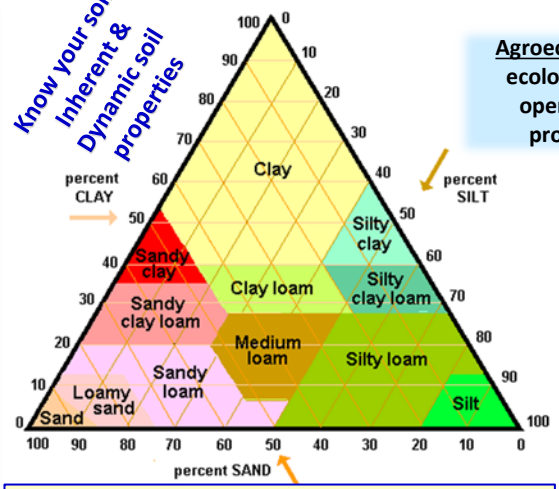
Soil Health: the Living Soil is greater than the sum of its parts

Know your soils Inherent & Dynamic soil properties



Ref.: Carbon that counts (Dr. Christine Jones) and Mycorrhizal Fungi: Highways for Water and Nutrients in Arid Soils (Dr. Michael F. Allen)

Agroecology is the study of ecological processes that operate in agricultural production systems.

The Soil Food Web refers to the collection of micro-organisms and micro-arthropods in the soil that interact directly or indirectly with plants, decompose organic matter, or prey on the organisms that interact with plants.

Every trophic level must function for the SFW to function.

Soil eaten by earthworms with organic matter is deposited on the soil surface as castings

Casts at the surface are evidence that earthworms are shredding, mixing, and burying surface residue.

Detritusphere: the layer that includes the litter and the adjacent soil influenced by the litter, is a very thin but microbiological highly active zone in soil.

Rhizosphere: is the narrow region of soil that is directly influenced by root secretions and associated soil microorganisms.

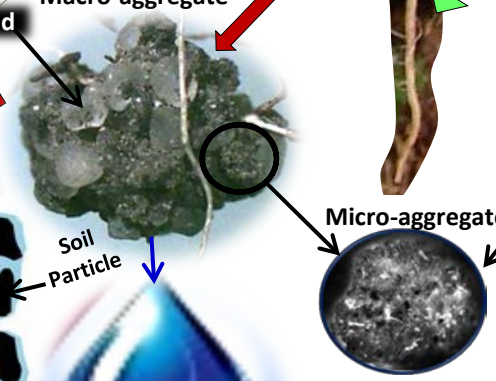
Drilosphere: specifically, it is the fraction of soil which has gone through the digestive tract of earthworms.

NOTE: The Soil Food Web (SFW) is sustained by the following Organic Matter sources:

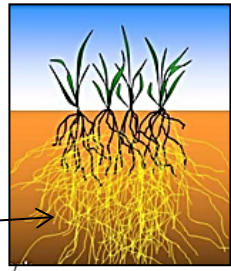
- Glomalin
- Root Exudates
- Surface Crop Residues
- Root Residues
- Predator-Prey relationships
- Plant Symbiosis
- Soil Humus
- Manure
- SFW residues /wastes
- Compost

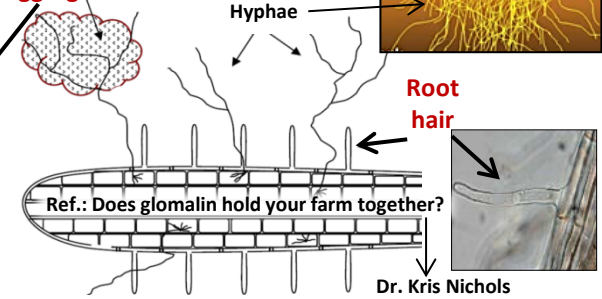
Tillage disrupts ecosystem processes

Soil Structure: is determined by how individual soil granules clump or bind together and aggregate, and therefore, the arrangement of soil pores between them. Soil structure has a major influence on water and air movement, biological activity, root growth and seedling emergence.



Fungal Hyphae binds soil particles together into aggregates. It also substantially increases active root surface for nutrient & water acquisition.



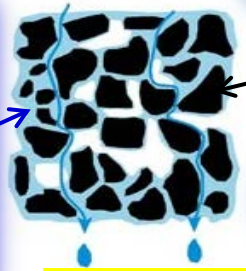


Soil contains a large distribution of pore sizes and channels through which water flows.

Liquid water flows through soil pores and in water films coating soil particle surfaces.

Capillary water

Soil Pores are primary an aquatic habitat (i.e., water films) for protozoa, bacteria, mycorrhizae, nematodes and other microorganims that are part of the soil food web.



(White areas indicating presence of glomalin; Dr. Kris Nichols, USDA/ARS, Mandan, ND) Glomalin glues together soil aggregates.

Hyphae of arbuscular mycorrhizae fungi grow beyond nutrient depleted zones found around roots and root hairs.

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(http://www.nm.nrcs.usda.gov/technical/handbooks/iwm/nmiwm.html)

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