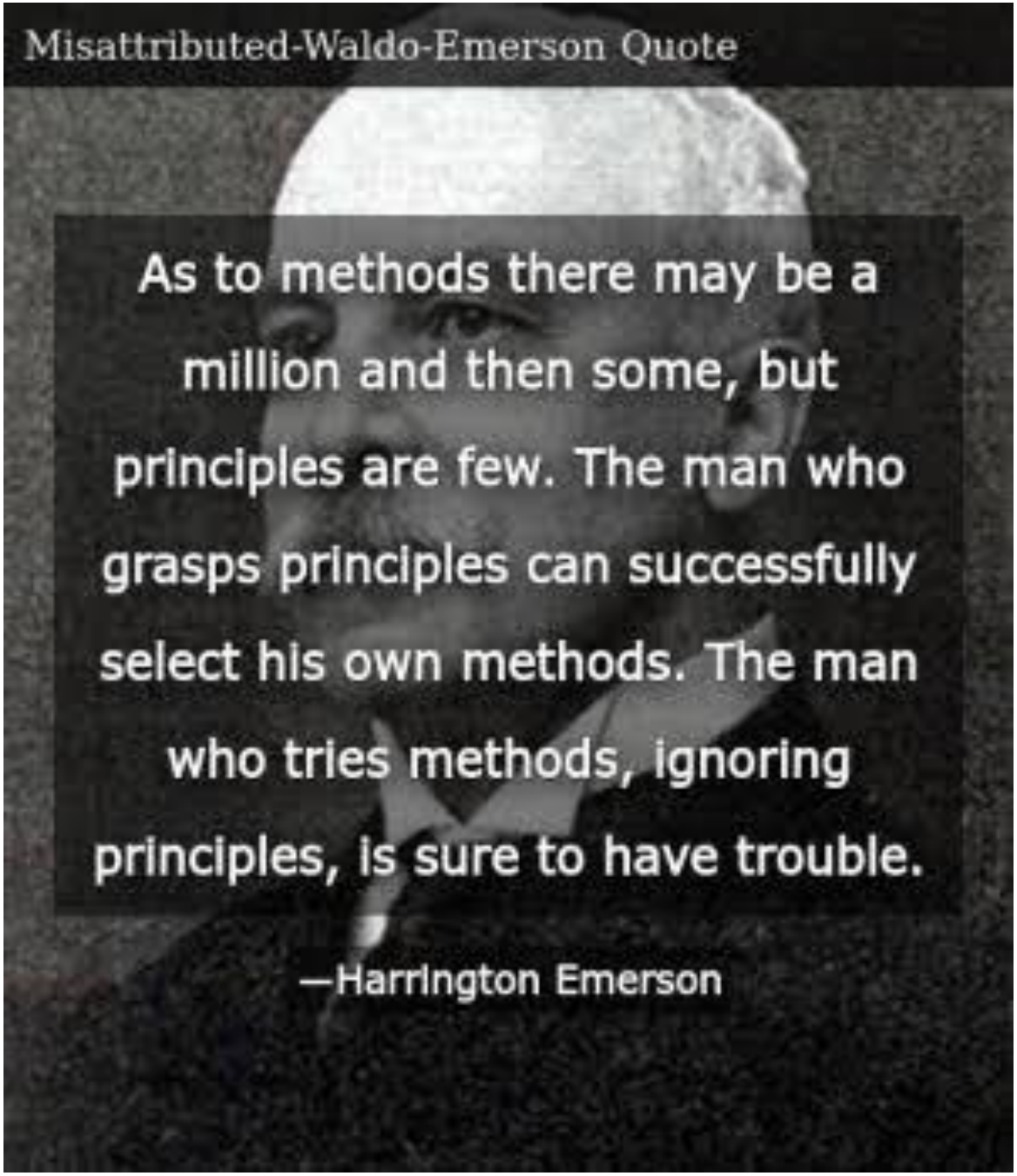
Building Soils with Biodiversity

A workshop on the fundamental principles and practices behind using biodiversity to build soils in our environment.

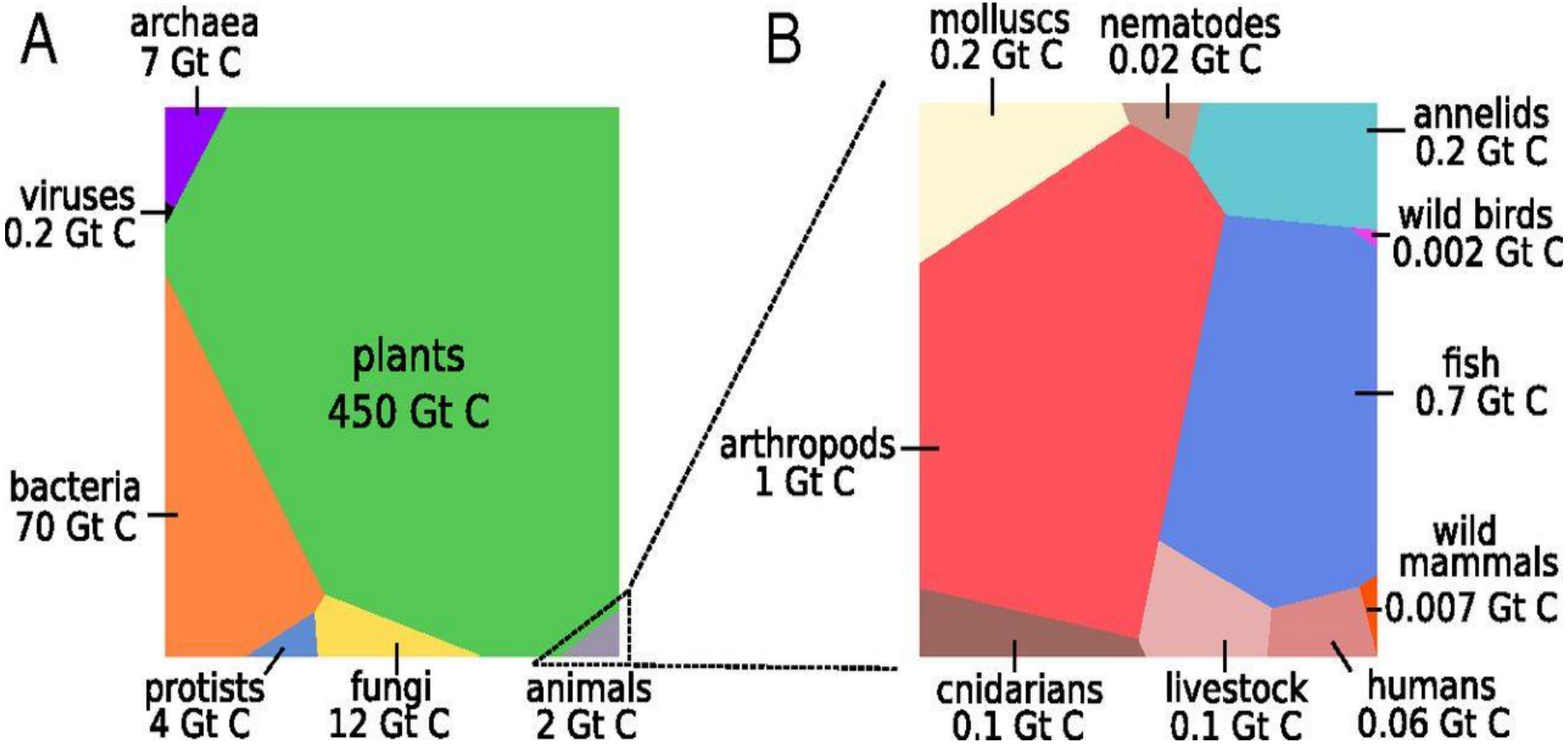

Misattributed-Waldo-Emerson Quote
As to methods there may be a million and then some, but principles are few. The man who grasps principles can successfully select his own methods. The man who tries methods, ignoring principles, is sure to have trouble.
—Harrington Emerson

The Chicken and the Egg

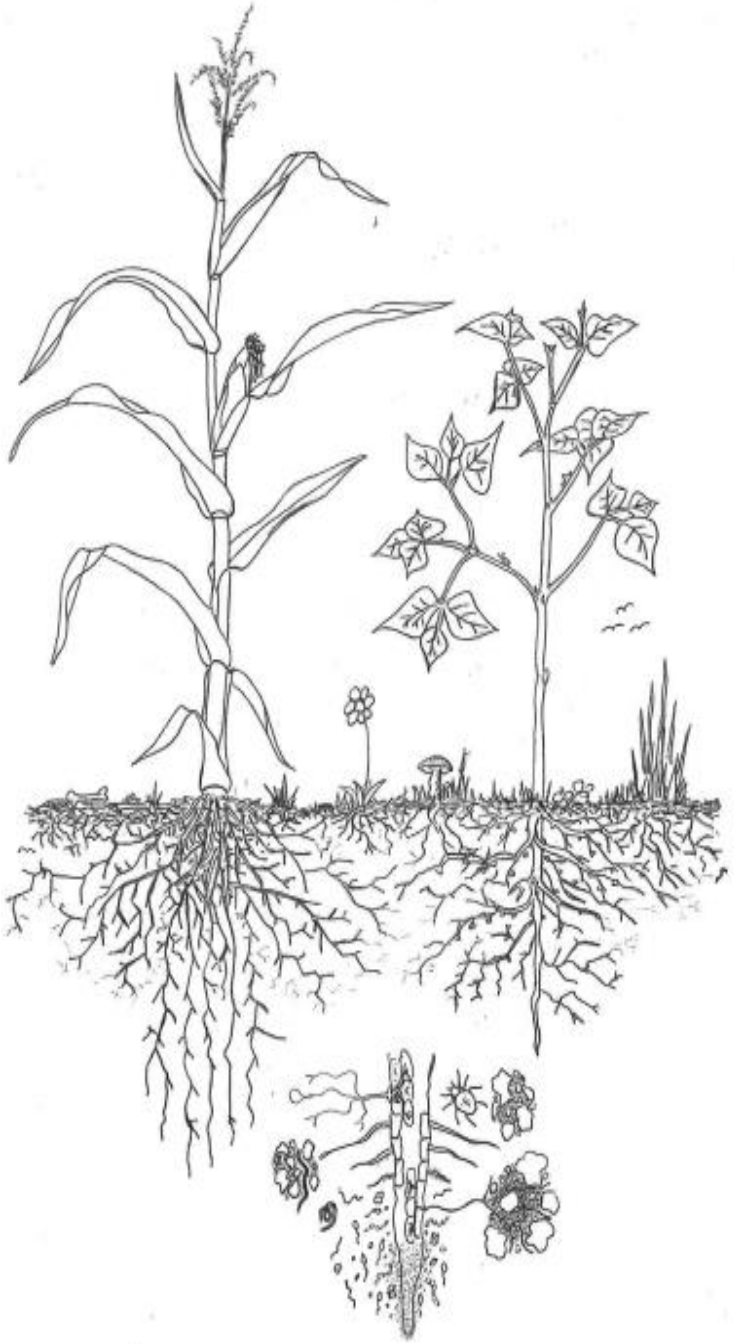
What came first, healthy plants or healthy soil ?

- We all know that good soils grow healthy plants, but without plants, soil would be little more than weathered rock particles.
- The carbohydrates produced by plants are both the renewable energy source that fuels life activity and the initial molecules from which all organic materials are built
- In exchange for these carbon compounds, microbes and animals perform services that promote healthy plant growth, such as nutrient acquisition, humus production and soil aggregation
- The presence of healthy plants, or more accurately, healthy plants and associated microbial and animal activity, largely determines soil quality

Composition of Global Biomass



https://www.pnas.org/content/115/25/6506



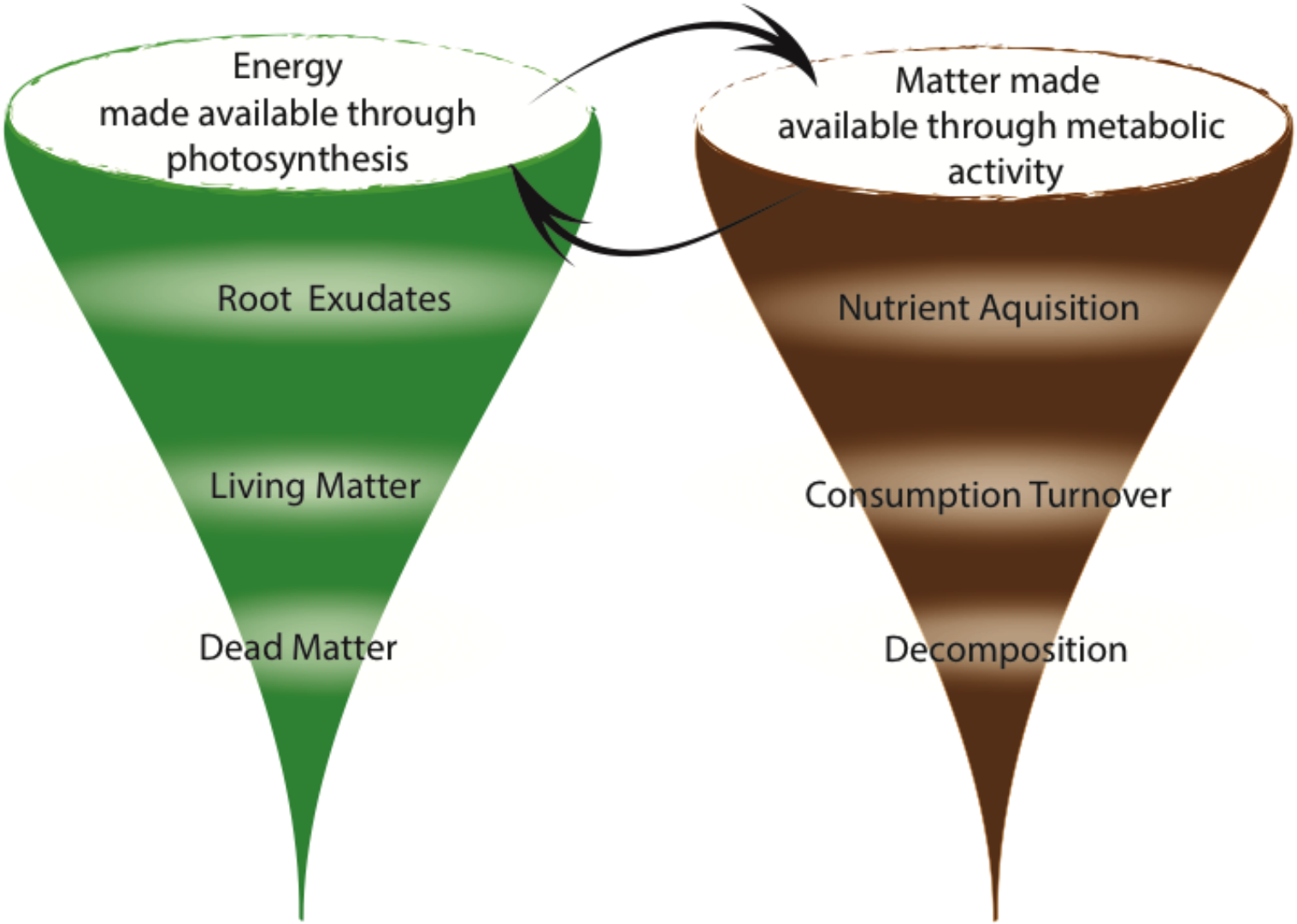
It’s all happening in the rhizosphere

Root exudation from healthy living plants is the biggest driver of important living processes that determine soil fertility and function!!!

Exudation from living roots are the most energy rich of these carbon sources. In exchange for 'liquid carbon', microbes in the vicinity of plant roots – and microbes linked to plants via networks of beneficial fungi – increase the availability of the minerals and trace elements required to maintain the health and vitality of their hosts. Microbial activity also drives the process of aggregation, enhancing soil structural stability, aeration, infiltration and water holding capacity.

Christine Jones
https://amazingcarbon.com/JONES-LightFarmingFINAL(2018).pdf

Biological Production Economy



Multi Species Cover Crops

Peas in Mix

Peas Alone

No Fert ?

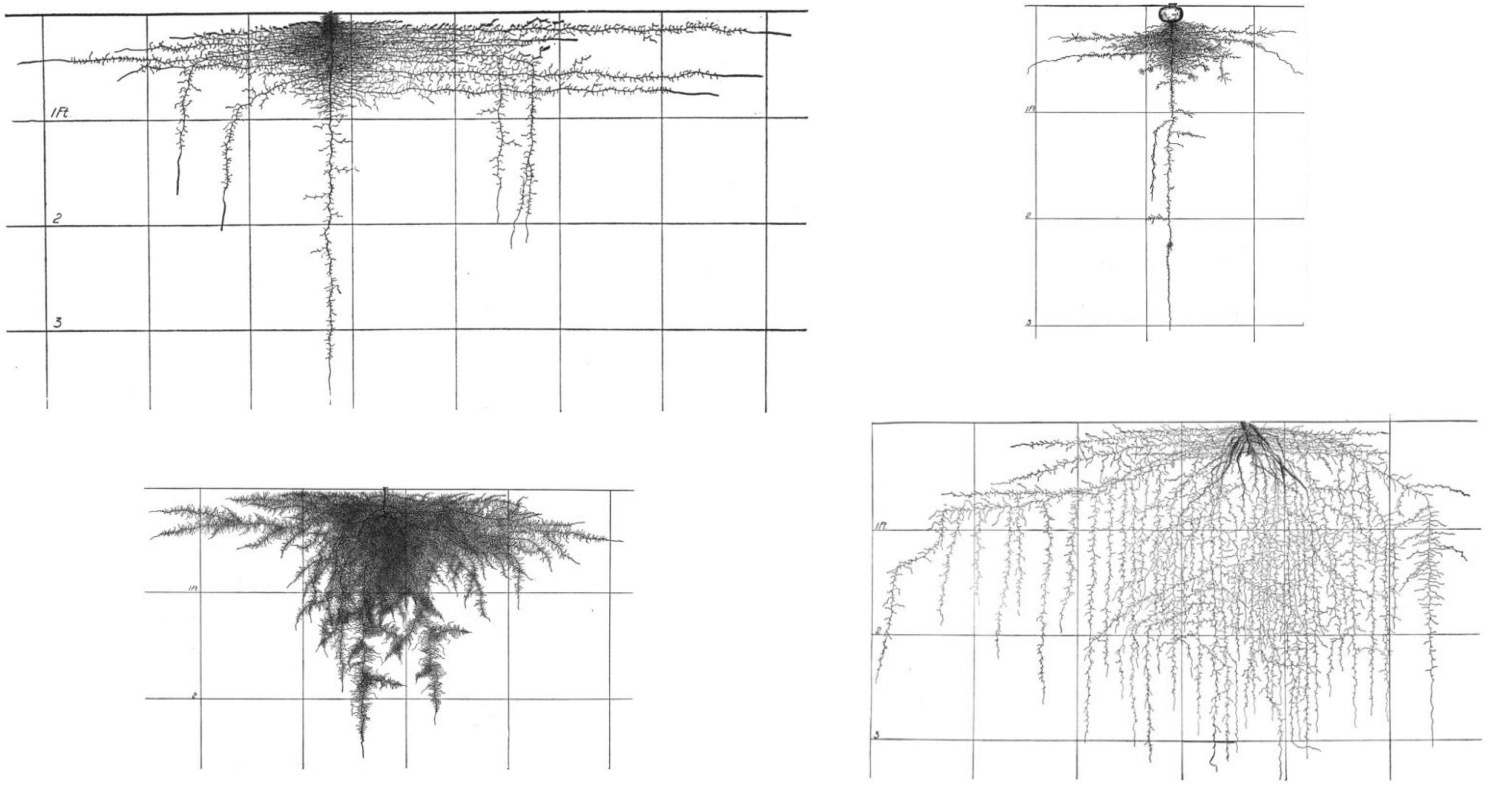
Fert ?

Variety is the Spice of Life

It is well established that plant diversity is an important characteristic of robust and resilient living systems

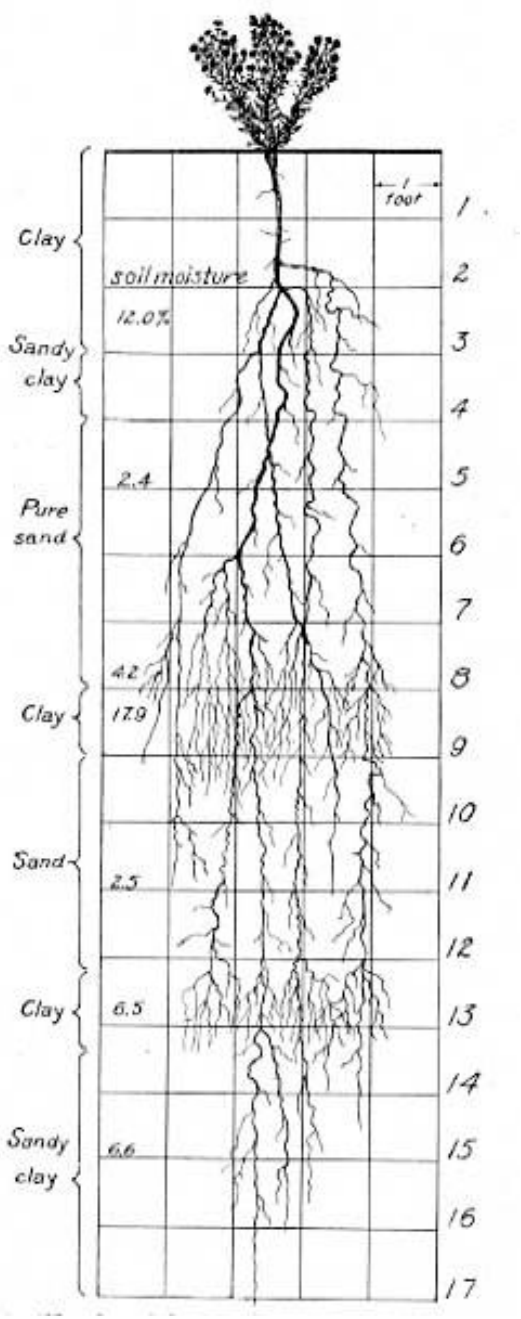
- Different plant types host and associate with unique microbial and animal populations
- Plant diversity promotes microbial and animal diversity, above and below ground
- Diversity entails better access to and production of resources and a greater range of services
- Diverse living networks enable efficient and widespread exchange of goods and services
- Communities as a whole, benefit from the inherent traits various species bring to the table

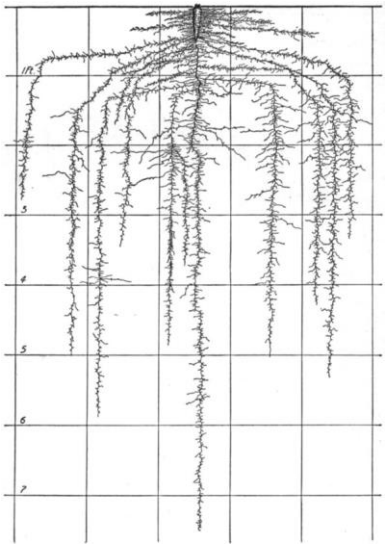
Root Spread and Density

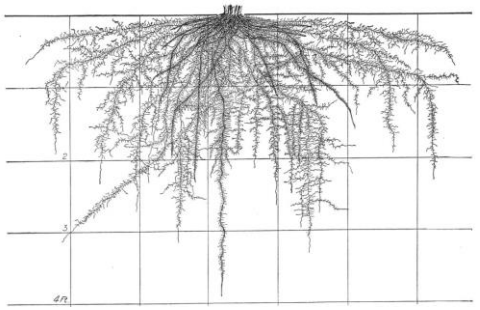


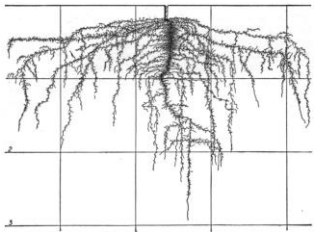
Clockwise from top left - mature root systems of cucumber, radish, sweet potato and cauliflower

Root Depths



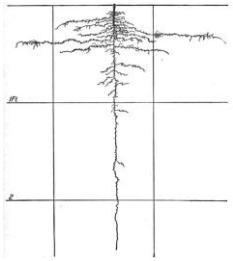




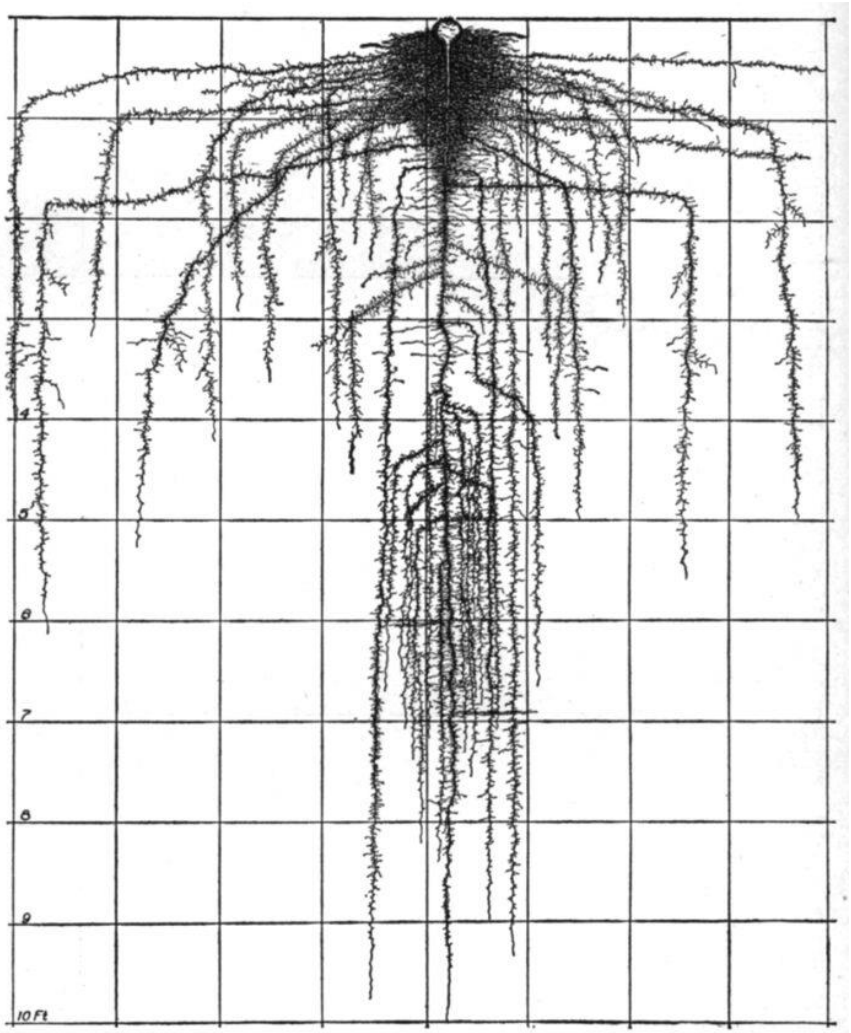


Clockwise from left - mature root systems of False Boneset, Carrot, Corn and Beans

Roots Over Time



Beet roots at six weeks and at three and a half months



Healthy Plant Communities Build Healthy Soils