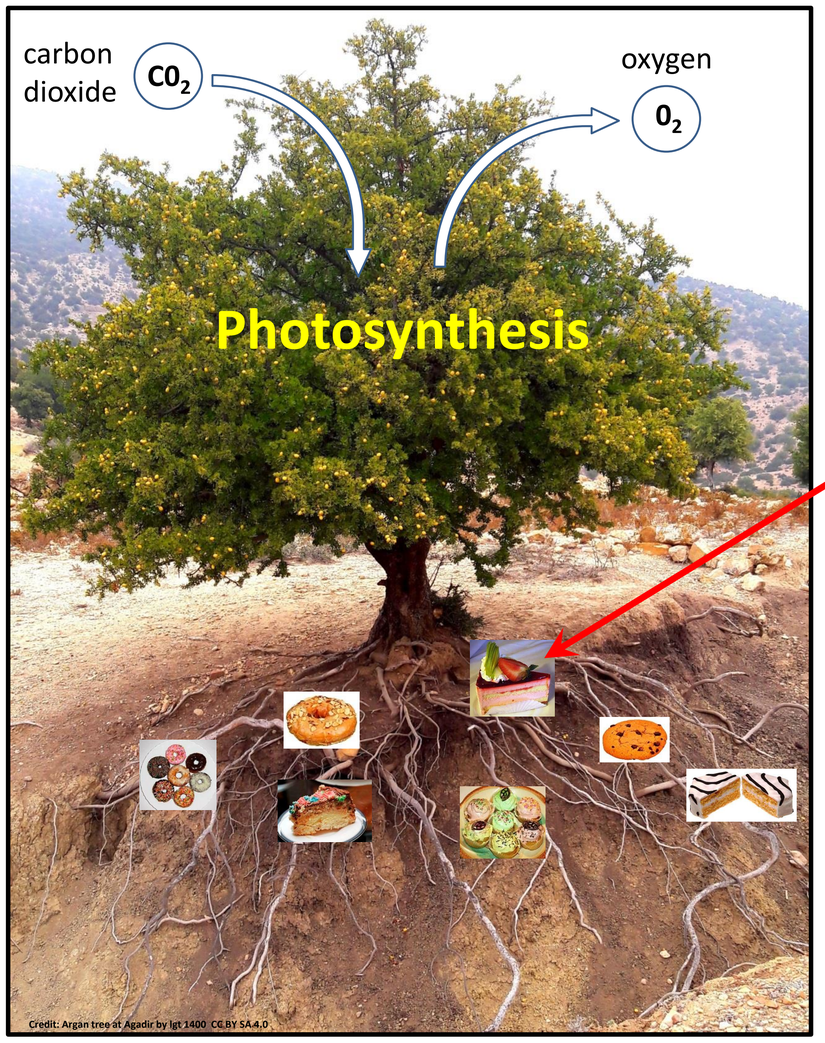
How Nature Grows Plants and Creates Soil



Nature's barter system

- Plants attract and feed soil microbes with carbon compounds, like sugars produced by photosynthesis, in exchange for all the other elements plants require.
- Up to 40% of these carbon compounds are released from the plant roots and are referred to as root exudates.
- For microbes like bacteria and fungi, these exudates 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 obtain nitrogen from the atmosphere.

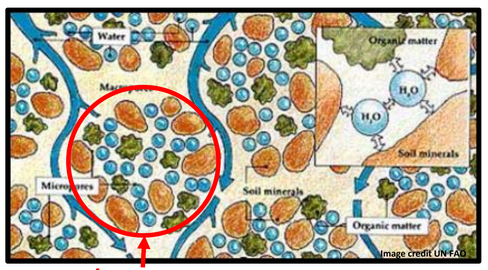
World's Largest Mining Operation Run by Fungi

Jennifer Frazer, Scientific American Nov. 5, 2015

Polished rock surface seen through a microscope

Can you spot the mining tunnels made by fungi?

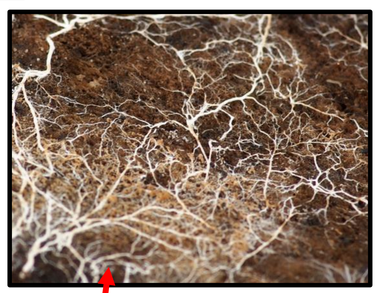
Bacteria & Fungi Build Soil Structure



microaggregate

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 (invisible clumps) that trap and purify water (blue).



Fungal strands tie microaggregates together forming larger visible sized clumps/aggregates (2-5 mm), providing homes for microbes with passage ways for air and water to infiltrate to great depths. This process creates a soil carbon sponge capable of storing lots of water.

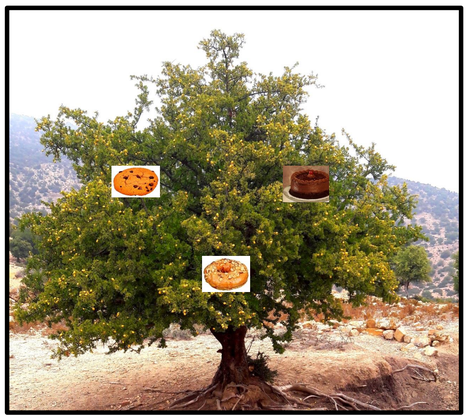
Soil Aggregates Formed Around Plant Roots

Plants, microbes, & animals together build fertile soil

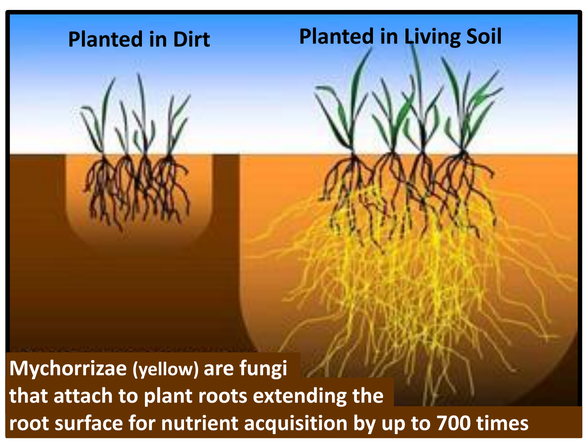
Dr. Christine Jones https://www.youtube.com/watch?v=C3_w_Gp1mLM

Fun facts

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



Plants also release sugars through their foliage leading to leaf surfaces covered with microbes living in a sea of biotic glues that protect the leaf surface from disease.



Soil fungi are responsible for a super sophisticated underground internet called the Wood Wide Web that can share signals and nutrients.

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Poster Created by Phil Gregory