are maps of soils across most of the country. If you have internet access, the easiest way to locate your property’s soils map is with the Web Soil Survey, available at:

[www.websoilsurvey.nrcs.usda.gov](http://www.websoilsurvey.nrcs.usda.gov). Or you can use the free SoilWeb App on your iPhone or Android device. Search for “SoilWeb” in the App store. Hard copies of soil surveys may be available from your local Virginia Department of Forestry or Natural Resources Conservation Service office. These are powerful tools for learning about your soils that can help you make sound decisions about what to grow on your land.



***A count of the rings on this yellow-poplar stump indicates it was about 30 years old. The wide width of the rings indicates it was increasing in diameter rapidly (above). This, and the fact that the remaining stand (right), has an average height of 75 feet, both suggest that this is an extremely fertile site. Photos by: Jennifer Gagnon, Virginia Tech.***

### **Soil Conservation**

I hope by now you have an appreciation for the important role your soils play in the health and productivity of your land and the importance of keeping it in place. Soil conservation, the protection of your soils, is perhaps the most fundamental of all conservation initiatives. Born out of the dustbowl era, the Natural Resources Conservation Service's (previously called the Soil Conservation Service) most fundamental goal then and now is to help landowners conserve their soil. Soil lost to wind or water erosion is lost forever or for at least a very long time. While various conservation practices such as adding organic matter to gardens and using no-till cropping systems can accelerate soil rebuilding, soil lost down river not only is effectively gone from the land, but also has a negative impact on another system - water.

Any activity you consider implementing on your land should protect the soil. It's your foundation. For a more detailed introduction to soil science, watch the video "Soil Stories" from the Natural Resources Conservation Service:

<http://www.youtube.com/watch?v=Ego6LI-ljbY>.

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