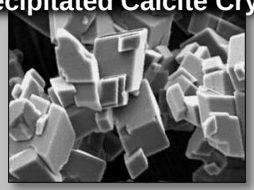
Components of Soil Microaggregates : A Storage Place for Carbon

The maintenance of a high degree of soil aggregation is one of the most important goals of soil management.

Emphasis on managing the soil as a living ecosystem.

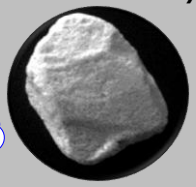
Precipitated Calcite Crystals



Clay particles (platelet shape) < 0.002 mm dia.

Clay Domain: small stack of parallel clay particles.

Very Fine Sand (0.05 – 0.1 mm dia.)



Clay-Humus Domain

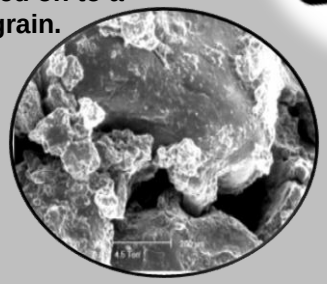
Ca & Mg bind humic acids to clay particles.

O_2

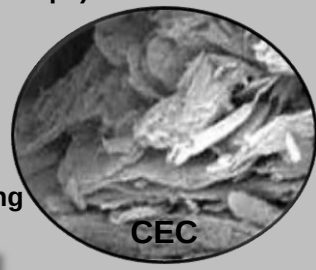
CO_2

Soil Macroaggregate

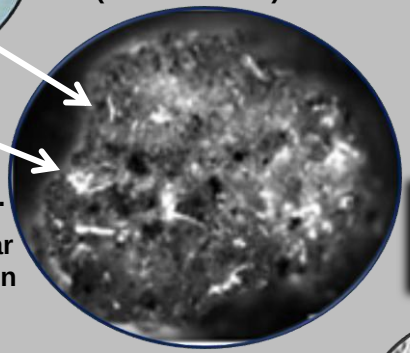
Clay Aggregates attached on to a sand grain.



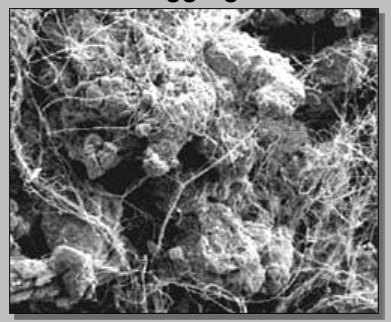
Clay particles (flake shape) < 0.002 mm dia.



Soil Microaggregate (< 0.3 mm dia.)



Fungal hyphae binding soil particles together into aggregates



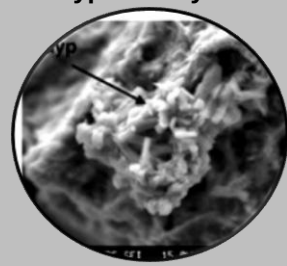
White areas indicating presence of glomalin (Image: Dr. Kris Nichols, USDA/ARS, Mandan, ND).

Glomalin: an Arbuscular Mycorrhizal glycoprotein

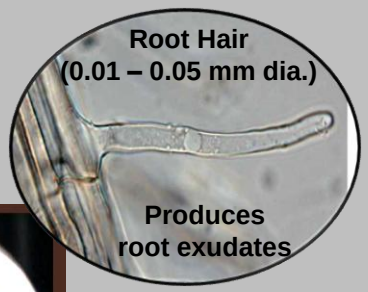
Iron Oxides coating Soil particle

Clay films coat the surfaces of soil particles & also line pore & root channels.

Gypsum crystals

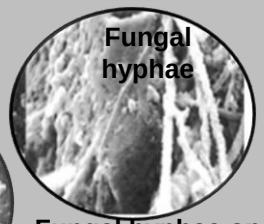


Root Hair (0.01 – 0.05 mm dia.)



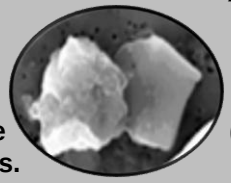
Produces root exudates

Fungal hyphae



Fungal hyphae on the surface of soil particles. (0.002 – 0.007 mm dia.)

Silt (0.002 – 0.05 mm dia.)



(Crystals precipitated in a void between clay particles.)

Bacteria

Rod-Shape Bacteria on the surface of a soil particle (0.0005 – 0.005 mm dia.). Bacteria produce polysaccharides.

Water stored in the micropores: Microbial & Root activity is affected by: pH, EC (salinity), soluble Organic Carbon & Nutrients, dissolved O_2 & CO_2, & Temp.

NOTE: Various species of fungi and bacteria can solubilize mineral elements from the mineral soil.

Particulate Organic Matter (POM): Tiny bits of plant & microbial debris that are encrusted on soil particles.

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Ref.: 14th Edition revised, The Nature and Properties of Soils (chapter 4)

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