



Environmental Horticulture Notes

EHN 55

KNOW YOUR SOIL

Soils vary greatly from one place to another. Some are ideal—they are deep, easily worked, and fertile. Many have physical or chemical limitations—they are too shallow, too sandy, too clayey, too steep, or too low in fertility. Some are too salty or contain other chemicals that are toxic to plants. On the other hand, there are very few places where good gardens and landscape plantings cannot be grown. The secret is to know the nature of the soil, the kinds of problems to expect, and what can be done about them.

SOIL ANALYSIS

It is commonly believed having a sample of soil tested in a laboratory is the first step in solving soil problems. This is not so. Laboratory analysis can be very helpful, particularly when certain kinds of chemical problems are involved. With many soils the problems are physical rather than chemical, and the best way to learn what physical problems there are is to dig some holes and see what is down there. However, before digging the holes, find out if a soil survey has been made of the area. If so, there are maps and reports in the Cooperative Extension office that give a great deal of information about soils in different areas.

SOIL SURVEY MAPS AND REPORTS

Soil survey information is especially useful where the soil has not been disturbed. While not quite as helpful where the soil has been moved around in developing streets, drainage ditches, utilities and buildings, knowing the nature of the original soil often makes it easier to understand what is found when digging holes.

DIGGING THE HOLES

The number of holes that must be dug depends on the size of the site and the kinds of plants that will be grown. For a home landscape, a hole near each corner of the property and each place where a large shrub or tree will be planted may be enough. A hand auger is a good tool for the job. It is easier to detect slight changes in texture, structure or density with a hand tool than with a power auger. Digging when the soil is moist all the way down also helps to detect changes in the characteristics of the soil, and even slight changes can make a big difference in the way plants grow or fail to grow. While digging, stop every few inches and examine the soil that is brought up. Examine for roots, color, odor, moisture, texture, structure, and density. Note changes in any of these characteristics as well as the depth of soil above hardpan, bedrock, hard clay or any other impervious material that prevents excess water from draining out of the soil.

ROOTS

While digging, look for roots or for evidence of where roots have been. Were there a lot of roots, or only a few? Were they all within a few inches of the surface, or did many of them reach deep down into the soil?

COLOR

Soils come in many colors, and soil of almost any color can be good. If the soil has not been moved around or scraped off, it is usually a darker color because it contains more organic material than further down. Soil that is mottled with black or rust colored spots probably has been waterlogged for long periods of time, and could get that way again unless precautions are taken to prevent it. This is often seen in soil that is underlaid by dense clay, hardpan or some other impervious material.

ODOR

When moist, most soils have a pleasing odor. Poorly aerated soil, or soil that stays wet much of the time, usually has a putrid, sour, or other disagreeable odor.

MOISTURE

While digging, check for moisture every few inches. Is the soil at that depth dry, moist, wet or waterlogged? A good field test for soil moisture is to try and squeeze a handful into a ball. If a ball forms, try to crush it and see if it will crumble. Dry soil will not form a ball; moist soil will form a ball that will crumble when crushed. A ball of wet soil can be squeezed around into different shapes but will not crumble unless it is very sandy.

TEXTURE

Most soils consist primarily of sand, silt and clay particles. It is the proportions of sand, silt and clay that gives a soil its texture. Sand particles are the largest. Silt particles are smaller than sand, and clay particles are smaller than silt. To get an idea of the texture of a soil, wet a small handful and rub between your thumb and forefinger:

- Sandy soil feels gritty.
- Silty soil feels slippery, but not sticky.
- Clay soil is both slippery and sticky (sticky enough to be molded into a ribbon).

Sand, silt and clay each play an important role in soil. Loam, which is soil with ideal texture, is a combination of the three particle sizes. Soils that contain a higher proportion of any one of the three may present problems. However, it is rare to find a soil that will not grow a good garden or landscape if it is properly handled.

STRUCTURE

The way the sand, silt and clay particles fit together give soil its structure. In soils with good structure, the particles fit together in a way that allows it to wet quickly and thoroughly, then permits the excess water to drain to lower depths so air can move into the spaces between the soil particles. To test soil structure, squeeze a moist clod. If it crumbles easily into tiny clods 1/8 to 1/4 inch in diameter, the structure is probably good. If the clod is difficult to break or only breaks into two or three pieces, the structure is poor.

DEPTH OF SOIL

In many places the soil is underlaid by hardpan, bedrock, compact clay, or some other material so dense that neither water nor roots can penetrate. It is important to note the depth of the soil in which plants have an opportunity to develop roots. Special care may be needed to prevent waterlogging in the root zone because roots soon die from lack of air in soil that stays too wet too long.

UNIFORMITY OF SOIL

Layers of different materials in the soil mass can interfere with movement of air and water within the soil. Even a thin layer of compact soil can delay water movement down through the soil causing the soil above it to stay too wet too long. A layer of sand or gravel can do the same thing. It seems water would readily drain out of soil underlaid by sand or gravel, but it does not. Water will not move into the sand or gravel unless the soil above it is completely saturated, so even soil above sand or gravel can stay too wet too long.

WHAT CAN BE DONE ABOUT SOIL PROBLEMS

See the following UCCE Sacramento County Master Gardener documents for suggestions to deal with specific soil problems:

- EHN 53 - "Garden and Landscape Plantings on Hardpan Soils"
- EHN 54 - "Managing Clay Soil in Gardens and Landscape Plantings"
- EHN 56 - "Improving Layered Soils for Gardens and Landscape Plantings"