SOIL HEALTH

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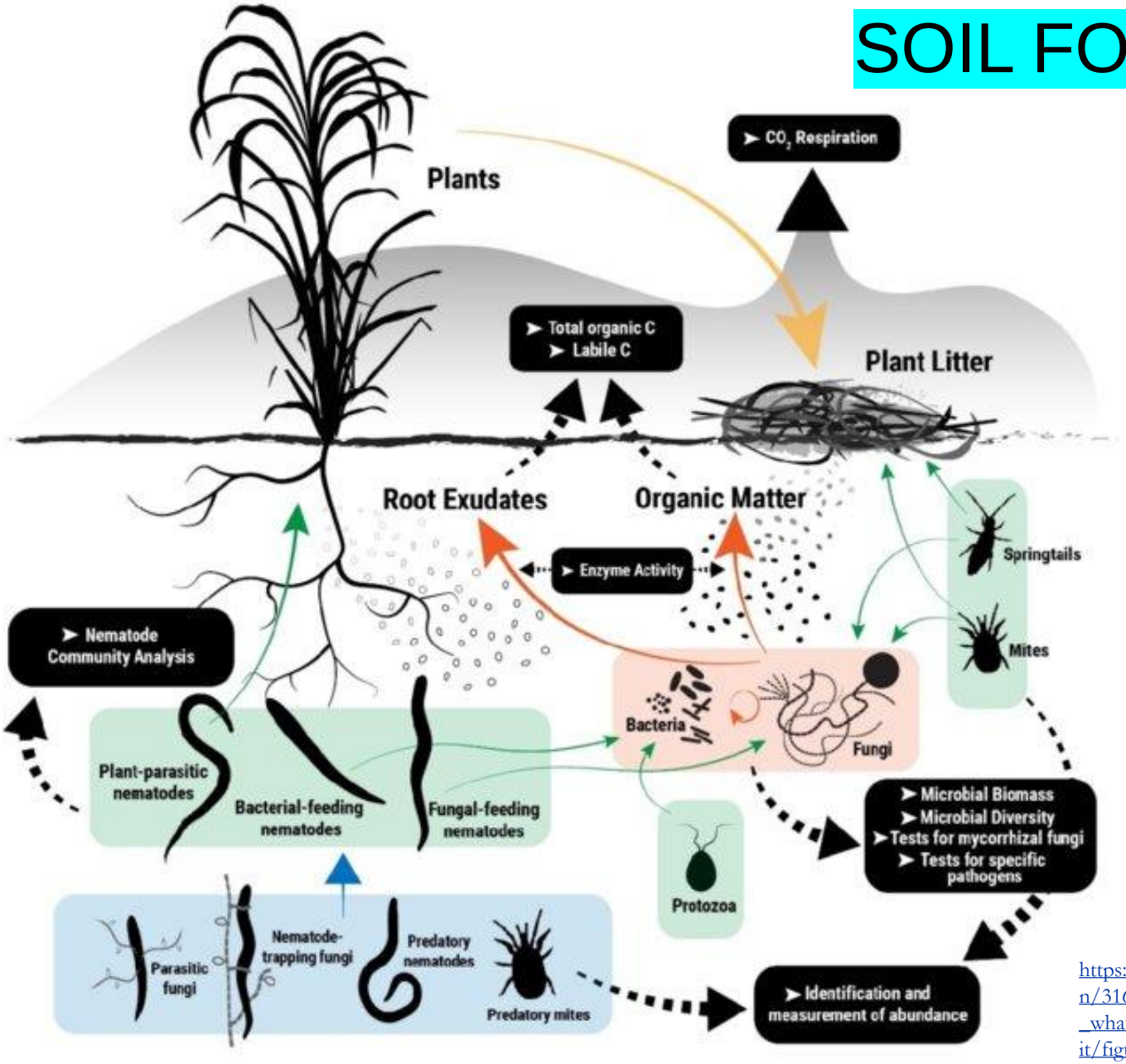
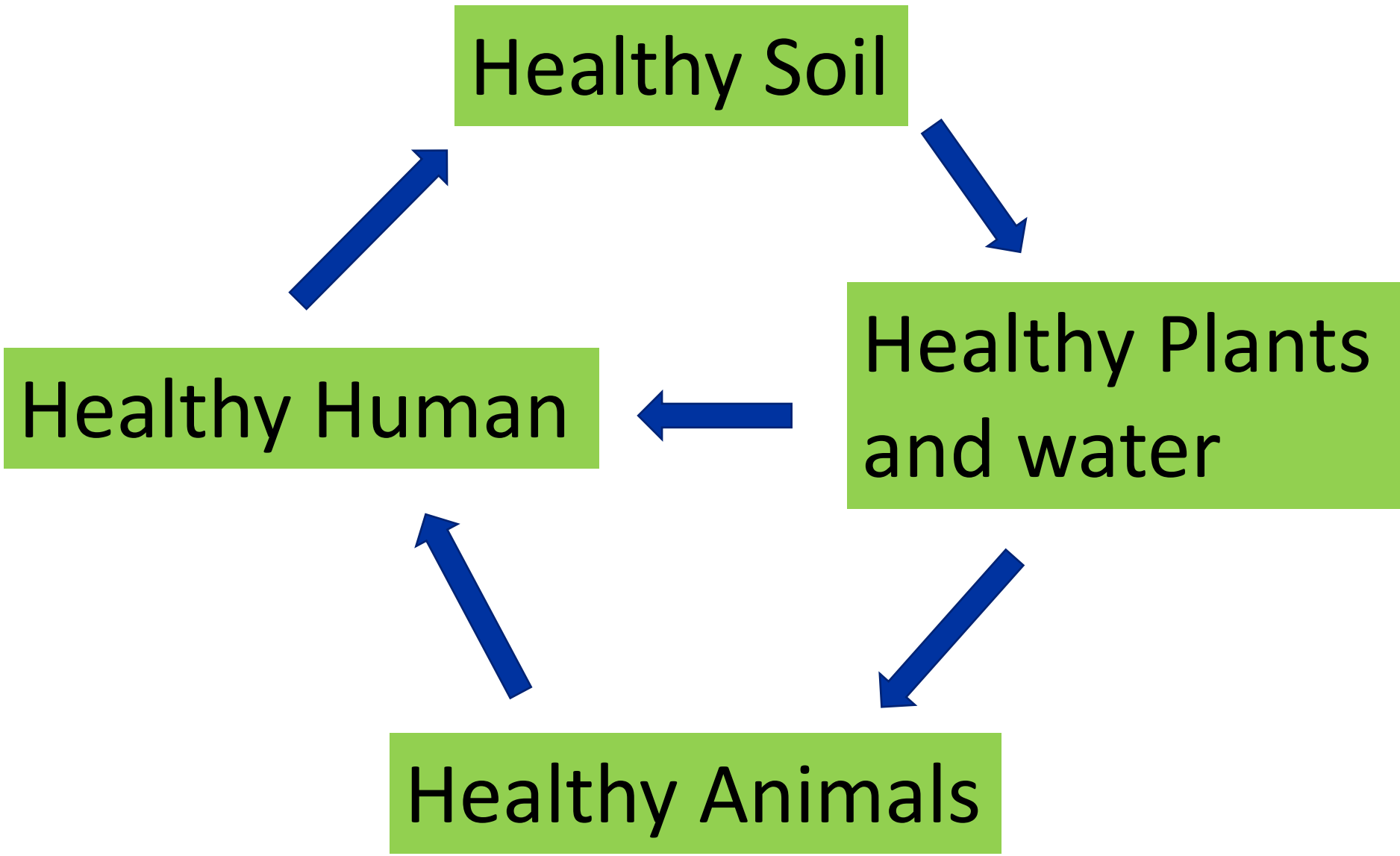
SOIL FOOD WEB



https://www.researchgate.net/publication/316820459_Soil_biological_health_-_what_is_it_and_how_can_we_improve_it/figures?lo=1

Healthy Earth



Soil Health = Soil Sustainability

The term Soil Health is used to assess the ability of a soil to:

1. Sustain plant (foods) and animal productivity and diversity;
2. Maintain or enhance water and air quality;
3. Support human health and habitation.

Healthy Soil

=

- Good structure
- High OM/nutrient content
- Low erodibility (surface cover)
- Good texture

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Add Soil Organic Matter

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Appropriate Management

Soil texture

Soil infiltration

Soil pH

Soil N, P, and K

WHAT IS HEALTHY SOIL?

- Good nutrient contents
- Good organic matter (carbon) content (~15 %)
- Good soil texture (about 40 % silt, 40 % sand, 20 % clay: loam soil)
- Good soil pore space (less compaction) (~50 %)
- Good drainage of surface soil (moderate speed)
- Good water holding capacity of soil (~40 %)
- Good coverage of cover crops

SOIL is a LIVING ORGANISM!!!

- SOIL breathes
- SOIL gets thirsty (needs water)
- SOIL gets hungry (needs foods)
- SOIL has skeletons
- SOIL has blood vessels
- SOIL is healthy with appropriate cares
- SOIL is sick – needs appropriate treatments

IS SOIL SAME WITH ME?

- Soil Pore Space: *lung, blood vessels*
- Soil water: *blood, body water*
- Soil aggregate/structure: *skeletons*
- Organic matter: *food (nutrients), multi-vitamins*
- Soil micro-organism/earth worms: *digestive system*

WHEN SOIL IS SICK

- No vegetations can live on soil.
- No soil micro-organisms and earthworms can live in soil.
- Soil color is too light or too gray.
- Soil makes bad smell.

- It produces unhealthy plants (foods).
- It makes unhealthy impact to environments and human.

What are Good Managements?

1. Soil test periodically *(blood test)*
2. Add organic matter/biochar
3. Control surface soil erosion (run-off by water/wind)
4. Plant cover crops
5. Add residue covers (mulching)
6. No-till / Conservation tillage
7. Crop rotations

FIVE PRINCIPLES OF SOIL HEALTH

- 1. Soil Cover.
- Maintaining plant residue or a living canopy on the soil surface minimizes erosion and weeds, moderates soil temperature, saves moisture and cuts compaction.
- In addition, a residue cover creates food and shelter for soil biology to thrive.

https://s3.amazonaws.com/media.sdsoybean.org/uploads/SDSL_Mag_Winter_2022_v4-002.pdf

- 2. Limited Disturbance.
- Tilled soils destroy soil aggregates to decrease water infiltration and storage.
- Organic matter is reduced through air exposure. Erosion increases with water runoff, and the wind carries it away.
- Soil biology is disturbed without living roots year-round. Chemical disturbance occurs with excessive use of pesticides and monocropping.

- 3. Living Roots.
- Maintaining a diversity of living roots from spring thaw to fall freeze delivers an energy source for healthy soil.
- Photosynthesis helps roots secrete exudates to form an active rhizosphere that feeds the soil organisms.
- Then the microorganisms produce nutrient-dense waste that feeds the plants.

- 4. Diversity.
- A corn-soybean rotation lacks plant and root diversity needed to supply the soil's diverse food needs to maintain a healthy diet— just like humans need.
- Rotating in a small grain is a great first step.

- 5. Livestock Integration.
- Returning livestock to grazing cover crops or crop residue in winter helps balance the carbon/nitrogen ratio, recycles animal waste into the soil for future crops, manages weed pressure, and reduces feeding costs.

- “By understanding the soil food web biological processes and the practices that improve soil health, it’s easy to see how feeding the soil will, in turn, feed our operations through the growth of a crop or livestock,” Vlieger says.
- “As producers experience this journey of making their soil more resilient and productive, over time, they see their operation become more profitable by reducing inputs. That makes them believers in this management change when soils prove they can work for you,” he says.

LOVE SOILS!!!

Techa Maka!!!