# LAB REPORT: Measuring soil aggregate stability

Lab Partners:

Statement of the Problem:

* Soil aggregate stability is an important physical indicator of soil health, which protects organic matter accumulation, improves soil porosity, drainage and water availability for plants, decreases soil compaction, supports biological activity, and nutrient cycling in the soil. Aggregates are primary soil particles (sand, silt, clay) held together in a single mass or cluster, such as a crumb, block, prism or clod using organic matter, calcium and metals as cementing materials. Soil aggregates are formed by natural forces (such as alternate wetting-drying) and organic substances derived from root exudates, roots, soil animals and microbial by-products which cement primary particles into smaller aggregates (micro-aggregates) or smaller aggregates into larger particles, such as macro-aggregates.
* Fungi can help build soil stability by binding soil particles together to form aggregates. Tillage and other disturbance of the soil can break up these soil aggregates and altering or even destroying the soil structure. Based on what has been covered previously how can we determine soil structure and links to biology?

Materials:

* 2 different soil samples – conventionally tilled field and one soil under natural growth. Both samples should be taken from the top 2-3 inches of the soil profile.
* 3 or more screens of different sized mesh (window screen or other insect screen). Suggested sizes:
	+ 5mm opening
	+ 2mm opening
	+ 1mm opening
	+ .5mm opening
	+ .25mm opening
	+ .125mm opening
* Spray water bottle
* Glass dishes – 6 or more

Procedure:

1. Position the 5mm screen over the top of the 2mm screen. Put both screens over a solid surface or catch tray. Put 100 grams of the first soil sample onto the 5mm screen and gently sieve the soil particles through.
2. Add any soil that is collected on the 5mm screen add to dish labeled 5mm+.
3. Position the 2mm screen over the top of the 1mm screen. Put both screens over a solid surface or catch tray. Put the soil sample onto the 2mm screen and gently sieve the soil particles through.
4. Add any soil that is collected on the 2mm screen to the dish labeled 2-5mm.
5. Repeat steps 1-4 with the increasingly smaller screens.
6. Repeat steps 1-5 with the second soil sample.
7. Gently spray the soil samples with water from the spray bottle until water covers the soil sample.
8. Record the time the water was added.
9. Record any observations from spraying the water and any effect on the soil
10. Check the samples at 5-minute intervals for up to 30 minutes, and if possible, every 30 minutes thereafter up to 90 minutes. Record observations of if the Slacking of the soil or how well the soil aggregates hold up.
11. Document each observation with a photo.

Data and Results:

|  |  |  |
| --- | --- | --- |
| **Size of particulate** | **Tilled field soil - observations** | **Undisturbed soil - observations** |
| **5mm+ Spray:** |  |  |
| **5 min:** |  |  |
| **10 min:** |  |  |
| **15 min:** |  |  |
| **20 min:** |  |  |
| **25 min:** |  |  |
| **30 min:** |  |  |
| **60 min:** |  |  |
| **90 min:** |  |  |
| **2-5mm Spray:** |  |  |
| **5 min:** |  |  |
| **10 min:** |  |  |
| **15 min:** |  |  |
| **20 min:** |  |  |
| **25 min:** |  |  |
| **30 min:** |  |  |
| **60 min:** |  |  |
| **90 min:** |  |  |
| **1-2mm Spray:** |  |  |
| **5 min:** |  |  |
| **10 min:** |  |  |
| **15 min:** |  |  |
| **20 min:** |  |  |
| **25 min:** |  |  |
| **30 min:** |  |  |
| **60 min:** |  |  |
| **90 min:** |  |  |
| **.5-1mm Spray:** |  |  |
| **5 min:** |  |  |
| **10 min:** |  |  |
| **15 min:** |  |  |
| **20 min:** |  |  |
| **25 min:** |  |  |
| **30 min:** |  |  |
| **60 min:** |  |  |
| **90 min:** |  |  |
| **.25-.5mm Spray:** |  |  |
| **5 min:** |  |  |
| **10 min:** |  |  |
| **15 min:** |  |  |
| **20 min:** |  |  |
| **25 min:** |  |  |
| **30 min:** |  |  |
| **60 min:** |  |  |
| **90 min:** |  |  |
| **.125-.25mm Spray:** |  |  |
| **5 min:** |  |  |
| **10 min:** |  |  |
| **15 min:** |  |  |
| **20 min:** |  |  |
| **25 min:** |  |  |
| **30 min:** |  |  |
| **60 min:** |  |  |
| **90 min:** |  |  |

Conclusions:

1. Which soil sample had soil aggregates hold up longer under spray and water submersion? Why?