

Know your soil: Sacramento County is a mixed bag

Debbie Arrington, Sacramento Bee, 2-5-11

Step into your garden and think about what's underfoot. Clay, silt, sand, maybe some rocks or gravel.

And, if you're lucky, billions upon billions of microbes.

Healthy soil is a living, breathing eco- system teeming with tiny creatures that help plants grow and sustain all life.

"The biggest misunderstanding gardeners have is that soil is not alive, that it's just dirt," said Sacramento soil expert Steven Zien. "That totally ignores soil's biology. 'Soil' should not be a dirty word."

"Dirt is for losers!" declared author-blogger Annie Spiegelman, who calls herself the "Dirt Diva." "You want to be a winner in your yard. You need those billions of microbes working for you underground to make you look like a gifted gardener.

"Make friends with the microbes. Then you'll have *soil* and not *dirt*."

How many microbes? Consider these facts from the U.S. Department of Agriculture's Natural Resources Conservation Service:

- One cup of soil can hold more bacteria than there are people on Earth.
- A single spadeful of rich garden soil contains more living species than can be found above ground in the entire Amazon rain forest.
- If you packed all the microbes from an acre of land together, they would weigh as much as two cows.

Despite its ever-living value, Sacramento's soil has been trashed for generations. Miners turned it upside down in search of gold. Farmers shredded its structure through repeated tilling. Developers compacted the soil and often scalped off the top.

Chuck Ingels, horticulture adviser for Sacramento County's UC Cooperative Extension, teaches soil science to Master Gardeners. People constantly ask him how to deal with poor soil.

"It's usually compacted, clay or soil that doesn't drain well," he said. "It's worst in Orangevale, Folsom – where it's also very rocky – and Elk Grove. There's a lot of hardpan out there. You can't break through it without some pretty powerful machinery."

That layer of hardpan – cemented clay that blocks the downward flow of water – sits anywhere from a few inches to a few feet below the surface.

Ingels said the area's richest natural soils are in Arden Park, River Park, the Pocket area and east Sacramento. Particularly good soils are also found along the American River and down into the Sacramento-San Joaquin Delta.

Most gardeners consider loam – a mix of roughly 40 percent sand, 40 percent silt and 20 percent clay – the best soil for growing. Sacramento has an abundance of clay, Ingels said, and most of our soil can be classified as loamy clay. That's both good and bad news: Clay retains moisture but it clogs drainage.

University of California, Berkeley, soil scientist Steve Andrews, known to Northern California's Master Gardeners as the "Dirt Dude," is passionate about soil: "There are no bad soils, only good soils that have had bad things done to them."

He preaches the difference between dirt and soil.

"We treat soil like dirt, and they are *not* the same thing. Dirt is the stuff that your nosy next-door neighbor likes to dig up on you. Dirt is the stuff in your vacuum cleaner. Dirt gets on your clothes, the kids, the dog and the cat. But dirt is *not* soil.

"Soil is a living treasure, an amalgam of sand, silt, clay, organic matter, air and water, transformed by time, climate, topography, biology, parent material – and us."

Andrews characterized Sacramento's soil, after decades of mining, farming and urban development, as "overworked, underappreciated and stressed."

More than 250 distinct native soils occur in the Sacramento Valley, sometimes two types on one lot. They can be grouped by topography. But human beings have dramatically changed the earth under our feet.

"Sacramento is a focal point where all this other stuff came together," Andrews said. "This is a great floodplain that doesn't get to cleanse itself because of the levees. People added insult to injury with mining and development. It makes soil sustainability that much harder."

Starting with the Gold Rush of the mid-19th century, mining left the soil on thousands of acres in Sacramento County a wasteland – and the effects are felt today.

"When we do soil testing in Sacramento, we have three areas of specific concern," Andrews said. "We look for mercury, lead and copper – heavy metals that have reached toxic proportions. The mercury was used by the miners to separate gold from quartz, but it's still in the soil."

Lead came from pre-1980s gasoline and paint, leached into the soil over generations. Our copper overdose can be traced to the brake linings of cars, Andrews said.

In addition, soil expert Zien said, Sacramento tends to have high levels of magnesium: "An indicator is horrible drainage. The magnesium binds the clay particles together so strongly, water can't get through."

Almost any soil can be made better by building up its microbe content. That's the basis of organic gardening.

"Organic gardening focuses on feeding the soil instead of feeding the plant," said Spiegelman. "This in turn promotes stronger plants that are less-susceptible to insects and disease."

Spiegelman, author of "Talking Dirt: The Dirt Diva's Down-to-Earth Guide to Organic Gardening" (Perigee Trade, \$15, 286 pages), discovered the joy of soil building after abandoning her early chemical dependence in the garden of her Petaluma home.

"I did everything wrong!" she recalled. "I crack-fed my plants with loads of chemical fertilizer, which made them grow so unnaturally fast and big that they would become exhausted and diseased. Then they're weak and extremely vulnerable to a pest infestation, so I'd go buy a toxic pesticide and spray it around without reading the safety directions."

When she finally read the labels, Spiegelman realized she was harming her garden – and the environment. (Most synthetic fertilizers and pesticides run off into creeks, rivers and the ocean.)

Synthetic fertilizers also build up harmful salts in soil, Zien said. Use compost and mulch, and soil critters do the work instead.

"Don't even till it into the soil; just spread it over the top," Zien said. "The microbes will come up and get it."

Added Andrews, "Just remember: Nix the chemicals. Mulch, mulch, mulch; compost, compost, compost. Your soil will be happy and so will you."