

## SOIL

Scientific developments in recent decades have expanded our understanding of soil as an ecosystem. Increasingly we see lively interaction and complex relationships among bacteria, fungi, insects, nematodes, and other life forms in the soil, intriguing in themselves and crucial to our understanding of how plants survive (or don't). Soil scientists, and practical botanists, still consider mineral content, pH, and soil structure, but within a much bigger context. These developments have implications for the casual residential gardener, trying to create a pleasing landscape that is environmentally friendly.

Viewing soil as a living organism implies that we consider both its inherent properties and the dynamic impact of managing the soil via horticultural practices. It is exceedingly difficult to change inherent properties. Better to choose plants that do well in alkaline soil than to try to change the pH. If soil has a sandy structure, it is hard to turn it into silt or clay. In choosing landscape plants, therefore, look carefully at their soil preferences. Some native plants prefer well drained soil and even thrive, in nature, in nutrient poor environments. Others like wet feet, loamy soil, and almost anaerobic conditions. Choose and plant accordingly.

Although many gardeners view fungus as threatening to plants, research suggests that some underground fungi play a crucial role in plant development. The fungi depend upon plants for carbohydrates for energy and in return ease the flow of nutrients to plant roots and protect the plants from predatory soil life forms. These fungi form dense underground webs. Disturbing the soil, whether via deep tilling for agriculture or uprooting for residential and commercial development, destroys these important webs and reduces the ability of the remaining soil to support plant growth. Similar conclusions apply to other soil life forms, many crucial to plant development.

Residential developments involve disturbed soils. Top layers are removed to adjust water flow, and replaced by "foreign soils," brought in as fill. Heavy machinery sits on the surface during building, heavily compacting the soil. Developments contain cement block buildings, walls, and roads, which affect the soil pH. Natural Florida soils are acidic. In many developments, pH levels exceed 7.0, alkaline.

An avid gardener finds it hard not to amend the soil, especially when it is pale sand. Amending can create adverse conditions for native plants, however. A safe practice is to add organic matter to the soil, avoiding manures. Organic matter should create a friendlier environment for the soil's complex life forms and help with soil compaction. Tilling soil disturbs fungal webs, so it is better not to dig organic matter into the soil, placing it instead on the surface. It will disintegrate and work its way into the soil.

Using fungicides, insecticides, and herbicides affect soil health. Unfortunately, these pesticides do not distinguish good fungi from bad fungi, good insects from bad insects, where we define good and bad based on our current understanding of how organisms affect the plants we want to thrive. These pesticides harm all. It is better to handle pesticides and synthetic fertilizers judiciously to restore soil health. Keep in mind, though, that a healthy Florida soil might not grow gorgeous plants that thrive in southern Michigan. Soil amendment affects the upper layer of soil, but much below the surface the basic soil composition that has evolved over millennia dominates. The U.S. Department of Agriculture provides a web soil survey, available on-line at [websoilsurvey.sc.egov.usda.gov](http://websoilsurvey.sc.egov.usda.gov). To use, go to the site and click on "Start WSS" and insert address and use tools to delineate the area of interest; click on soil map to get soil name and clicking on the soil name to access attributes of that soil.

The home gardener should take seriously the preferred conditions for plants and put the right plant in the right place. In terms of adjusting soil conditions, adding compost/organic matter to the soil surface mimics natural conditions. Avoiding massive soil disturbance is wise, but in residential developments that disturbance has occurred already. With native plants, some experimentation (keeping notes) in the home garden might help develop practices that work in the local environment.