

SOIL COMPACTION

In a well-structured soil, open pore space allows water and oxygen to reach roots, keeping all plants healthy and thriving. Soil acts similar to a very dense sponge that holds and releases water and nutrients, and allows air movement. Soil compaction squeezes and destroys this structure, resulting in dense, hard soil with little air and water movement.



Photo Courtesy of USDA-NRCS

CAUSES OF SOIL COMPACTION

- Removal of topsoil exposing denser subsoil
- Compaction by heavy construction equipment
- Vehicle traffic, including lawnmowers
- Traffic on wet or saturated soils
- Heavy rain on bare soil, or on soil with a high clay content



Photo Courtesy of John Fech

CHECK FOR SOIL COMPACTION

Use visual checks, soil checks, or measurements:

- Water ponding on the landscape
- Worn paths from foot or vehicle traffic
- Excessive runoff during heavy rainfall
- Shallow, enlarged, or twisted tree roots
- Plants under stress such as stunted growth, discolored leaves and drought stress
- Dense soil that is difficult to dig into

ASSESS SOIL COMPACTION

- Use a thin metal rod, hollow metal pipe, or wire survey flag to push into soil and feel compaction
- Use an instrument called a soil penetrometer
- Call Digger's Hotline (in Nebraska: 811 or 800-331-5666) to identify buried utilities before probing or digging in your lawn.



REDUCE SOIL COMPACTION

- Avoid walking in planting beds; instead, lay down temporary wooden planks, or a thick layer of mulch.
- Avoid tilling or digging soils that are too moist, that is, if soil can be formed into a ball and not fall apart.
- Avoid mowing when soil is too wet
- Don't allow heavy equipment or vehicle traffic on your lawn.
 - If necessary, use wide planks or plywood beneath wheels or tracks to distribute weight.
 - For new construction, operate from inside the building footprint with the smallest equipment needed



Photo Courtesy of Real Life Garden Solutions website

CORRECT SOIL COMPACTION

- Let annual freeze-thaw cycles alleviate shallowly compacted soils
- Choose adapted plants, such as water-loving plants that tolerate compacted soils.
- Cover soils with 2-3 inches mulch or use groundcovers to prevent direct rainfall impact which can form a thin surface crust, preventing water infiltration.
- Core aerate the soil, alleviating shallow compaction and reducing the accumulation of thatch.
- Add compost to your soil. A topdressing of compost can improve soil health, water holding capacity and help create pore spaces.
- Deep tillage, compost incorporation, and replanting may be needed in extreme cases.



Photo Courtesy of Kelly Feehan

ADAPTED FROM:
[HTTPS://WWW.UDEL.EDU/ACADEMICS/COLLEGES/CANR/COOPERATIVE-EXTENSION/FACT-SHEETS/COMBATING-SOIL-COMPACTION/](https://www.udel.edu/academics/colleges/canr/cooperative-extension/fact-sheets/combating-soil-compaction/)
ADDITIONAL REFERENCES:
[HTTPS://EXTENSIONPUBS.UNL.EDU/PUBLICATION/9000016369063/PROPERTIES-OF-LANDSCAPE-SOILS/](https://extensionpubs.unl.edu/publication/9000016369063/properties-of-landscape-soils/)
[HTTPS://NJAES.RUTGERS.EDU/FS1313/](https://njaes.rutgers.edu/fs1313/)

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