

UNIVERSITY OF NEVADA COOPERATIVE EXTENSION

A COUNTY—STATE—FEDERAL PARTNERSHIP

NEVADA SOILS - WORTH THE TOIL

SOIL MAKES OR BREAKS THE GARDEN

Soil (in northern Nevada, that's the stuff between the rocks) will make or break the garden and the gardener. If the soil is in good condition, proper watering is easy, and healthy, productive plants are almost guaranteed. If the soil isn't in good shape, growing anything successfully, except weeds, will be a continual battle.

TRUE OR FALSE? HOW MUCH DO YOU KNOW ABOUT SOIL?

1. Nevada soils are generally adequate for good plant growth if water is supplied. 2. To improve drainage, put rocks in the bottom of the planting hole. 3. Gypsum is the best thing to use to break up tight, slow-draining soils. 4. Fertilizer requirements vary from plant to plant but not from soil type to soil type. 5. Before planting a vegetable garden, the soil should be tested.

Statements one through four are false and statement five isn't necessarily true. Read on to find out why.

THE VIRTUES OF ORGANIC MATTER

Soil organic matter refers to organic (once-living) materials in various stages of decomposition in the soil. Nevada soils are notoriously low in organic matter and organic soil amendments are recommended for good plant growth. Organic matter conditions and improves any soil. It acts as a sponge so it can absorb large quantities of water in relation to its weight. This is beneficial in porous, sandy soils because it slows down water drainage and the rapid leaching of vital nutrients. In heavy clay soils, organic matter speeds up water drainage

by loosening and aerating the soil. Fine organic matter covers mineral particles and keeps them from sticking together so the soil is readily cultivated which helps maintain its structure after cultivation.

The best organic soil amendments are compost, leafmold, peat moss and humus. Sawdust, straw, and shredded bark are also good sources of organic matter. Grass clippings from lawns that have not been treated with a weed killer work well also. The latter group uses up nitrogen in the soil as they break down, so additional nitrogen fertilizer must be added.

Manures are recommended too as a source of organic matter, but they have some serious drawbacks. Barnyard manures are a good source of weed seeds! Since fresh manure is over 70 percent water, well-aged manure would be a more efficient source of organic material. It should be composted and leached of excess salts before being used in the garden. "Sterilized steer manure" from the local garden center should be used with caution. Even though the weed seeds are not viable because it's "sterilized", the salt content may be very high. Sterilized steer manure is obtained from feedlots where the cattle are kept in crowded conditions and urine salts further raise the manure's salt content.

HOW MUCH ORGANIC MATTER TO USE

A new lawn bed should have 1-1 1/2 to 2 inches of organic matter worked in to a depth of eight inches before planting. Any more and the lawn will be too soft and spongy when walked on.

When planting ornamentals such as trees and shrubs, use native soil as a backfill in the planting

hole. If the native soil is heavy clay, use one part organic matter to four parts existing soil to backfill.

Flower beds and vegetable gardens need lots of organic matter for abundant growth. Use three to six inches of organic matter worked in to a depth of ten to twelve inches. Additional organic matter should be worked in every year.

WHY WATER IN THE SOIL WON'T DRAIN

In many instances the upper layer of a soil may become completely saturated with water before it will move into the lower soil horizon. This is due to different soil textures, a phenomenon known as interfacing. An interface is a sharp line of demarcation between two soil types.

When planting a tree, novice gardeners will often carefully arrange a layer of rocks in the bottom of the planting hole. Then they may toss in some compost followed by native soil, more compost or steer manure, and finish off with more native soil. All this is done in the interest of getting the tree off to a good start in enriched soil that drains well. The best of intentions with the worst of results!

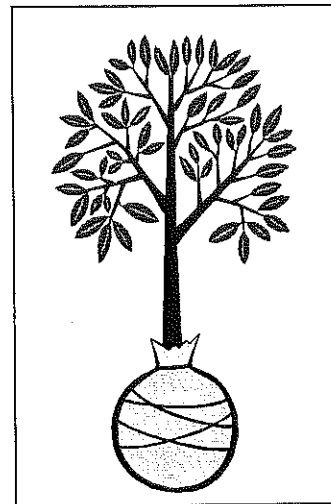
The same kind of problem can occur when a building contractor completes a house. They'll spread a thin layer of topsoil over the existing soil. In many cases the soil has been compacted by trucks and heavy equipment for months and is often full of trash and building debris, and they say, "There! The lawn is ready to be planted!" You might as well try to grow grass on your driveway. Water drainage and root penetration will be nil.

The good gardener avoids soil interfaces; and works the soil carefully to a gradual transition from one type of soil to another. Consider our novice gardener's planting hole. Some native soils are heavy clay, or sandy with a layer of hardpan underneath. The tree came from the nursery; planted in a container of fast-draining planting mix, and the gardener built up a five-layer cake of different soils and soil amendments in the hole.

Water drainage is definitely impeded and growth will suffer.

When planting trees, use organic matter sparingly only in heavy clay or very coarse sandy soils. Otherwise just backfill with native soil. If organic matter is used,

thoroughly mix it with the soil that is taken out of the hole, replacing 1/4 of the native soil with organic matter. Also, the planting hole should be as large as possible, up to five times as wide as the rootball, so that the tree can establish a well-developed root



system in this loose soil. **DIG A \$50.00 HOLE FOR A \$5.00 PLANT!**

WHY GYPSUM IS NOT THE ANSWER FOR ALL TIGHT SOILS

Soil can be tight or slow-draining for several reasons:

1. The soil is physically tight because the individual clay soil particles are so small that they pack together into a solid mass with little space for air or water. The remedy for this type of soil is organic matter and lots of it. Cultivation and the addition of organic matter causes the tiny soil particles to group together into porous crumbs or granules leaving room for a film of water and air in between.
2. The soil is physically tight and high in salt. Stunted growth, leaf margin burn, and white crust on the soil surface, are indicators of a "salt affected soil", a soil with a high soluble salt content. The remedy for this type of soil is the addition of lots of organic matter followed by heavy leaching with salt-free water to wash out the soluble salt.

3. The soil is chemically tight because it's high in sodium. "Sodium affected" or alkali soil can only be positively identified with a soil test, but it is known that the soils along the east side of the Truckee Meadows from Spanish Springs south to Steamboat are often high in sodium. Sodium-affected soils do not drain well because each tiny soil particle is surrounded by sodium ions. This coating of sodium ions prevents the soil particles from clumping together into larger granules with room for air and water in between.

This is the time to use gypsum along with lots of organic matter. The sodium ions will not release their grip on the tiny soil particles unless they are displaced chemically by other ions. Calcium ions in dissolved gypsum (calcium sulfate) will replace the sodium ions, so that the soil particles can clump together. The displaced sodium can then be washed out of the soil.

Gypsum does not benefit a soil that is physically tight because of small particle size nor will it improve drainage in salt-affected soil. It is only effective (if used with large quantities of organic matter) in an alkali soil, which has to be determined by a soil test.

If a soil test from an independent laboratory indicates your soil is high in sodium (SAR value of 3 to 9), use gypsum at the recommended rate prescribed by the laboratory.

4. The soil is high in salt and sodium. This is difficult to reclaim. It requires liberal quantities of organic matter, gypsum and heavy leaching. Often a high water table prevents this. Raised beds and container planting offer the best solution to this problem.

FERTILIZER REQUIREMENTS MAY VARY

All plants require sixteen essential elements for good growth. Carbon, hydrogen and oxygen are obtained from the atmosphere and water. Nitrogen, phosphorus, and potassium are macronutrients obtained from the soil, along with ten other

secondary and micronutrients. Plants may vary slightly in their soil pH tolerances or micronutrient requirements, but their basic needs are the same.

Let's consider the three primary elements necessary for plant growth: nitrogen, phosphorus, and potassium. Potassium is generally present in abundant amounts in the form of potash in our soils. Phosphorus may be present in adequate amounts, but for good crop production of fruit, vegetables or flowers, a phosphorus fertilizer should be worked into the soil before planting. Phosphorus stays where it's put in the soil and will not benefit the plant unless it is in the root zone. Nitrogen is the crucial primary nutrient that must be regularly replenished in the soil and more often in some soils than others.

Nitrogen, essential for rapid growth and healthy green color, is soluble in water and leaches through the soil readily. Fast-draining sandy soils will require more frequent nitrogen applications than heavier clay soils. This is another reason why organic matter is so important to prevent loss of vital nutrients. Sodium-affected soils that require regular applications of gypsum and frequent watering to leach out the sodium will also need more nitrogen. Organic soil amendments that use up nitrogen in the process of decomposition will temporarily deplete the soil and plants of nitrogen.

Another soil factor that affects a plant's nutrient uptake is pH. In alkaline soils (pH greater than 7.0), for example, an essential micronutrient such as iron becomes unavailable to the plant. It may be present in abundant quantities but in a form the plant is unable to use.

Iron chlorosis, interveinal yellowing of the leaf, is a common problem in northern Nevada and can be corrected either by lowering soil pH, by adding sulfur, or using a "chelated" iron product. Chelates are synthetic organic substances that keep the iron in a non-ionized, water-soluble form that plants can utilize.

DO I NEED A SOIL TEST?

If you are about to plant a vegetable garden in a new spot, we recommend the use of liberal quantities of organic matter as previously outlined and good garden management. Your plants should thrive. If you're doing everything right and the garden is still not productive and plants are doing poorly, then consider a soil test.

Private labs, which charge a fee, will test for nitrogen, phosphorus and potassium as well as other nutrients. Such tests can be arranged through the following firms who should be called first to determine sample size and for more detailed instructions.

A&L Labs	(209) 529-4080
Colorado State lab	(970) 491-5061
Denele Labs	(209) 634-9055
Sunland Lab	(916) 852-8557
Stukenholtz Laboratory	(800) 759-3050 or (208) 734-3050
Univ. Wyoming	(307) 766-2135
Western Labs	1-(800) 658-3858 or (208) 722-6564

www.westernlabs.com]

Cooperative Extension offers the foregoing names for information only and makes no representation of the firm's qualifications.

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