

HOME GROUNDS FACT SHEET

CORNELL Cooperative Extension
Nassau County



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Soil Compaction

What is Soil?

Soil is a mixture of solids, air, and water. The air and water exist as pockets between particles. Although we feel that the soil is solid, the ability of the particles and pockets to withstand the punishment of physical and chemical demands of human use is limited.

Why Does Soil Become Compacted?

Heavy pedestrian or equipment traffic, or athletic use can result in compaction, particularly in the first inch of soil beneath the surface. Pressure from above compresses the pockets for air and water and the soil becomes a hardened cap.

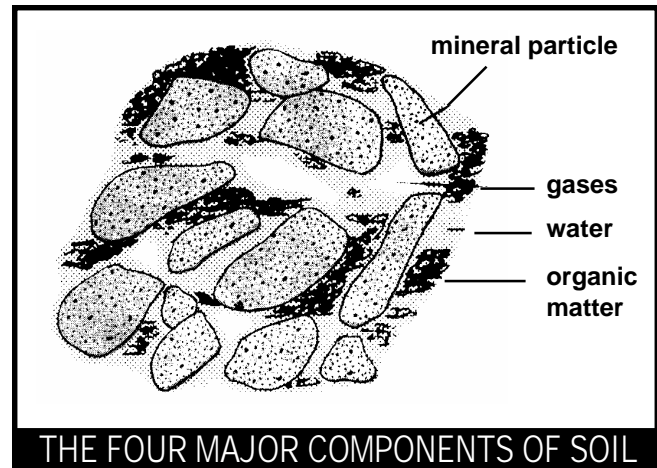
Why is Soil Compaction a Problem?

Compaction destroys the air and water exchange between the surface and the roots. Limited permeability of air, water, fertilizers and pesticides results. Poor quality roots result, leading to loss of plant vigor and increased susceptibility to insects, disease and mechanical injury.

What Affects the Potential for Compaction?

Soil particles are affected by freezing and thawing, which helps to decompact them, by soil chemistry cycles and additions such as amendments and fertilizers and by decomposition. Soil is also greatly affected by mechanical practices such as plowing or aerating. Soil which has lots of clay or fine silt lends itself to compaction. A bulk density test, which measures the ratio of soil mass to soil volume, is a general measure of soil compaction.

Give your soil a "physical," free of charge. To look at your soil, remove a chunk of undisturbed soil at and below the root zone and examine the way the soil holds together. Granular soils, containing rounded clumps, are healthy soils. Blocky soils indicate compacted or overworked soil. Prism or plate-like aggregations are an indicator of too much salt or fertilizer. The presence of algae or moss on the surface of the soil is an indicator of poor drainage caused by compaction.



Combating Compaction

There are several strategies to combat compaction. Often the source of compaction, heavy use, cannot be reduced. Therefore increasing aeration is critical.

For turf, core aeration by machine, a process that removes four inch long cores, will punch holes in the compacted areas to permit greater interchange of water and air between surface and root zones. Preservation of earthworm activity by adjusting the pH to neutral and stopping applications of earthworm toxic materials will greatly enhance natural aeration. Earthworms and beneficial soil organisms can be encouraged in the soil around trees and shrubs by keeping the root zone covered with organic mulch such as wood chips, bark nuggets, or nut and seed hulls. If possible, the mulch should extend to the foliage drip line.

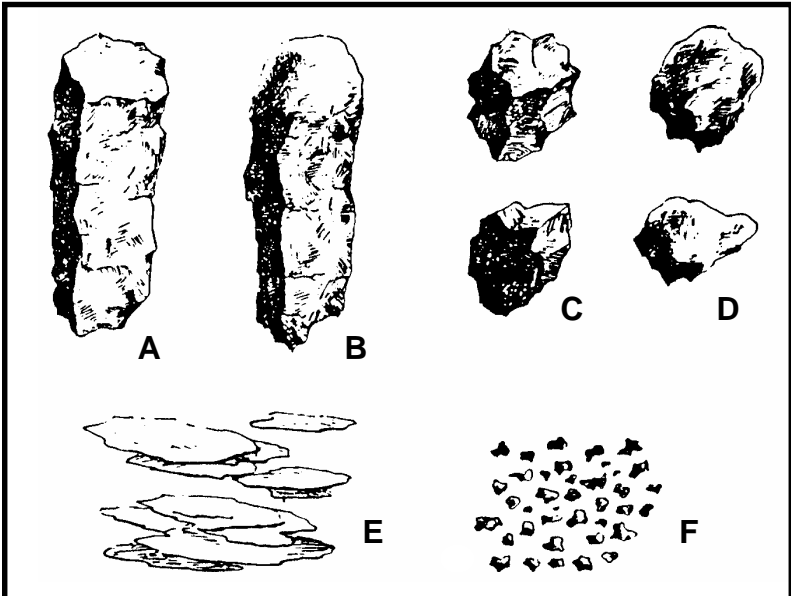
Organic amendments incorporated, where possible, into soils with high clay and silt contents will improve the ability of the soil to withstand heavy traffic. Such amendments might include fibrous materials such as peat or rice hulls which will serve to increase permeability and reduce water retention by heavy soils as well as reducing compaction potential. Remember

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VARIOUS SHAPES OF SOIL STRUCTURAL UNITS, OR PEDS:

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|--------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| A, prismatic; | D, subangular | <i>(from Soil Survey Manual, p. 227, U. S. Department of Agriculture Handbook No. 18, 1951, Washington, DC: U.S. Government Printing Office.)</i> |
| B, columnar; | blocky; | |
| C, angular blocky; | E, platy; and | |
| | F, granular. | |

that peat moss is very acid. Keep the pH balanced. Additional benefits of amendments include increased micronutrients and the soil's ability to hold these micronutrients.

When to Correct for Compaction

The best times to initiate a program to improve compaction are in the spring and the fall—core aeration will be best tolerated by existing turf stands during these times. Modifying soils with organic amendments can be done during this time as well. Make sure to mix the amendments through the top eight inches or so of soil (see Home Grounds Fact Sheet C-1-24: Steps to Successful Lawn Renovation).

Monitoring earthworm activity can be done at anytime. The greater the number of these squirming little miners you can encourage in your soil, the greater the beneficial effect on compacted areas will be.