How does Nature Grow Plants & Create Soil

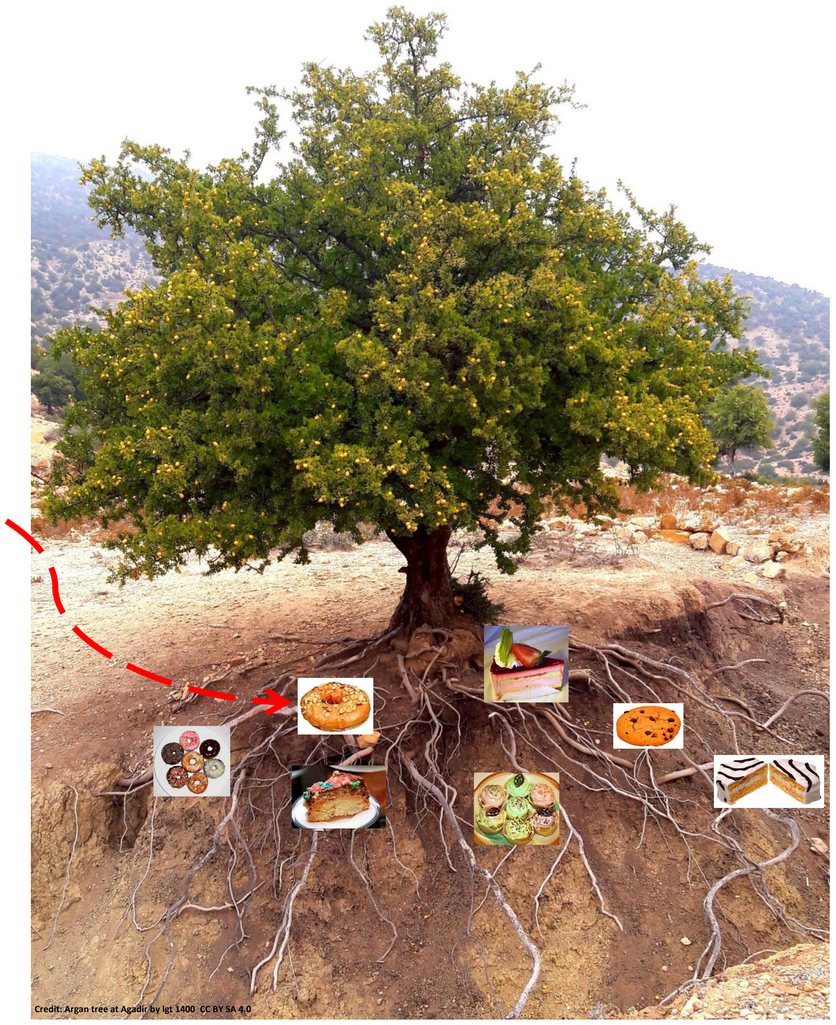
Microbes, the secret behind healthy soil

A handful of healthy soil contains more microbes than there are humans on earth.

A microscope view of a nematode feasting on a sea of bacteria

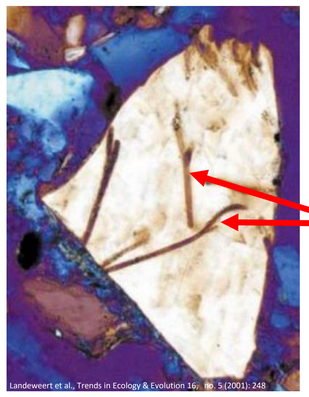
Nature's barter system

- Plants attract & feed soil microbes with sugars produced from photosynthesis in exchange for all the other elements they require.
- The plant releases up to 40% of these sugars as root exudates to attract and feed the specific microbes the plant requires.
- For the microbes they are like cakes and cookies
- Bacteria and Fungi recycle dead plant and animal matter, and are able to mine all the nutrients plants require from the rocks, sand, silt, & clay, and nitrogen from the atmosphere.



The World's Largest Mining Operation is Run by Fungi

Jennifer Frazer, Scientific American Nov. 5, 2015



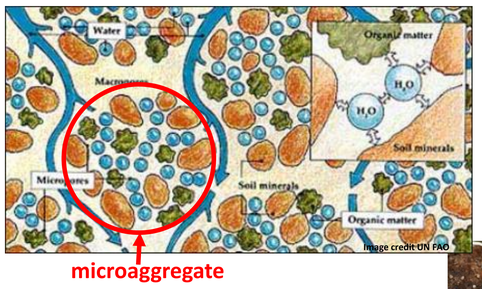
Polished rock surface seen through a microscope

Can you spot the mining tunnels made by fungi?

Plants also release exudates through their foliage

In healthy soil conditions leaf surfaces are covered by microbes held to the plant by the strong biotic glues. That protective layer is one of nature's ways of achieving disease suppression.

Bacteria & Fungi Build Soil Structure



Together they build underground cities for the microbes to live in.

Bacteria secrete biotic glues that stick soil minerals (brown) and organic matter (green) together into microaggregates that trap and purify water (blue).

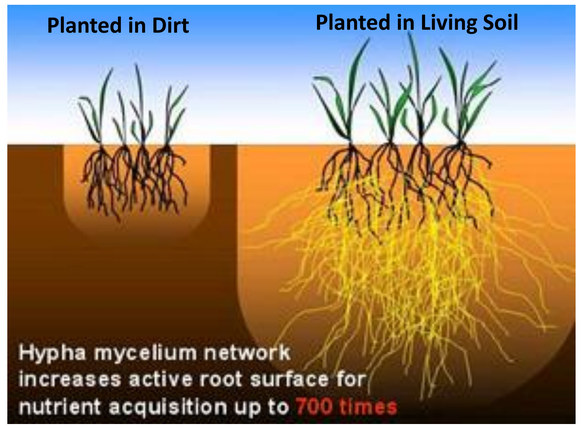
Fungal strands tie microaggregates together forming aggregates (2-5 mm). These are the homes for microbes with doors and windows that act as passage ways for air and water to infiltrate to great depths. The process creates a soil carbon sponge with lots of air pockets and humus.

Soil Aggregates Formed Around Plant Roots

Plants and microbes together build fertile soil.

Dr. Christine Jones https://www.youtube.com/watch?v=C3_w_Gp1mLM

Mychorrizal Fungi Greatly Extend Plant Root Area



Poster Created by Phil Gregory, Professor Emeritus, University of British Columbia
"The Magic of Soil" https://www.youtube.com/watch?v=AWILIYSf5ts