

## Seeds: When a Sacramento gardener hits bottom, it's usually hardpan

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It's a hard fact of life for the Sacramento area's gardeners: Hardpan seems to be everywhere.

That layer of cemented clay, a permanent plug preventing good drainage, sits under thousands of our homes and gardens. Sometimes it's bare inches below the surface; in other places, a few feet.

Our abundance of hardpan is the reason rice grows so well here; it keeps the roots constantly moist. Hardpan also helps form wetlands, a joy for migrating birds in natural preserves.

But gardeners view hardpan as a major pain.

Chuck Ingels, horticultural adviser for Sacramento County's UC Cooperative Extension, hears about hardpan every day. It's among local gardeners' top complaints.

His solution: Build up, not down.

Instead of trying to improve the drainage underground, construct raised beds or berms in the garden. Aim for them to be at least a foot high. The beds and berms also allow gardeners to custom-mix their soil.

"You're making your soil higher," Ingels said. "Breaking through hardpan is really difficult. So many times, when homes were built, construction compacted the soil. That just makes it worse."

Hardpan holds together tightly because it's made of tiny clay particles. Much smaller than gravel, sand or silt, the clay particles can cling like Super Glue. Often a pickax can't make a dent.

But some tactics work to soften up hardpan.

"If hardpan is a serious problem, you can drill holes through it," suggested Steven Zien, a Sacramento organic gardening and soil expert. "Pour compost tea down the holes and inoculate the soil, stimulating the microbes."

Compost tea? That's a weak solution of compost steeped in water. To stimulate microbe activity, Zien also suggests aerating the compost tea. He uses aquarium pumps.

After pouring in the tea, he doses the hardpan holes with more compost.

"Mix quality compost with sand and pour it down the holes," Zien said. "That creates a favorable environment for micro-organisms in the soil. It starts creating the structure where the hardpan will open up."

The right kind of holes aren't little ones.

"You need a heavy-duty auger," Ingels said. "There's no formula to the process, but the closer the holes, the more likely the success. The holes allow water and roots to go down and work through the hardpan.

"But if there's more hardpan below that, water still won't go down."

How about just adding a little sand to your clay soil? That's no solution, said Mike Singer, a retired soil scientist from the University of California, Davis.

"Adding sand to a clay soil is how you make adobe bricks! To improve drainage by adding sand, you would need to add 80 percent to 90 percent sand by volume," he said. "The cost is excessive, and no homeowner would do such a thing."

In the battle against hardpan, Zien offered another approach and this anecdote: A client discovered excessive hardpan in her new home's backyard. New landscaping died quickly, thanks to poor drainage. A shovel couldn't penetrate more than a few inches.

After testing the soil, Zien suggested that she try mulch and worm castings to improve the soil before replanting her shrubs.

Several months passed, then the client gave Zien another call to come see her yard. She had covered her entire backyard to a depth of 6 inches with pure worm castings, a very expensive mulch. Winter rain had leached the nutrients into the ground.

"Then, with a big smile, she reached down into the soil," Zien recalled.

"She could wiggle her arm all the way down to her elbow. That hard clay had opened up."

And her new shrubs thrived.

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