Developing A Soil Aggregate Stability Standard For Use In Laboratory Proficiency Testing

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Introduction

Soil health is an important part of agriculture and one of the most reliable indicators to evaluate soil health is soil macro-aggregate stability. Soil testing labs will soon be faced with the demand to process soil heath samples, but currently have no standard on which to base QA/QC protocols. Our goal was to create a standard, reproducible soil sample to evaluate inter-laboratory performance on aggregate stability testing.

Methods

Two soils from Cache Valley, with different clay and organic matter content, were collected. The soils were treated with various amounts (1%, 3% and 5% by weight) of a soil stabilization polymer. The treated soils were then formed into pseudo-aggregates by extrusion through a metal screen and oven dried. The dried soils were tested for aggregate stability using the wet sieving method (see apparatus in photo). This process was repeated on both soils twice.

Discussion

There are differences in aggregate stability between the soils and treatment replications, with the Wellsville soil having greater variability than the Godfrey soil. The resulting values of aggregate stability, however, shown little variability (Coefficients of Variability < 10% over 10 subsamples within treatments, Figures 2 and 3). The systematic differences between batches in both soils, indicates that sample handling (i.e., differences in how the soils were mixed and how thoroughly the stabilizer was incorporated into the soil) have a statistically significant impact on the outcome. We were also able to obtain a wide range of aggregate stability values with low standard error by mixing the various treated soils together at various ratios (Figure 3)

Wet Sieving Apparatus

Results

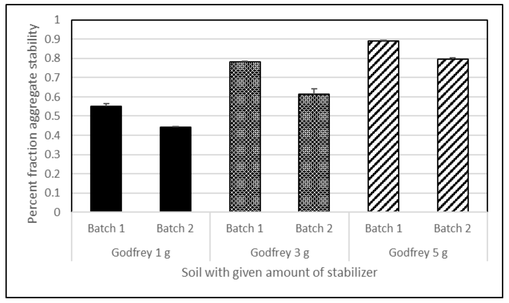

Figure 1 – Godfrey soil

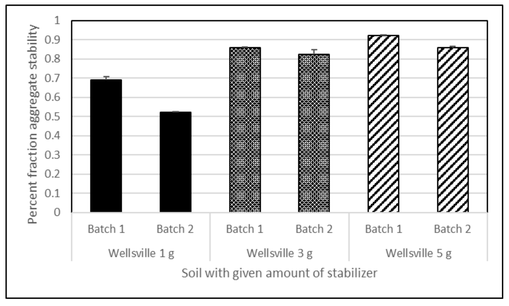

Figure 2 – Wellsville soil

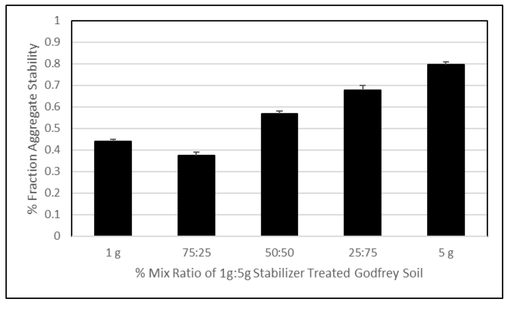

Figure 3 – Godfrey mixed soil

Wellsville 5 g Results

What's next?

We will use different packing methods to ship the soils to participating labs for testing, to determine how the soils hold up during shipment.

Conclusion

We found that we were able to create a reproducible standard soil aggregate stability sample that will help evaluate inter-laboratory performance on macro-aggregate stability testing. These reference samples will be beneficial in light of the National Soil Health Initiative and planned national soil health inventory in that labs will have consistent reference samples upon which to base their internal QA/QC monitoring protocols. This will help ensure that soil health inventory results will be consistent nationwide.

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