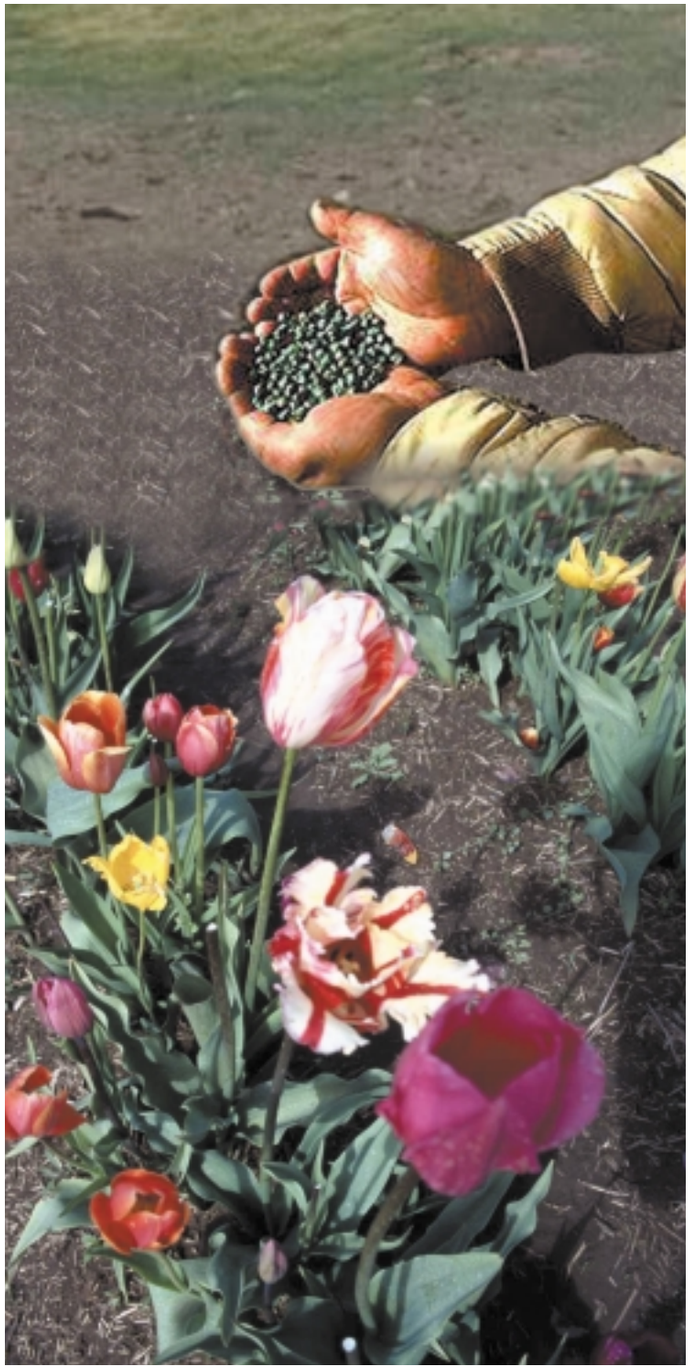

GARDEN INFORMATION SERIES

University of California

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GARDEN INFORMATION

When and How to Amend Landscape

SOILS

WHEN AND HOW TO AMEND LANDSCAPE SOILS

When should landscape soils be amended?

Remember that *no amount of soil amendment will overcome poor design, plant selection, improper planting, or poor care.* Prior to planting, most soils will need fertilizer, but most research findings indicate that amending tree or shrub planting holes or beds with organic matter or other amendments is not necessary. Amending should be done *only if there is an extreme soil problem to amend.* To be effectively amended, individual planting holes should be enlarged to at least three times the size of the prospective plants' root balls. However, since plant roots eventually grow out of planting holes, amending the entire planting bed or area is the best long-term solution when an amendable problem exists. Compacted soil or soils with layered zones of different textures can usually be most *effectively improved by physically breaking them up with deep digging or ripping* prior to planting rather than by mixing in an amendment.

When amendments are necessary, they must be thoroughly and uniformly mixed into the soil to a depth that will solve the problem. Keep in mind that the depth of active roots of most trees and shrubs extends from one foot to two or three feet, so amendments mixed only into the top four to six inches of soil will be of little benefit.

Guidelines for amending physical problems of soil

Physical amendments (sand or organic materials) are designed to dilute existing soil particles to improve soil texture (extremely sandy or clayey soils) or structure (highly compacted soils with poor aeration and drainage). The amendment selected should be the same or larger in particle size than that of the existing soil. For new landscapes or in extensive renovations, deep digging of dense compacted soils is recommended first. In established landscapes, compaction and similar problems might be best remedied with turf aerators, power augers or water jets that create numerous holes around root zones. Use of physical amendments is recommended only when soils are extremely high in clay or sand, or if they are extremely and uniformly compacted at and below the surface.

Sand can be effective if enough is added so that it is at least 45% of the soil volume in the root zone, an amount usually making it too expensive as an amendment. Use of sand in smaller volumes will usually compound the original problem.

Organic materials (compost, shredded bark, fir bark, peat moss, composted manure, etc.) are very effective when soil is amended at least 25% to 30% by volume. Composted or nitrogen stabilized organic material is recommended since the decomposition process requires nitrogen and a soil deficiency might occur. Nitrogen fertilizer should be mixed with organic material at a rate of one to three lbs. nitrogen/1000 sq. ft. of area amended. Composted *Eucalyptus* trimmings are generally safe to use as amendments. Organic materials are typically much less expensive than sand and have multiple benefits beyond dilution of soil particles. Organic matter contributes small amounts of micronutrients essential to plants, provides compounds that bind soil particles together to form small aggregates that improve soil structure, and dilutes fine particles that are present in heavy clay or silty soils. The effect of these materials is not permanent since they do decompose after an extended time. Coarse-textured materials last longer.

Guidelines for amending common chemical problems of soil

Most plants grow best in a pH range of 5.5 to 8.0. A pH of 7.0 is neutral; values above 7.0 are alkaline and those below 7.0 are acidic. In many areas of California, pH levels are too alkaline. Make soils more acidic (less alkaline) by lowering the pH with elemental sulfur, iron sulfate, aluminum sulfate, or through the use of acidifying fertilizers. Results might not be seen for several months to a year after application. Approximately 12 to 20 lbs. of sulfur/1,000 sq. ft. of area might be necessary to reduce pH from 8.0 to 6.5. Multiple applications of five lbs. of sulfur/1,000 sq. ft. or less are recommended to avoid injury to plants. Incorporate these materials eight inches or deeper to deliver the maximum benefit. Although it is seldom needed in California, soil may be made less acidic (more alkaline) by raising the pH with additions of lime (calcium carbonate).

Soils with poor structure and poor water infiltration caused by high concentrations of sodium (sodic soils) can be improved by applying gypsum (calcium sulfate). *Gypsum will not improve water infiltration and structure of soils when the problem is not due to sodium!* Gypsum has no effect on pH, but it adds calcium to soils. Calcium is an essential plant nutrient and it also replaces sodium in the soil, thus improving the structure of sodic soils. Applications of about 20 lbs./100 sq. ft. followed by repeated leaching with water can effectively reduce sodium concentrations and thereby improve water infiltration. Repeated leaching over several months might be required before effects are seen. A rule of thumb is that four inches of water will leach four inches of soil. Where ponding occurs, water should be applied very slowly in short, repeated cycles until the total amount of water desired has been applied.

Excessive soluble salts can significantly reduce the growth of sensitive plants at low to moderate levels. However, levels of two to four times this amount are usually necessary before salt injury is easily diagnosed and leaf symptoms (leaf burn or scorch, leaf drop) appear. Repeated leaching as recommended above for sodic soils might reduce salt concentrations. Water thoroughly after fertilizing and do not heavily fertilize soils already high in soluble salts. Keeping salty soils evenly moist may reduce injury to plants.

Frequently, sodic soils are also high in soluble salts. These soils require a combination of the above treatments.

Ask your nursery or garden center professional for additional information and assistance about amending soil.

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