



Soil & Aeration

Soil Facts:

Soil types are varied around the world. Soil formation is influenced by:

- Local climate
- Organisms present
- Topography
- Bedrock/underlying sediment type
- The effect of time

Soil is made up of living and non-living matter. The composition of soil strongly influences how it functions in a given ecosystem.

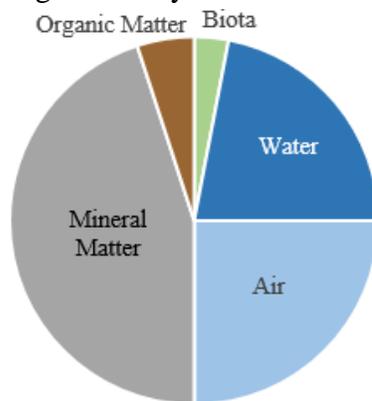


Image courtesy of Comprehensive Assessment of Soil Health: The Cornell Framework

Surface & Subsurface Hardness

Compaction is measured using a penetrometer or soil compaction tester that is pushed through a soil profile at two depth increments (surface: 0-6", and subsurface: 6-18"). Field penetration resistance is measured in pounds per square inch (psi)

Results of surface compaction:

- Runoff
- Erosion
- Slow infiltration
- Poor water storage

Results of subsurface compaction

- Prevents deep rooting
- Poor drainage
- Poor deep-water storage
- Poor infiltration
- Runoff
- Erosion
- Impaired water movement

Soil compaction can severely restrict the growth of mycorrhizal fungal hyphae and the mobility of other beneficial soil organism

Soil Functions with Crop Production & Environmental Quality:

- Retaining and cycling nutrients and supporting plant growth
- Sequestering carbon
- Allow infiltration, and facilitate storage and filtration of water
- Suppressing pests, diseases, and weeds
- Detoxifying harmful chemicals
- Supporting the production of food, feed, fiber, and fuel

Evaluating Water Quality Benefits from Soil Aeration:

In 2017, the Winooski Natural Resources Conservation District of Northeast Vermont partnered with Shelburne Farms and Stone Environmental, to continue innovative research on how water quality may be improved through soil aeration. There were two sites in Vermont that tested aeration treatment for compacted soils, and the results are summarized information from both locations.

Results:

After one-year treatment, the surface soil compaction was reduced by 4% and the subsurface soil compaction was reduced by 3%. The soil moisture content of aerated plots was 7% greater than in non-aerated plots. This indicates that the soil had a greater capacity to infiltrate and hold water. Additionally, there was an increase in dissolved nutrients in the soil immediately available for plant uptake. Through decreasing soil compaction and increasing water holding capacity, the aerated soils had a greater yield potential.

With this project and other research, there is reason to believe that if aeration treatments were to continue over growing seasons, then the surface compaction would continue to improve every year.



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