

What to do about compacted soil

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Gardeners are sometimes unaware of the problems soil compaction can cause in lawns, flower beds and gardens. The soil may seem difficult to dig or till. Plants do not grow as well as they should, developing inadequate root systems. Water may collect on the soil after a heavy rain, puddling rather than soaking in.

Why pore spaces are important in soil. About half of a healthy soil is made up of mineral particles like sand, silt and clay plus organic matter. The remaining half is called pore space. Pore space creates room for air and water to move around the mineral particles and is required to have a healthy environment where plant roots, beneficial microorganisms and earthworms can break down plant residue into organic matter.

What causes soil compaction? Compaction occurs when soil particles are packed closely together. It is more common with heavier soils like clay and loam; however, when heavy equipment is used on the lawn or in the garden, sandy soils compact. The problem may be compounded by events that happened to the soil over the course of years. The pore spaces are reduced to the point that air and water cannot move freely and plant roots cannot grow easily into the surrounding soil. The soil could remain overly wet longer than is healthy for the plants growing there.



Joy Landis

Compressing soil into a ball.

Factors contributing to compacted soil

Over-tilling soil. Healthy soils should have little clumps of particles that are bound together in small, pea-sized lumps called aggregates. When tilling an area multiple times, aggregates are broken down into single particles, leading to fewer pore spaces. After a rain, water doesn't move as easily through the soil. A mini-pond is created and when the soil finally dries, it resembles an alligator's skin. This linear pattern of cracked soil does not let air or water in.

Working the soil when it is wet. Before tilling a garden or working the soil, make sure it is not too wet. Take a handful of soil and compress it into a ball. When gently poked, it should fall apart. If it does not, the soil is too wet. Wait until the soil is drier and crumbles. This problem typically occurs in the spring when gardeners are anxious to get started.

Mixing sand into clay soils to loosen soil. Adding sand creates the opposite of the desired effect. The soil can become like concrete. Add organic matter such as compost, peat moss or leaf mold is the best method to improve the soil.

Compressing soil because of weight. Vehicles parked or driven over an area, construction activities and



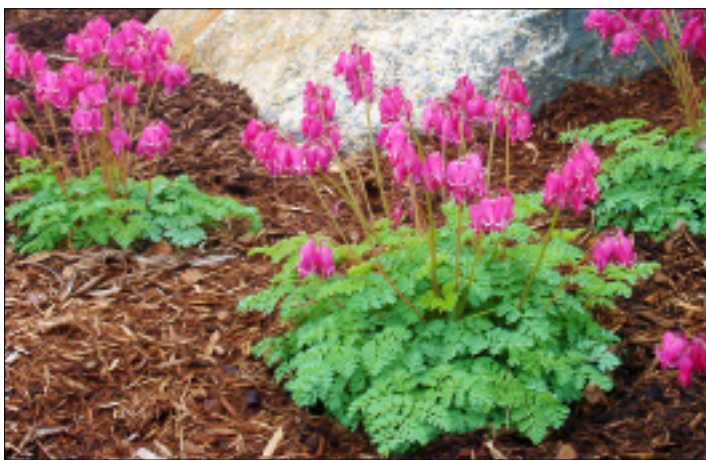
Kevin Frank

Dead areas indicate where mower tires repeatedly drove over the lawn, compacting the soil. The path between the tires is robust

even places with a great deal of foot traffic can become compacted. It could be a riding mower's tires running over an area repeatedly or an area where the dog runs constantly.

Solving compaction problems

Once you realize your soil is compacted, there are several things you can do. Resist the urge to routinely roto-till or cultivate the garden. Instead, consider adding organic matter by using mulch or compost over the top of a flower bed or simply hand-spade it into the top 3 to 6 inches of soil. For a vegetable garden, put 2 inches of compost on the soil surface and till in and repeat for a total of 4 inches in a season. A goal of 5 to 15 percent of organic matter would be advantageous.



Rebecca Finneran

Mulch in a perennial garden.

If a mechanical rototiller is used, be careful not to repeatedly go over areas that are already cultivated. Using organic matter like straw or chopped leaves in a vegetable garden that can be mowed and turned into the soil in the spring or fall will add more organic matter. Get a soil test once every three years to check on nutrients, soil pH and percentage of organic matter. Go to homesoiltest.msu.edu to purchase a soil test self-mailer kit.

For a large vegetable garden, another solution is to grow a cover crop at the end of the season. Mow and turn the cover crop into the soil the following spring before planting. The roots penetrate compacted soil and loosen it. By mowing and turning the mowed tops in, the soil is loosened. Cover crops could include annual ryegrass, winter wheat, winter rye, buckwheat, oilseed radishes and hairy vetch.

None of these fixes are quick or easy. An awareness of how soils are compacted, how to prevent compaction, and how to improve them is a lifetime commitment to having better soil and better crops.

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