The Soil Biology Behind Organic Land Care

Presented by

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Categories of Soil

- Physical
  - Friability, porosity, infiltration, texture, bulk density and aggregation
- Chemical
  - Mineral Content, nutrient content, pH, organic matter, salinity
- Biological
  - Biodiversity, biological activity, nutrient cycling, biomass, pathogen suppression

The differences between turf and woody plant systems

Woody Plant System

- High carbon food resources are required
- Soil is dominated with fungal biomass
- Highly evolved system with tremendous diversity

Herbaceous Plant System

- High nitrogen food resources are required
- Bacterial and fungal biomass are balanced
- Less complex microbial system, less diversity

Roots?

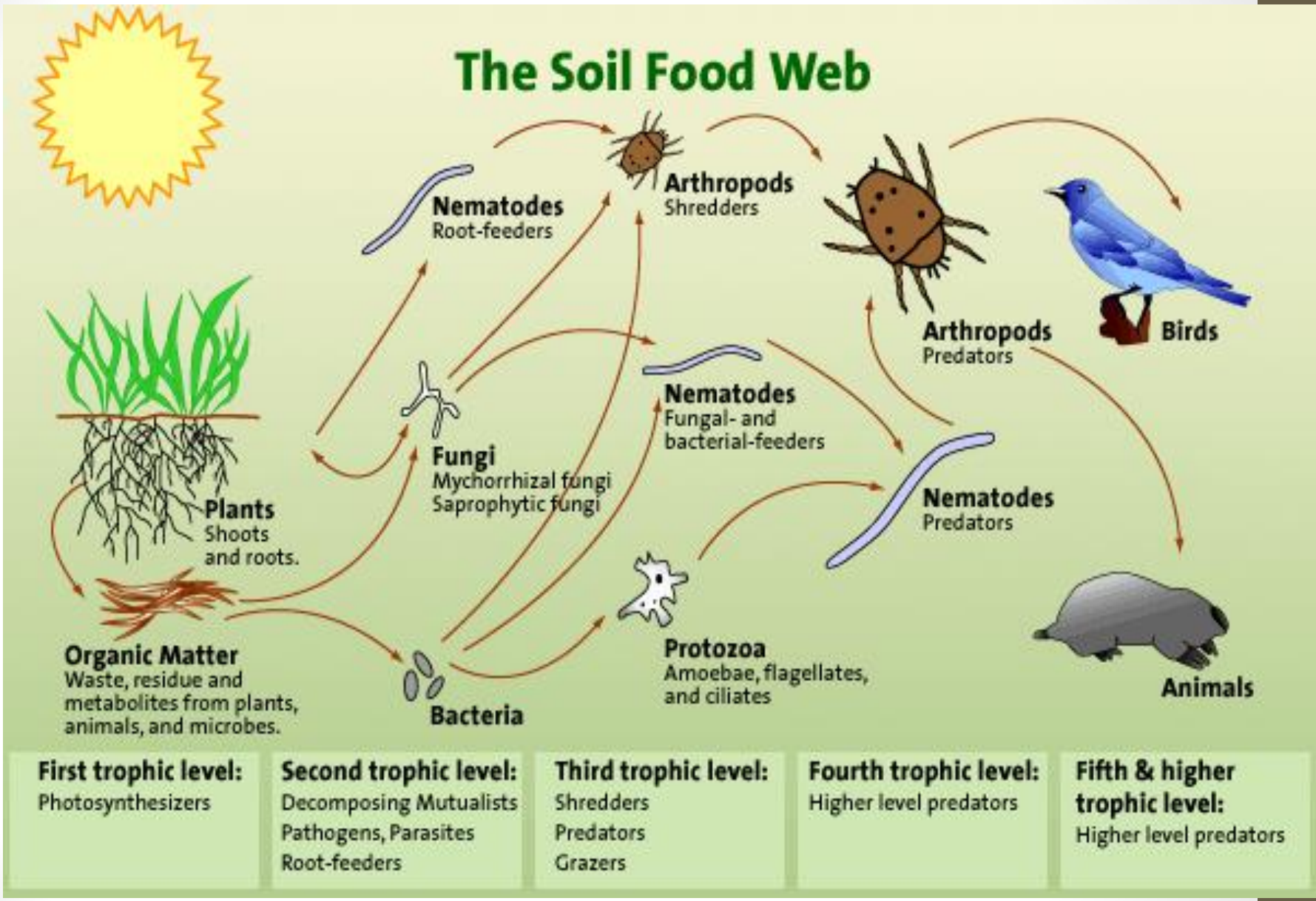
- Healthy roots do not grow in the soil. Roots grow in the pore space between soil particles.
- When compaction is severe, we are forced into conventional management practices
- Why???

Exudates

- Roots put out compounds called exudates which feed the biology specific to plant requirements.
- Exudates change with different stimuli
  - Stress
  - Vegetative growth
  - Flowering/fruiting
  - Temperature

Root Exudates

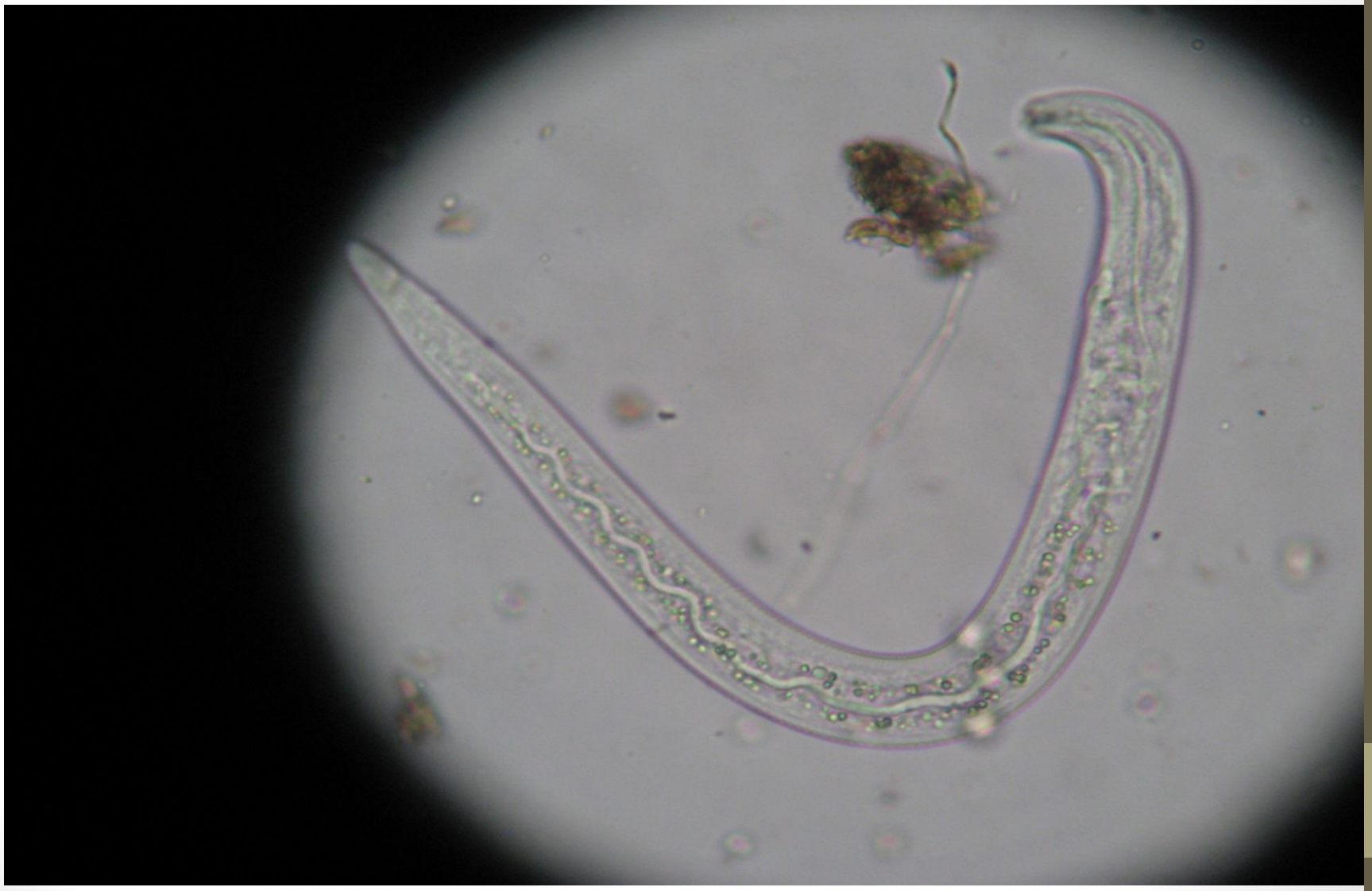
- Approximately 30% of the energy that plants produce is exuded through the root system to feed the biology that is specific to it’s growth


The Soil Food Web
Nematodes
Root-feeders
Arthropods
Shredders
Arthropods
Predators
Birds
Nematodes
Fungal- and
bacterial-feeders
Fungi
Mychorrhizal fungi
Saprophytic fungi
Plants
Shoots
and roots.
Nematodes
Predators
Organic Matter
Waste, residue and
metabolites from plants,
animals, and microbes.
Bacteria
Protozoa
Amoebae, flagellates,
and ciliates
Animals
First trophic level:
Photosynthesizers
Second trophic level:
Decomposing Mutualists
Pathogens, Parasites
Root-feeders
Third trophic level:
Shredders
Predators
Grazers
Fourth trophic level:
Higher level predators
Fifth & higher
trophic level:
Higher level predators

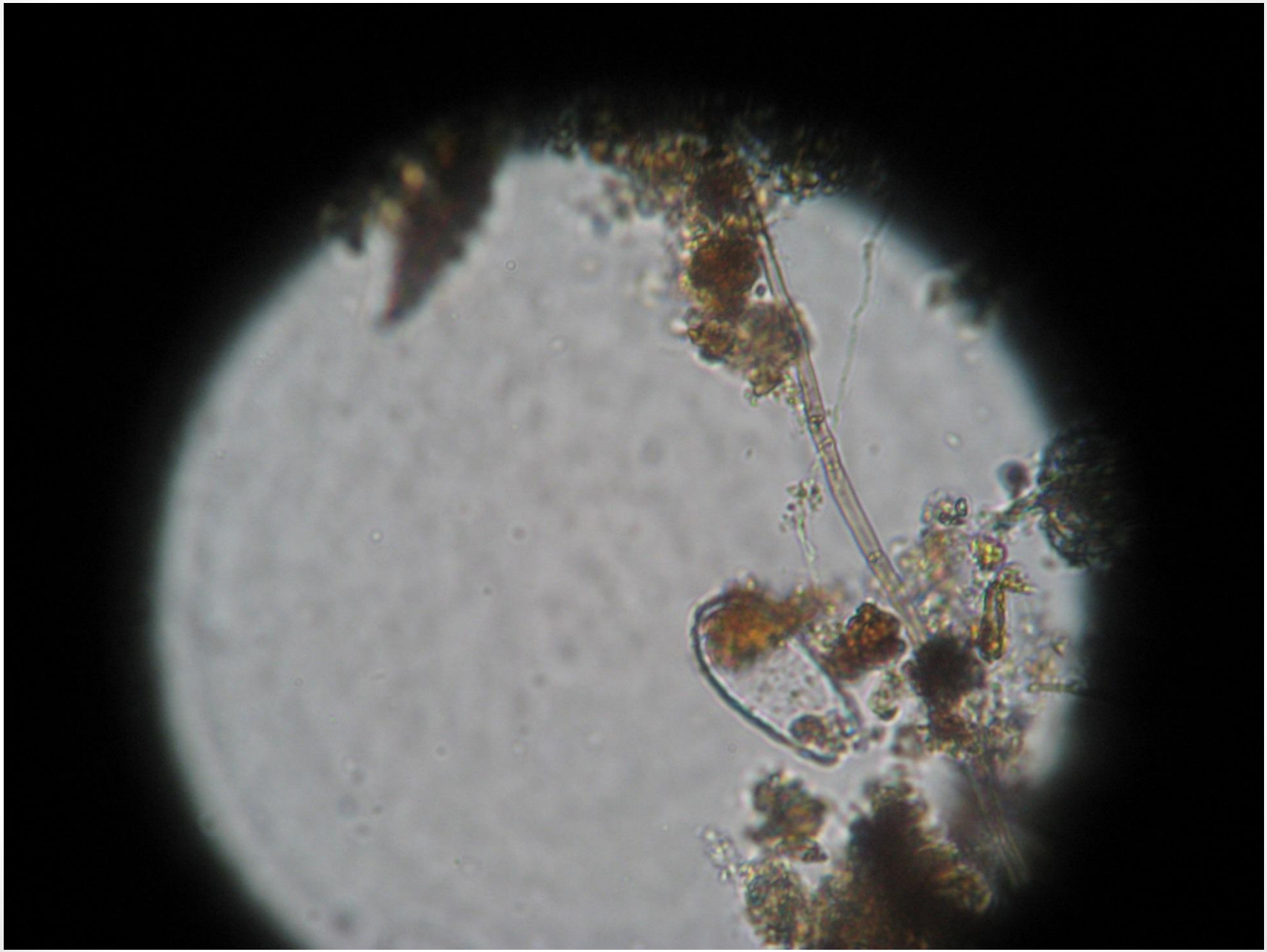
Compost Samples

Direct Microscopy

Active Mycorrhizal Growth




Ciliate Grazing




Diversity?

Biology enhances these functions:

- Nutrient sequestration (immobilization)
- Nutrient cycling – right forms, right place and at the right time
- Decomposition : Toxins, organic matter
- Insect and disease reduction : Occupy infection sites, increase plant health
- Increase : Water holding capacity, root depth, soil structure, yield, color, size