



DEAD DIRT CSI: Garden Soil Compaction

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Fall is the best time of the year to evaluate your "yarden". Did your carrots come up straight and perfect? Which plants were healthy and lush, and which ones were scrawny and unhappy? Did your lawn have brown spots though you watered diligently? Is it the sun/shade exposure?

OR – is it soil **compaction**! Lawns and gardens can both be affected. Is the soil difficult to dig when either wet or dry? Is plant growth stunted? Are leaves discolored from nutrient deficiencies? Did plants not develop as large a root system as they should have? Does water puddle or flood without soaking in quickly? Are certain weeds taking over in some areas? If you have quack grass, bindweed, knotweed, chicory, mustards or plantain, your yard might be telling you your soil needs attention.

Did you know that about half of a healthy soil is composed of mineral particles like sand, silt, clay and organic matter? The other half is called pore space. Yes, soil requires room for air and water to move around the mineral particles, creating a healthy environment for roots and beneficial micro-organisms and earthworms to break down plant residue into organic matter.

Soil compaction happens because of weight being placed on soil. It is that simple. Unfortunately, it is relatively easy to mash down your soil, resulting in those air spaces disappearing.



Soil compaction is most likely to happen to heavier soils like clay or loam; however, when heavy equipment travels over it, even sandy soil can become compacted. If the soil doesn't have enough organic material to fluff it up, the parts of the soil can settle together. Even working the soil when it is too dry can disrupt the natural structure of the soil and collapse it.

The problem may be compounded by events that have happened to the soil over 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.

Once you realize your soil is compacted there are many things you can do and several things you must not allow!

- Do not over-till your soil as this breaks down the small soil aggregates into single particles (super-soft fluffy soil); then, when soil gets wet, it does not allow the water to pass through. The water pools, dries and creates cracked soil. Consider adding organic matter over the top of a flower bed, and hand shovel

it into the top 3-6 inches of soil. For the veggie garden, add 2 inches of compost, till in, and then repeat with another 2 inches. If you must use a rototiller, do not go over the same area repeatedly.

- Do not mix sand into clay soil thinking this will loosen it. It will create cement! Instead, add organic compost such as peat moss or leaf mold to loosen the soil. You will see the change immediately. Start with a quart pot-full as you turn over the soil. Turn it over until it is well incorporated, for a goal of 5-15% organic material.
- Don't work up your soil when it is too wet. Take a handful of soil, and compress it into a ball. When you gently poke the ball, it should fall apart. If it doesn't, allow the soil to dry out; otherwise, the air spaces will be compacted.
- Simply walking on the ground can compact the soil. Your first step in dealing with compaction is changing habits, so the problem won't come back. Create pathways and designated areas for walking and driving. Use walls, fences and mulch to protect your garden from foot and vehicular traffic.
- Adding lots of organic matter allows micro-organisms to open your soil for you. Spreading mulches, adding amendments or a compost tea full of beneficial organisms will attract earthworms. They will show up and leave behind their high-nutrient castings. And as they move about, the worms create holes in the soil for roots and air!
- A compacted lawn can be repaired by pushing the solid tines of a garden fork into the lawn down to a depth of about 3 inches and wiggling the fork slightly to widen the holes, continuing the process every 4 inches. Or, go "old-school" and use aerator shoes. For larger lawns, you can rent an aerator. These machines will either remove plugs of soil from the ground or will puncture the ground and give the soil room to decompress. Aerating the lawn around trees helps to loosen the soil, so tree roots can penetrate further.
- For a large vegetable garden, another solution is to grow a cover crop at the end of the season; then, mow it in the following spring before planting. The roots penetrate the compacted soil and loosen it. Cover crops could include annual ryegrass, winter wheat, winter rye, buckwheat, oilseed radishes or hairy vetch.
- Because bare soil is prone to surface compaction, when rain falls and creates a crust at the surface, covering soil with mulch or growing groundcovers can help. 2- or 3-inches of shredded leaf mulch or wood chips will provide similar benefits.

When planning new construction, work with the building and landscape professionals to develop a soil preservation plan which clearly outlines the areas that are not to be disturbed.

- Always use the lightest equipment possible.
- Where compaction cannot be avoided, remove and store the topsoil for reuse.
- During construction, spread thick layers of mulch over areas that may receive traffic. Sheets of plywood on top of the mulch will help spread the weight in heavy use areas.

Apply some of the simple checks above, and take steps to restore your soil. You'll notice a striking difference in the growth and vitality of your plants once compacted soil is restored.

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