# LAB REPORT: Soil Compaction

Lab Partners:

Statement of the Problem:

* When farmers drive over fields with heavy equipment or when livestock graze, they can compact the soil. Soil compaction is the compression of soil particles into a smaller volume, which reduces the size of pore space available for air and water. This compaction can have a negative effect on water moving through the soil profile. It can be more complicated for biota like worms to enter the soil and move through it.
* When comparing two samples of soil – loose and compacted – which will allow for water to move through more quickly? Which will allow for worms to burrow in more quickly?
* Write a possible solution for the problem.

Hypothesis:

Materials:

* Mass scale
* 1,000 grams of dry topsoil
* Two 500-gram beakers
* Spoon, weight, or press
* Water
* Timer or stopwatch
* Worms

Procedure:

1. Using a mass scale, weigh out 1,000 grams of a sample of dry topsoil. Put 500 grams into two beakers or another clear sided container.
2. Using a spoon, weight or other method of compaction, firmly press down the soil into one of the beakers. Try to remove any pore space. Total volume of the compressed soil should be much less than the other sample.
3. Add 250 ml of water to the surface of the compressed sample. Using a timer or stopwatch, record how long it takes the water to reach the bottom of the soil sample. Repeat this procedure with the sample that was not compressed.
4. If necessary, add more water to both samples so they are damp but not sodden. Different soils will take different amounts of water. Try to create a moisture level that would be hospitable to worms.
5. Place two or three worms on the surface of each soil sample. Time how long it takes for the worms to start burrow into the soil samples and if they are able to burrow into the samples.
6. Record your observations. Take photos throughout to document the experiment.

Data and Results:

|  |  |  |
| --- | --- | --- |
|  | **Topsoil – no compaction** | **Topsoil – compacted** |
| **Time for water to reach the bottom** |  |  |
| **Time for worm to fully burrow into the soil** |  |  |
| **Notes and other observations** |  |  |

Conclusions:

1. Which soil sample allowed the water to infiltrate more quickly and more fully? Why?
2. Which soil sample allowed for the worms to burrow more quickly and more fully? Why?

Research Solutions: Conduct research to answer the following questions.

1. What are some procedures or methods that farmers and landowners can implement to protect soil from becoming overly compacted?
2. What are some procedures or methods that farmers and landowners can implement to help correct or improve soil that has become compacted?
3. How many worms (carrying capacity) might be able to live in the compacted soil versus how many worms might be able to live in the un-compacted soil? Explain your thought process.

Report:

As a group, prepare a poster, PowerPoint, or other presentation to describe your experiment and your results to the rest of the class. Be prepared to make a 10-minute presentation and answer questions about your experiment and about soil compaction.