

Megan Perry.2208  
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# Soil Compaction

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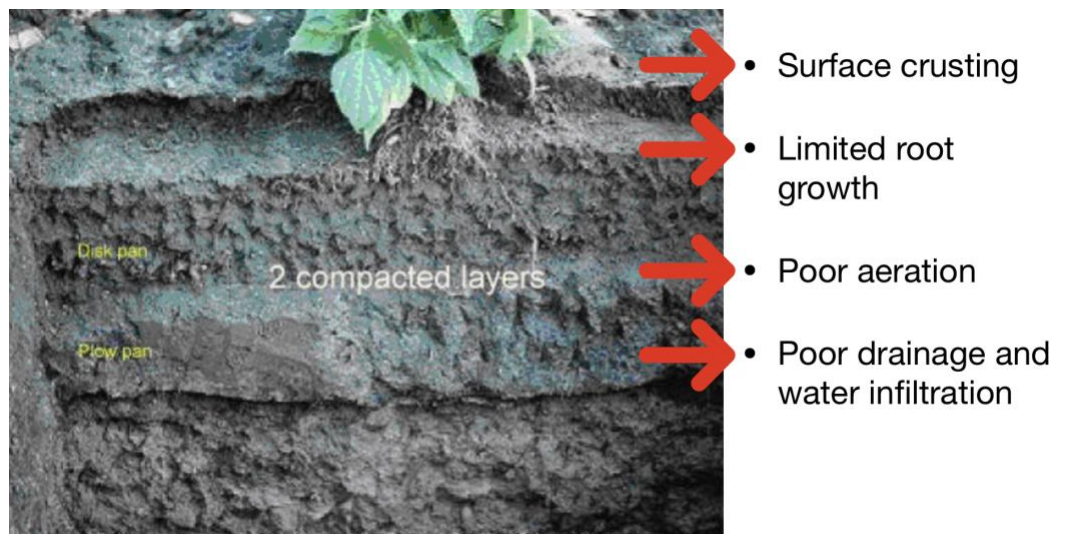
## *Definition:*

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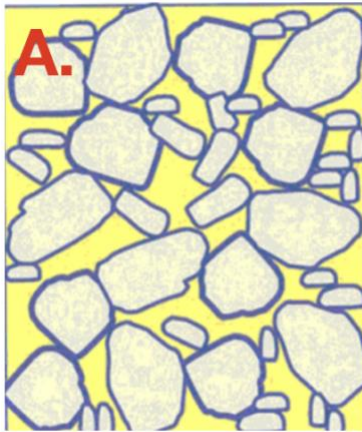
Soil Compaction is the arrangement of soil particles in a way that increases the soils density and decreases amount of air and water pores. Compaction limits root growth, infiltration, drainage, and soil aeration. (1)

## How

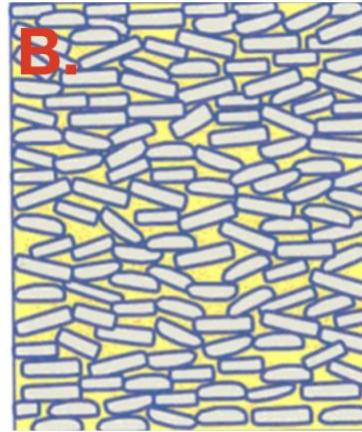
Soil Compaction can be naturally occurring, but most the time is caused by land management practices. Compaction often occurs on farms, logging areas, or places using large/heavy machinery. Soil Compaction is caused by the use of large equipment, tillage and early planting. Non-compact soil is composed of 50% particles and 50% air and water pores. Soil particles are composed of a mixture of sand, silt, and clay molecules, along with organic matter. Soil compaction is more likely when there is a mix of the three soil particles; the smaller particles compact into the spaces between the larger particles. The more organic matter the lesser the chance of a soil compaction problem. (1)



Compaction Soil Profile. This picture of a soli profile show the tightly packed soil particles, along with the limited root growth and poor aeration and water drainage. (2)



A. This picture displays an example of soil particles and water and air pores in the correct ratio 50/50 that allows for good drainage, aeration and root penetration (1,2)

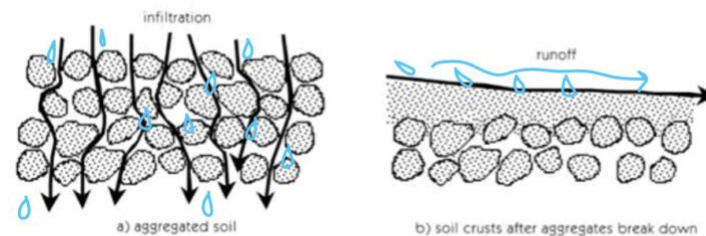


B. This is an example of a soil profile with compaction. As compared to picture A. The soil particles are much closely packed together and the water and air pores are much smaller and more condensed. (1,2)

## Signs and Symptoms

**Soil Symptoms-** Soil compaction will show many symptoms including: surface crusting, increased erosion levels, and standing water. These symptoms indicate soil compaction and reduced air and water pores.

**Plant Symptoms-** Soil compaction based on plants behavior includes: Slow emergence, disease, and uneven growth. As well as wet and cool soil surface. These symptoms indicate that root penetration is limited and the seeds are over saturated due to poor drainage.(1)



**Compact Soil Surface Layer.** This picture shows the compaction of soil particles on the surface layer. This compaction creates a crust and impenetrable surface causing erosion and runoff. (1,2)

## Solutions

Examining and regulating management practices over time will help prevent soil compaction. These practices include examining equipment use and number of passes through a field. Not using heavy machinery on wet ground is a good way to prevent compaction. Freeze/thaw methods will help to break up soil compaction and create aeration. Adding additional organic matter to soil will also help to decrease soil compaction. (1) Practicing good crop rotation with crops that are deep rooted will help to increase aeration in soil as well. (3)

## Bibliography

1. Soil Compaction . midwestlabs.com/wp-content/uploads/2016/12/141-soil-compaction-new.pdf.
2. Lajos , Blasko. "Soil Science|Digital Textbook Library." Digitális Tankönyvtár, 2008, [www.tankonyvtar.hu/en/tartalom/tamop425/0032\\_talajtan/ch13s12.html](http://www.tankonyvtar.hu/en/tartalom/tamop425/0032_talajtan/ch13s12.html).
3. "What Is Soil Compaction, Where Does It Occur?" The Crop Site, 2012, [www.thecropsite.com/articles/1387/what-is-soil-compaction-where-does-it-occur/](http://www.thecropsite.com/articles/1387/what-is-soil-compaction-where-does-it-occur/).