

Appendix 1: Soil Organisms

1. Earthworms

Role in Soil Health:

Break down organic matter, improve soil structure and porosity and enhance nutrient cycling through their castings

Thrive In:

- Moist, aerated soils rich in organic matter
- Neutral pH (6-8)
- Undisturbed environments (no-till or reduced-till systems)

Decline In:

- Frequent or deep tillage
- Soil compaction
- Drought or poor drainage
- Heavy pesticide use



2. Mycorrhizal Fungi

Role in Soil Health:

Form symbiotic relationships with plant roots to increase water and nutrient uptake (especially phosphorus); help build soil aggregates

Thrive In:

- Soils with living plants and root exudates
- Low phosphorus inputs
- Stable, undisturbed environments

Decline In:

- Overuse of synthetic fertilizers
- Tillage (disrupts fungal networks)
- Monocultures
- Bare soils with no root hosts



Name: _____

3. Springtails

Role in Soil Health:

Feed on fungi, decaying organic matter and bacteria, helping with decomposition and nutrient cycling

Thrive In:

- Moist, organically rich soils
- Mulched or forested areas
- Leaf litter and compost piles

Decline In:

- Dry or compacted soils
- Chemical pesticide exposure
- Tillage or loss of organic matter



4. Nematodes

Role in Soil Health:

Some species help decompose organic matter or prey on pests; others feed on plant roots (not all are beneficial)

Thrive In:

- Diverse microbial populations
- Moist soil with moderate temperatures
- Adequate organic matter

Decline In:

- Soil fumigation or chemical treatments
- Excessive drought or flooding
- Lack of microbial life or plant diversity



Name: _____

5. Actinomycetes

Role in Soil Health:

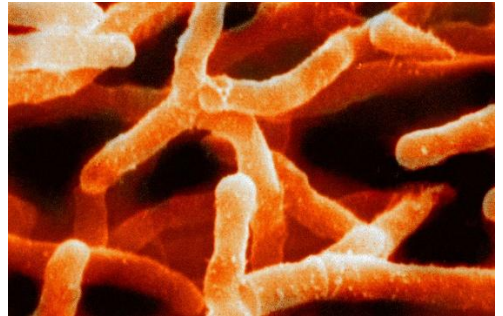
A type of bacteria that helps decompose tough materials like cellulose and lignin; contributes to the earthy smell of healthy soil

Thrive In:

- Warm, aerated soils with moderate moisture
- High organic matter
- Near-neutral pH

Decline In:

- Poor drainage or saturated soils
- Soil compaction
- Acidic pH
- Lack of plant residues



6. Mites

Role in Soil Health:

Include decomposers, predators of pests and contributors to microbial activity; play multiple roles depending on the type

Thrive In:

- Mulched or forested soils
- Moisture-stable environments
- Organic residues or compost

Decline In:

- Disturbed soils (tillage or compaction)
- Dry, bare or nutrient-poor soil
- Chemical exposure



Name: _____

7. Protozoa

Role in Soil Health:

Feed on bacteria, regulating microbial populations and releasing nutrients for plants (especially nitrogen)

Thrive In:

- Moist, well-aerated soils
- Abundant bacterial populations
- Stable temperatures

Decline In:

- Drought or waterlogged soils
- Low microbial activity
- Pesticide exposure



8. Ants

Role in Soil Health:

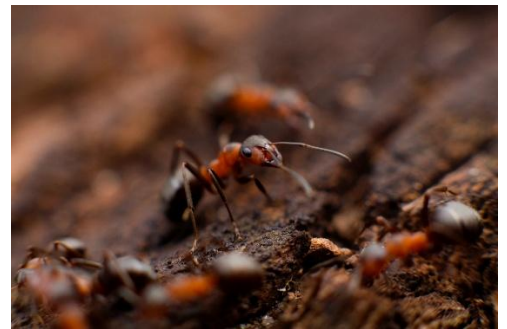
Aerate soil through tunneling, assist in decomposition and redistribute nutrients and seeds

Thrive In:

- Loamy or sandy soils
- Warm climates
- Undisturbed environments

Decline In:

- Flooded or compacted soils
- High pesticide use
- Loss of ground cover or food sources



Name: _____

9. Grubs (Larval Beetles)

Role in Soil Health:

Decompose organic material and break down plant matter; some are pests of roots.

Thrive In:

- Moist soils with decaying roots or mulch
- Presence of vegetation (especially turf and pasture)
- Moderate temperatures

Decline In:

- Tillage and soil disruption
- Cold or dry conditions
- Predator populations (e.g., birds, beneficial nematodes)



10. Bacteria

Role in Soil Health:

Decompose organic matter, fix nitrogen, suppress diseases and support plant health in countless ways

Thrive In:

- High organic matter
- Moist, oxygenated soils
- pH near neutral (6.5-7.5)

Decline In:

- Acidic, compacted or extremely dry soils
- Pesticide exposure
- Lack of food sources like root exudates

