


Living Soil: The Foundation for Healthy Plants



A close-up photograph of a person's hand holding a large, dark brown clump of garden soil. The soil is crumbly and appears very rich. The background is blurred, showing more soil. Overlaid on the soil is a block of yellow text.

A single teaspoon of rich garden soil can hold up to one billion bacteria, several yards to miles of fungal filaments, several thousand protozoa, and scores of nematodes. Kathy Merrifield, retired nematologist at Oregon State University

Living Soil

- Has a high humus content
- Builds a living soil structure
- Feeds plants through nutrient cycling
- Encourages deep root growth
- Protects plants from disease
- Sequesters carbon in the soil
- Holds water in micro pores

Community

Plants and microbes live in a symbiotic community.

Plants will call in the microbes they want to live with them.

Knowing the community plants live in helps you to know what to feed the soil life.



Living Soil

- Plants
- Diversity of microbes
- Carbon

Soil Texture/Soil Structure

- Soil texture is determined by the size of the particles of the mineral component of your soil.
- Physical soil structure and structure/aggregation created by the microbes



Biological Soil Structure

- Lots of micro and macro pores, water and air is held in these pores.
- Filters and transforms many pollutants as water moves through the soil
- Recharges aquifer, water moves through underground passage ways to creeks

Water Infiltration

- Soils that are alive and have a high population of earthworms can absorb two inches of rain in 12 minutes.
- Soils without earthworms may take 12 hours or longer to absorb two inches of rain.

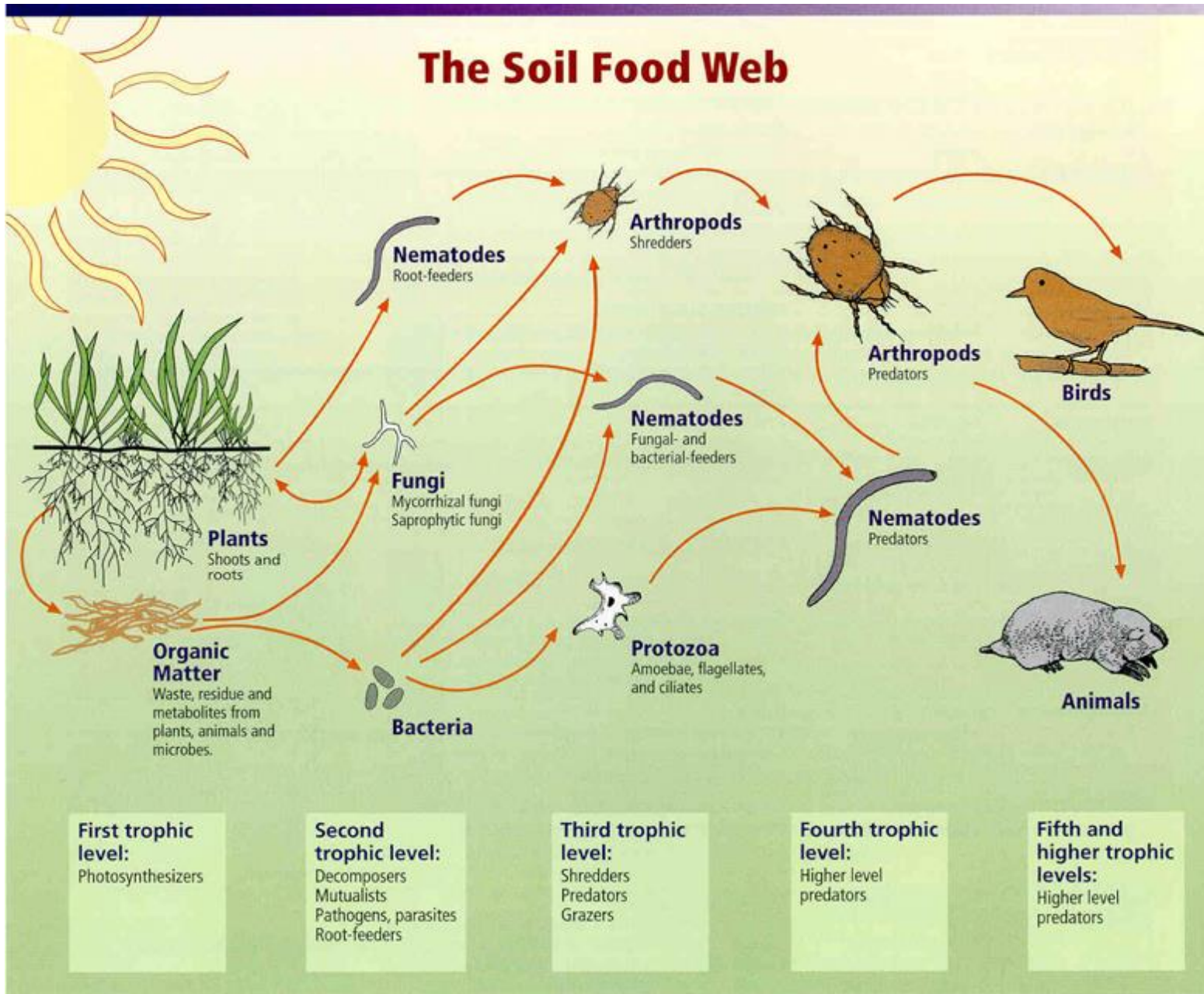
Nutrient Cycling

- Bacteria and fungi are the foundation of the nutrient cycle.
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- Nutrients do not leach out of the soil, they are held in the bodies the microbes
- Nutrients are released in the root zone by the microbes

Soil Life

- Bacteria
- Fungi
- Protozoa
- Nematodes
- Micro and Macro Arthropods

The Soil Food Web

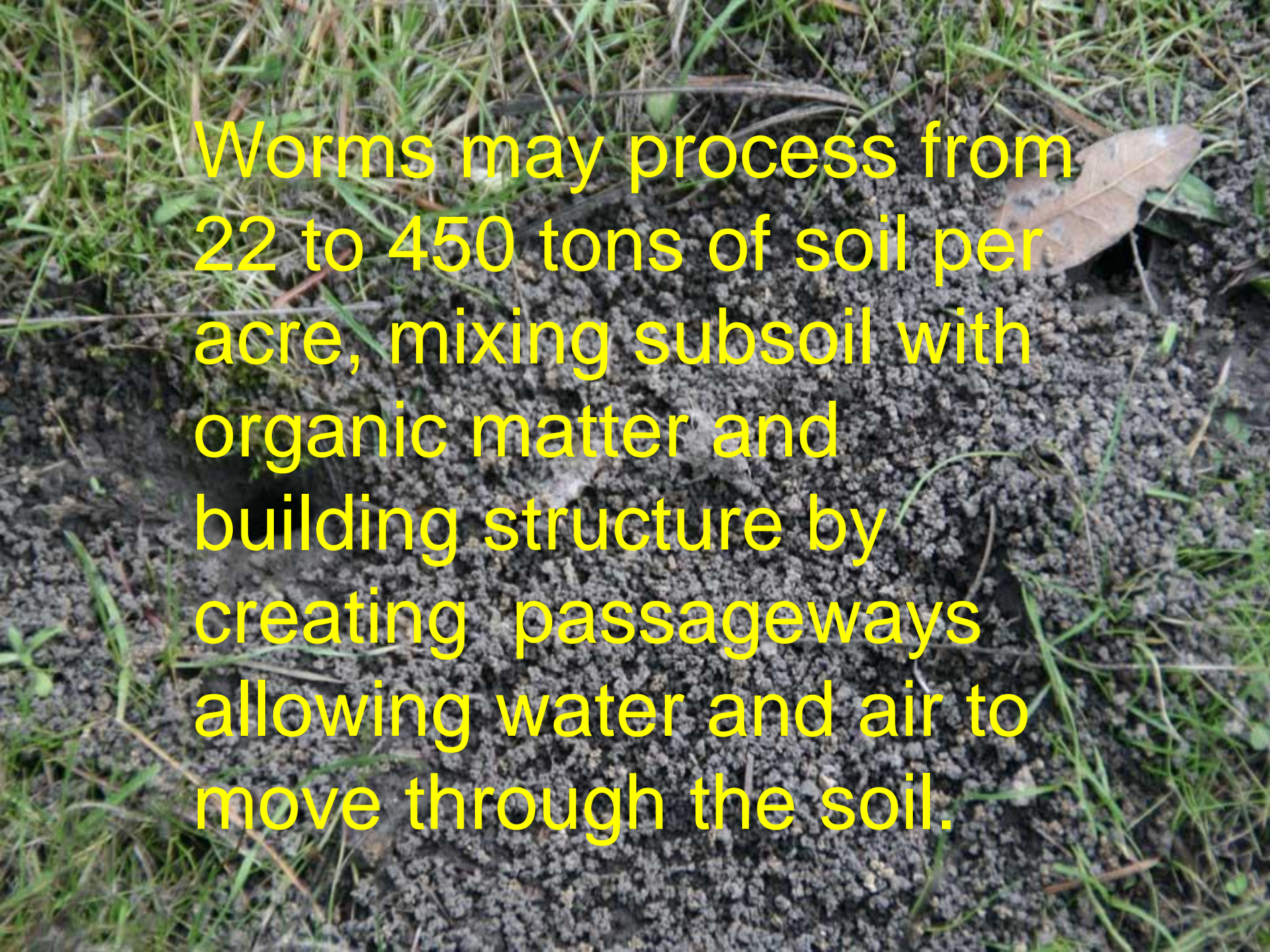


Relationships between soil food web, plants, organic matter, and birds and mammals
 Image courtesy of USDA Natural Resources Conservation Service
http://soils.usda.gov/sqi/soil_quality/soil_biology/soil_food_web.html.





Photo by David Read for [Nature](#)



Worms may process from 22 to 450 tons of soil per acre, mixing subsoil with organic matter and building structure by creating passageways allowing water and air to move through the soil.

Add Life

Compost

Thermal

Cold

Worm Castings

Compost Tea and Extracts

Feed the Soil

- A little compost will provide food and life
- Mulch with leaves, chipped trimmings, wood chips and barks. Mulch provides food for the fungi and protects the soil.
- Organic Fertilizers feed the bacteria and fungi
- Bacteria and fungi are the foundation of the soil food web and food for the higher predators



Protect the Soil

- Mulch and dense planting protect the soil from wind, from compaction due to rain, and holds moisture in the soil.
- Maintain pathways to keep traffic off of planted areas.

Mulch pathways



Work with your native soil

- Do not remove native soil.
- Learn to work with the existing soil by eliciting the help of the soil food web and giving them the air and food they need.
- Use compost and mulch to add life and provide food and protection.

The background of the slide is a photograph of soil that appears compacted. The soil is dark brown and has a cracked, uneven texture. It is covered with patches of green moss and small, low-growing green plants, some of which have thin, upright stems. The overall appearance is one of a dry, disturbed, and possibly nutrient-depleted soil surface.

Compaction

- Blower and traffic
- Repeated tilling, turning, and breaking up the soil
- Too much organic and inorganic fertilizers, pesticides, fungicides, herbicides
- The elements, sun, wind, rain
- No mulch or plant cover

Consequences of Compaction

- The fungi and beneficial nematodes are most sensitive to compaction, less air, less beneficial life.
- Earthworms move away.
- As life leaves the passageways start to compress and you get compaction.
- Rain water runs off rather than moving into the soil.

Rebuild Living Soil Structure

Compost, Mulch, Plants



Sheet Mulching

A simple way to remove weeds and lawns and build living soil structure.

Compost

Paper or cardboard

Mulch

Moisture

Time



Diversity of Life

- The key to healthy plants is a complete soil food web.
- What we consider a pest is food for the predators, do you really need to use a pesticide?

Benefits of Living Soil

- Builds soil structure
- Allows air and water to penetrate into soil
- Holds moisture in soil, less need to water
- Breaks down pollutants in soil and water
- Cycles nutrients to plants
- Builds humus in soil, sequesters carbon
- Plants are more disease and pest resistant

*Living soil is the foundation of
a healthy landscape!*



Presented by:

Theresa Lyngso
Lyngso Garden Materials
345 Shoreway Rd., San Carlos
tlyngso@lyngsogarden.com
www.lyngsogarden.com
650 364-1730 x110