bettersoil Alliance

June 2022

Soil Aggregation

The benefits of a well-aggregated soil are understood by farmers, but many growers are battling soils with poor physical properties. For example, soil crusting and compaction are two common types of soil structure challenges and are yield-killers on any farm. Aggregated soils allow better water infiltration and drainage. The space between the aggregates allows young roots to explore the soil and fully access water and nutrients. Restoring and protecting soil aggregation and structure is critical for efficient use of water resources, maintaining soil quality, and ensuring farm sustainability.

There are some well-known techniques that can improve soil aggregation. This includes maintaining a vegetative cover on the soil for as much of the year as possible and eliminating excessive soil disturbance and tillage. The extent of soil aggregation is one important indicator used in assessing soil health.

The essential role of soil biology for improving soil aggregation has not received sufficient attention. For example, mycorrhizal fungi release a glomalin protein that glues soil particles together. Fungi also grow extensive "nets" belowground, called hyphae, that help physically tie soil particles together. In another example, a wide range of soil fungi and bacteria release a complex mixture of sugars, proteins, and DNA as a slime or "biofilm" that holds soil particles together in aggregates.

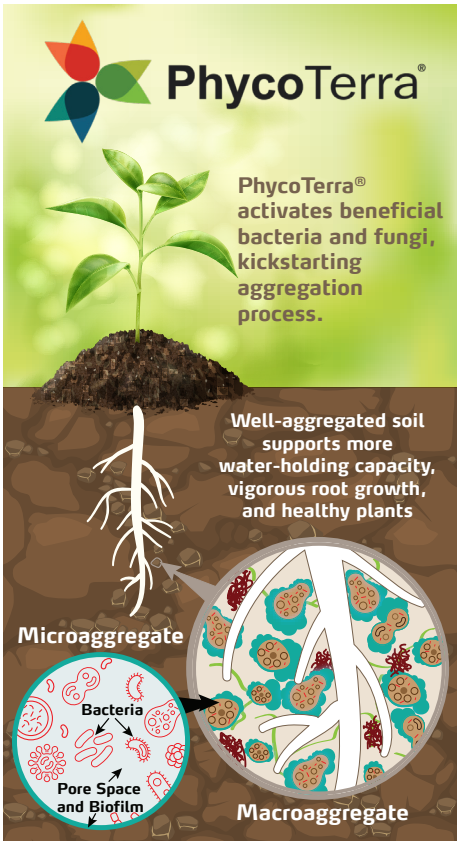
Known as Extracellular Polymeric Substances or EPS, these sticky organic compounds vary tremendously in composition and structure. These organic "glues" adsorb onto soil particles to form bridges between minerals and organic matter. The EPS compounds serve a vital role in building stable soil aggregates, restoring soil structure, improving root habitat, and enhancing water-holding capacity.

EPS compounds have other beneficial effects that have been documented. These natural microbial materials help with drought tolerance by retaining additional water and nutrients. The EPS compounds are also linked with greater salt tolerance by plants as they decrease soluble sodium in the soil and reduce the salt concentration of the water.

The EPS, glomalin, and hyphae-producing bacteria and fungi are already present in most soils, waiting in a dormant state for food and water before returning to an active state. Once a soluble carbon substrate becomes available, they quickly become active and begin again to produce soil-building components that help restore soil structure.

The benefit of adequate soluble calcium is also well known to be an essential contributor in building soil aggregates. Calcium serves an important function as a bridging agent to bind clays and organic matter into stable units that form micro-aggregates, allowing water and air movement into the soil.

Building good soil structure is a key part of soil and plant health. Do not overlook the silent role that soil microbes play in this process. Also keep the soil well supplied with adequate calcium to maintain a healthy soil that stores more water, allows for better seed germination, and supports vigorous root growth. Careful attention to seemingly small details will have a great payoff at the end of the season.



The information provided is accurate to the best of Better Soil Alliance members' knowledge and belief. Any recommendations are meant as a guide and must be adapted to suit local conditions.