
Compaction Assessment

Ecological Process:

- **Water Cycle:** Soil compaction primarily affects the small water cycle by reducing infiltration rates. This leads to increased surface runoff, erosion, and impacts on water availability for plants and groundwater recharge.
- **Nutrient Cycle:** Compaction alters soil structure, impacting root growth, microbial activity, and nutrient availability. This affects soil fertility and nutrient cycling processes.
- **Community Dynamics:** Changes in soil conditions due to compaction can influence plant growth, biodiversity, species composition, and overall ecosystem stability.

Why Perform This Test:

To assess soil compaction levels which impact water infiltration, nutrient availability, and overall ecosystem health.

Tools and Materials:

- Penetrometer
- Field flags
- Measuring tape
- Datasheets
- Clipboard
- Pencil/Pen/Marker
- Phone with geolocation

Selecting Samples:

Identify 10 sub-sampling sites within a 30m x 30m area, avoiding edges and roadways to ensure representative sampling.

Preparing the Penetrometer:

1. **Select Penetrometer Tip:** Choose the appropriate tip based on soil conditions:
 - **Larger Cone (0.798 inches base diameter):** Use for softer soils to distribute force effectively and avoid excessive penetration.
 - **Smaller Cone (0.505 inches base diameter):** Use for compacted or harder soils to penetrate without disturbing the soil structure excessively.
2. When reading the penetrometer - make sure you're reading the appropriate (inner or outer) gauge depending on which tip you are using.

What to Measure:

1. Identify Sampling Points by walking through the sampling area in a zig-zag pattern, randomly stopping at 10 locations (sub-sample sites) within the designated 30m x 30m area.
2. At each sub-sample site:
 - a. Measure compaction, noting/recording:
 - i. Depth 200 psi was reached.
 - ii. Depth 300 psi was reached.
 - iii. Whether or not 300 psi was reached within the top 6 inches.
 - iv. If the soil is impenetrable, make a note of this on the data sheet. Ideally, you will relocate to a different field or location within that field. If not possible, proceed with observational metrics. You may also consider using alternative tools for sampling (i.e., step in sampler or spade).
 - b. Place a flag to mark the sub-sample site.
 - c. **IMPORTANT:** all sub-sample sites in a field should have a compaction of: < 300 psi by 6" **OR** > 300 psi by 6". NOT A COMBINATION OF BOTH.
 - d. If you encounter an "anomalous" compaction reading, relocate your sub-sample site. Do not mix compaction categories within the same site; if the measurement does not fit the category, move to another location.
 - e. Take a picture to geolocate the sub-sample site.

How to Measure:

1. Measure Soil Compaction by inserting the penetrometer vertically into the soil at each sampling point.
2. Gently apply downward pressure until the tip reaches the desired depth or until maximum resistance (300 psi) is reached.

Post-Field GPS Recording:

- After completing the fieldwork, return to your home or office.
- Use the photographs taken with geolocation enabled to pinpoint the exact locations of each sampling site on a digital map (e.g., Google Maps, GIS software).
- Record these coordinates on the data sheet.
- Enter or confirm the GPS coordinates for each site based on the photographs and any additional notes taken during the fieldwork.