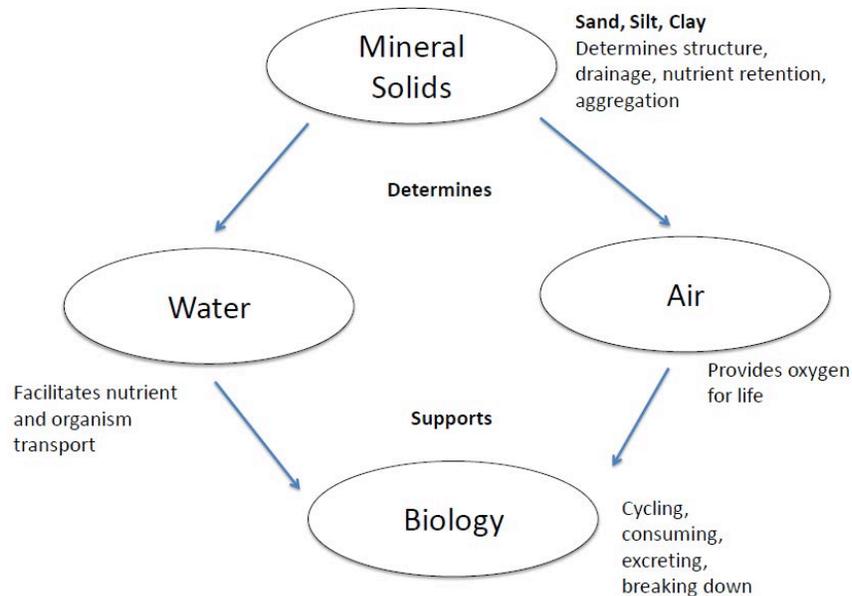




Getting to Know Your Soil

“A soil is an organism where everywhere is a mouth” – anonymous

Soil is composed of four basic components: mineral solids, water, air and organic matter.



Mineral solids are stone fragments, sand, silt, and clay. It is the proportion of the latter three that determines the soil’s texture. *These characteristics are difficult to change through soil management.*

Water is essential for soil life. Water is the medium that facilitates nutrient transport through the soil and enables plant nutrient uptake. Water also enables/facilitates the movement of microbes such as nematodes and bacteria through the soil.

Air is constantly moving in and out of the soil. Air provides the oxygen required for cell functioning in aerobic organisms including plant roots. Both air and water occupy the pore spaces created within and between soil aggregates (clusters of sand, silt and clay particles bound together by particle surface chemistry and microbial and plant exudates).

Organic matter is any material that is part of or originated from living organisms. Organic matter may be divided into three fractions, the living, the dead (active fraction) and the very dead (stable fraction).



The *living soil* organic matter fraction includes microorganisms, soil-dwelling insects, microarthropods, animals and plants.



The *dead fraction* consists primarily of fresh residues from crops, recently dead microorganisms and insects, sloughed-off root cells, leaf litter, and manure, etc. This fraction is considered active. The sugars, proteins, cellulose and other simple compounds are quickly broken down (degraded) by soil microbes and used as a food source, which fuels the soil microbial population. The exudates (sticky substances) produced by the microbes (and roots) as well as the microbes themselves (e.g. fungi) help bind the mineral particles together to form soil aggregates. Good soil aggregation is important for maintaining good (crumbly) soil structure and enabling adequate air exchange and water drainage.

The *very dead* organic matter fraction is also called humus. Humus is very stable and resists further degradation. Although it is not an important food source for microbes, it is important for storing nutrients and water, and binding toxic chemicals.

All of these elements relate to each other. The texture of the soil (mineral solids) determine how much air and water are in the soil, as well as the ability of nutrients to cycle underground. All three factors directly influence the ability of organic matter to break down, which results in the rise and decline of complex soil food web communities.

All soils are unique to their location and varying based on bedrock composition, vegetation, and past management. We can learn more about our particular soils by testing for pH and nutrients, as well as by conducting a series of simple tests to learn about the texture and drainage capacity. Much of the management of soils in a the garden context has to do with adding consistent and diverse forms of organic matter.

To learn more about soil biology, testing, and management, visit:
www.gardening.cornell.edu/soil

Adapted from *Cornell Soil Health Assessment Training Manual, 2nd Edition (2009)*
Free Download at: <http://soilhealth.cals.cornell.edu/extension/manual.htm>

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