



THE CHALLENGES OF GARDENING ON SERPENTINE AND GABBRO SOILS

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Many gardeners complain about the quality of their soil, saying it is too rocky or has too much clay. But some gardeners in Nevada and Placer Counties have to contend with soil that is actually toxic to many ornamental landscape plants and in some cases possibly to the gardeners themselves. These soils present unique challenges because of their chemical makeup, but also offer the opportunity to grow local native plants, some of which will not grow on anything else.

The soils in question are known as **Serpentine** and **Gabbro**. They form from what geologists call ultramafic rocks, those containing over 70% iron and magnesium minerals. They occur in fault zones, primarily in the Coast Range of California and the western Sierra Nevada foothills. In Placer County, they are found around Foresthill, in areas from Auburn to Colfax, and in isolated areas of the Tahoe National Forest. In Nevada County, they are common to the west of Highway 49 and areas around Chicago Park and Washington.

Serpentine soils are derived from the metamorphic bedrock serpentinite, the state rock of California. The rock ranges from black to green in color and is often mottled or blotchy with a waxy or soapy feel to it. Serpentine often contains white streaks of asbestos that, when disturbed, creates a dust that is toxic if inhaled or ingested. The soil is usually shallow, rocky and reddish brown in color due to the amount of iron oxide in it. Because of a large clay content, drainage can be slow, but while water is present, it is often unavailable to plants.

Asbestos exposure is most likely to occur when serpentine rock or dry soil is disturbed, causing asbestos dust to become airborne. If possible, avoid driving over, grading, or excavating these areas. Gardeners should thoroughly water areas known to contain serpentine before digging, rototilling or leaf-blowing. The moisture will keep asbestos fibers from becoming airborne. If feasible, cover areas of serpentine soil with 3 to 6 inches of mulch or asbestos-free soil. Growing food crops in serpentine is not advised (and may be difficult anyway, due to conditions discussed below).

Gabbro soils are similar to serpentine in their chemical properties, but do not contain asbestos. They are derived from intrusive igneous parent materials that are greenish to black in color with a coarse crystalline structure. They also weather to a reddish or orange color.

Several qualities of serpentine and gabbro soils make them inhospitable for traditional landscapes. Most definitive is the low Calcium/high Magnesium ratio. Additionally, they have low levels of nitrogen, phosphorus and potassium, the major nutrients required by plants. If this weren't bad enough, they also contain high levels of iron and heavy metals such as nickel, chromium and cobalt that are toxic to most plants. The result is plants that are stunted, fail to thrive, or die due to no fault of the gardener.

So what's a gardener to do?

Constructing raised beds with imported soil or using containers filled with growing media is a possible solution, especially for growing vegetables and to avoid digging in asbestos-laden soils. There is another alternative—the ultimate case of finding *the right plant for the right place*.

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Many native plants have evolved to tolerate and even thrive in the harsh conditions presented by serpentine and gabbro. Some of these are “endemic,” meaning they grow only on these soils; some are rare and endangered. By embracing the unique local soil conditions and planting these natives, home gardeners can create beautiful, site-appropriate landscapes while helping to preserve our local flora.

There are gabbro and serpentine tolerant plants to meet every landscape need, from groundcovers to background shrubs and trees. Besides our local species, many of the plants that grow on serpentine in the coastal range will also grow in the foothills, adding to the possible plant palette. When shopping for these plants, be sure to get the species listed, as not all in a genus are tolerant.

Large trees: MacNab cypress (*Cupressus macnabiana*), ghost or gray pine (*Pinus sabiniana*), Coulter pine (*Pinus coulteri*), bay laurel (*Umbellularia californica*), Buckeye (*Aesculus californica*) and many oaks: blue (*Quercus douglasii*), interior live (*Q. wislizenii*), canyon live (*Q. chrysolepis*) and the lovely Brewer oak (*Q. garryana* var. *breweri*).

Small tree to large shrubs: oracle oak (*Quercus x morehus*), Fremont's silk-tassel (*Garrya fremontii*), toyon (*Heteromeles arbutifolia*), snowdrop bush (*Styrax officinalis* var. *californica*), holodiscus (*Holodiscus discolor*), flannel bush (*Fremontodendron* sp.), holly-leaved cherry (*Prunus ilicifolia*), and Western Redbud (*Cercis occidentalis*).

Medium-sized shrubs: leather oak (*Quercus durata*), Lemon's or wedgeleaf ceanothus (*Ceanothus lemmmonii* or *C. cuneatus*), holly-leaf redberry (*Rhamnus ilicifolia*), fuchsia-flowering gooseberry (*Ribes speciosum*), shrubby penstemon (*Keckiella* sp.) and hoary coffeeberry (*Rhamnus tomentella*). Several manzanitas (*Arctostaphylos* spp.) will tolerate gabbro and serpentine conditions. Deer grass (*Muhlenbergia rigens*) provides a contrasting texture in this size range.

Smaller plants: serpentine columbine (*Aquilegia eximia*), California buckwheat (*Eriogonum fasciculatum*), mountain pennyroyal (*Monardella odoratissima*), and many seasonal wildflowers and bulbs.

You can even create a butterfly garden that will attract native species and hummingbirds while delighting you with beautiful blooms. Plants to use include the foothill penstemon (*Penstemon heterophyllus*), scarlet monkey flower (*Mimulus cardinalis*), sticky monkey flower (*M. aurantiacus*), pitcher sage (*Lepechinia calycina*), heart leaf milkweed (*Asclepias cordifolia*), hummingbird sage (*Salvia spathacea*), black sage (*Salvia mellifera*) and *Senecio clevelandii*.

Serpentine/gabbro tolerant groundcovers: blue-eyed grass (*Sisyrinchium bellum*), Creeping sage (*Salvia sonomensis*), ridge hedge nettle (*Stachys ajugoides* var. *rigida*), mountain violet (*Viola purpurea*) or California barley (*Hordeum brachyantherum californicum*).

Unfortunately, many of these plants could be difficult to find for purchase. California Native Plant Society sales are a good place to start. If your local nursery doesn't have them in stock, they may be able to special order them. Finally, there are online sources that offer California natives for mail order.

Don't be afraid of these soils. With the proper precautions and practices you can garden safely and successfully. And, by using tolerant native species, you will be preserving important local flora and fauna that are unique to our little corner of the world. When life gives you lemons, make lemonade; when life gives you gabbro or serpentine, make a bio-preserve!

References

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