8. Aggregate Stability

Aggregate stability measures the amount of stable aggregates against flowing water. It is recommended that aggregate stability be determined on the top three inches of surface soil. The soil sample should be air-dried before determining aggregate stability.

Materials needed to measure aggregate stability:

- **2-mm sieve (3-inch diameter)**
- **0.25-mm sieves (2.5-inch diameter)**
- **terry cloths**
- **400-watt hair dryer and drying chamber**
- **calgon solution (about 2 tbsp of calgon per 1/2 gallon of tap water)**
- **bucket or pan**
- **scale (0.1 g precision)**
- **distilled water**

Did You Know?
Soil aggregates protect organic matter within their structure from microbial attack. Formation and preservation of aggregates allows organic matter to be preserved in the soil.

Considerations: If the soil is moist, air-dry a sample before determining aggregate stability. When taking a soil sample, care should taken not to disrupt the soil aggregates.

1 **Sieve the Soil Sample**

Transfer about a 1/4 cup of air-dried soil to the 2-mm sieve. Shake the sieve gently and collect the soil passing through the sieve. Try to pass all of the soil through the sieve by gently pressing the soil through with your thumb **(Figure 8.1)**.

Figure 8.1

2 **Weigh Sieved Soil Sample**

Weigh the 0.25-mm sieve, and record its weight on the Soil Data worksheet. Weigh out about 10 g of the sieved soil from Step 1 (make sure the soil is mixed well before taking a subsample). Record the exact weight on the Soil Data worksheet.

3 **Slowly Wet the Soil Sample in Sieve**

Saturate one of the terry cloth sheets with distilled water and lay it flat. Place the 0.25-mm sieve containing the soil on the wet cloth, allowing the soil to wet up slowly **(Figure 8.2)**. Wet the soil for five minutes.

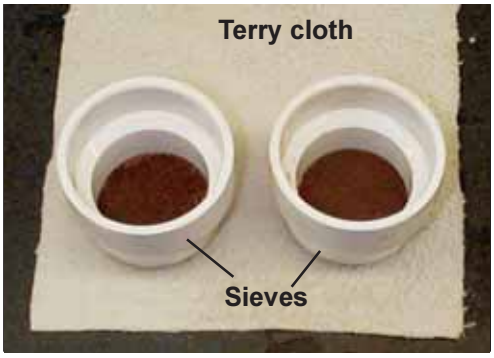

Figure 8.2

NOTE: A container (bucket or pan) of distilled water is needed for Step 4. The water temperature should be at or near the temperature of the soil.

4 Wet Sieve the Soil

- Place the 0.25-mm sieve with soil in the container filled with distilled water, so that the water surface is just above the soil sample.
- Move the sieve up and down in the water through a vertical distance of 1.5 cm at the rate of 30 oscillations per minute (one oscillation is an up and down stroke of 1.5 cm in length) for three minutes. **Important: Make sure the aggregates remain immersed in water on the upstroke.**

5 Dry Aggregates

After wet sieving, set the sieve with aggregates on a dry piece of terry cloth, which will absorb the excess water from the aggregates in the sieve. Then place the sieve containing the aggregates on the drying apparatus **(Figure 8.3)**. Allow the samples to dry using the low power setting.

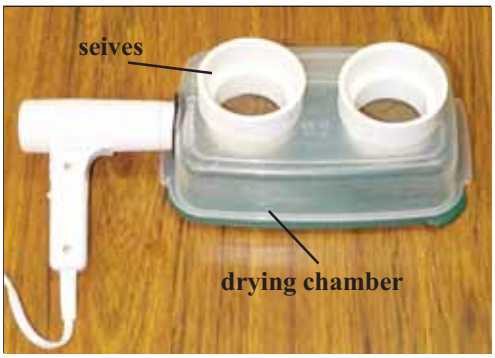

Figure 8.3

NOTE: Be careful when drying the soil to prevent particles from blowing out of the sieves. It may be necessary to put a cover over the top of the sieves to keep aggregates in place.

6 Weigh Aggregates

After drying, allow the aggregates and sieve to cool for five minutes. Weigh the sieve containing the aggregates. Record the weight of the sieve plus aggregates on the Soil Data worksheet.

7 Disperse Aggregates in Calgon Solution

- Prepare calgon solution. Immerse the sieve containing the dried aggregates in the calgon solution **(do not completely immerse the sieve)**. Allow the aggregates in the sieve to soak for five minutes, moving the sieve up and down periodically. Only sand particles should remain on the sieve.
- Rinse the sand on the sieve in clean water by immersing the sieve in a bucket of water or by running water through the sieve.

8 Dry and Weigh Sand

- Remove excess water by first placing the sieve containing the sand on the dry terry cloth, then placing it on the drying apparatus. Allow sand to dry.
- After drying, allow the sand and sieve to cool for five minutes. Weigh the sieve containing the sand. Record the weight of the sieve plus sand on the Soil Data worksheet.

CALCULATIONS:

Water Stable Aggregates (% of soil > 0.25mm) = $\frac{\text{(weight of dry aggregates - sand)}}{\text{(weight of dry soil - sand)}} \times 100$