Bowen Island Garden Club

"The base line of the investigations of the future must be a fertile soil. The land must be got into good heart to begin with. The response of the crop and the animal to improved soil conditions must be carefully observed. These are our greatest and most profound experts. We must watch them at work; we must pose to them simple questions; we must build up a case on their replies in ways similar to those Charles Darwin used in his study of the earthworm.

Bowen Island Garden Club

Other equally important agencies in research are the insects, fungi and other microorganisms which attack the plant and the animal. These are Nature’s censors for indicating bad farming. To-day the policy is to destroy these priceless agencies and to perpetuate the inefficient crops and animals they are doing their best to remove. To-morrow we shall regard them as Nature’s professors of agriculture and as an essential factor in any rational system of farming.”

—Sir Albert Howard, An Agricultural Testament

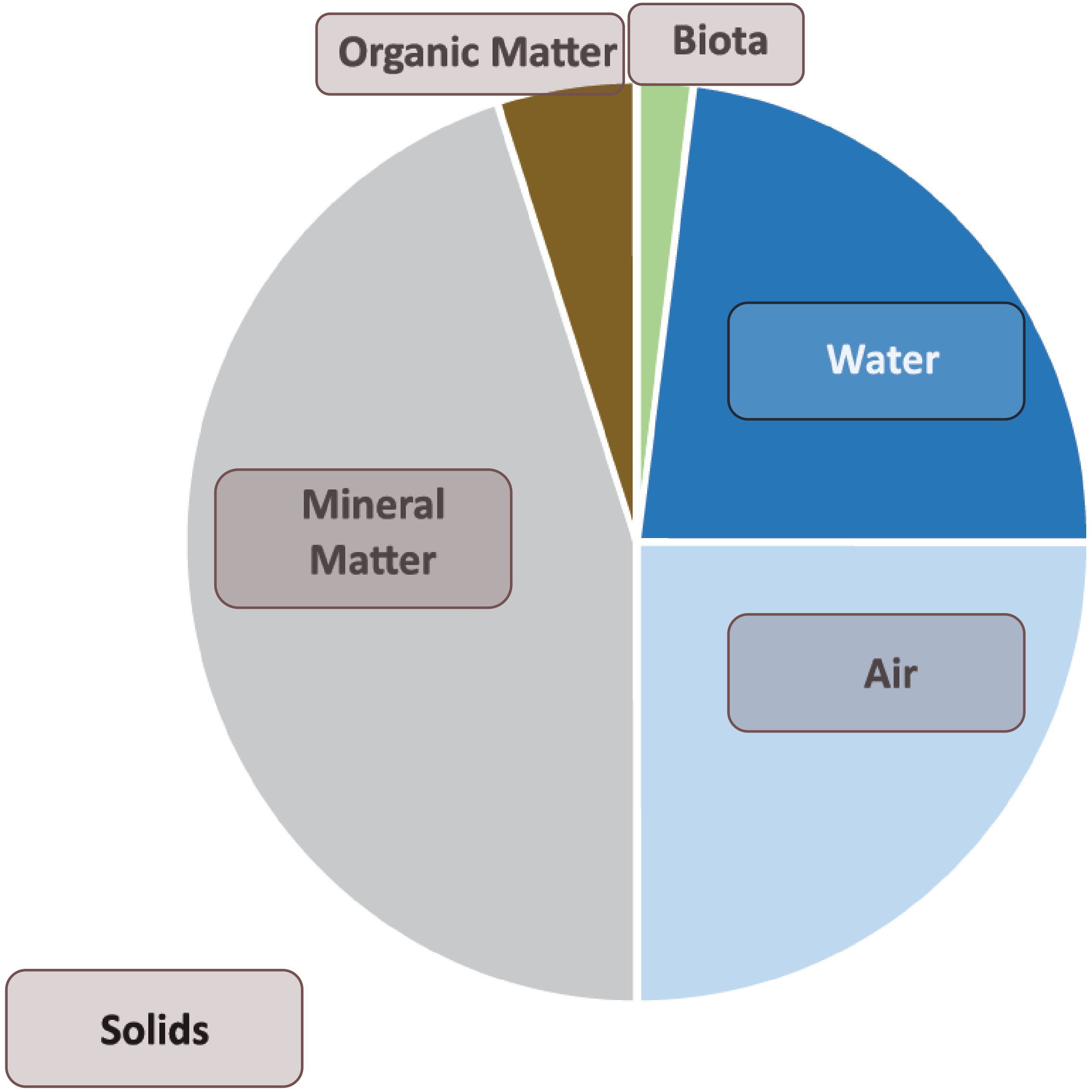
SESSION AGENDA

- Soil – an Ecological System
- Decomposition + Organic Matter
- Nutrient cycling + Soil Aggregates
- Garden Club Members – soil samples, test results, moving forward

Soil **is an** Ecological System

“It is a **community** of **living organisms** merged with the non-living components acting **AS A SYSTEM**.”

SOIL IS AN ECOLOGICAL SYSTEM



The network of pores are influenced by soil air and water. When water enters the soil, this network becomes blocked and the water allows nutrients to be transported through the soil. When water leaves, air comes in providing oxygen to aerobic organisms and plant roots.

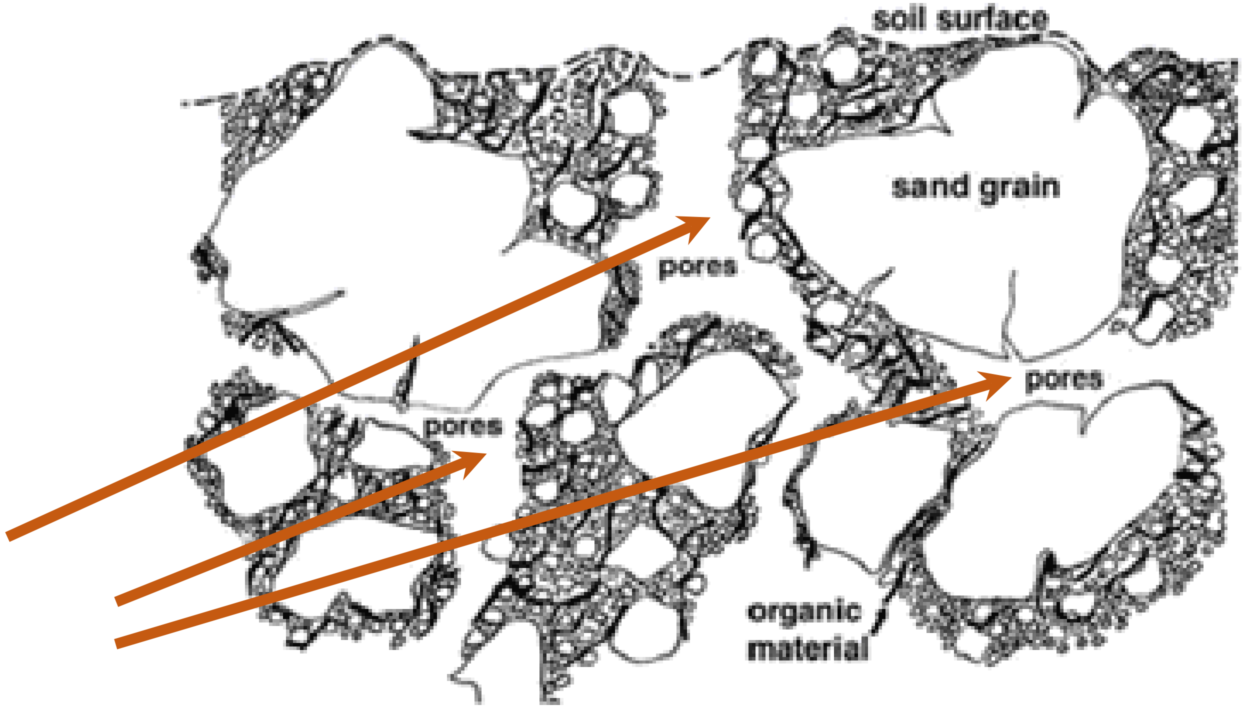


Image credit: Cornell University

Walter Jehne – soil carbon sponge; add nothing

SOIL IS AN ECOLOGICAL SYSTEM

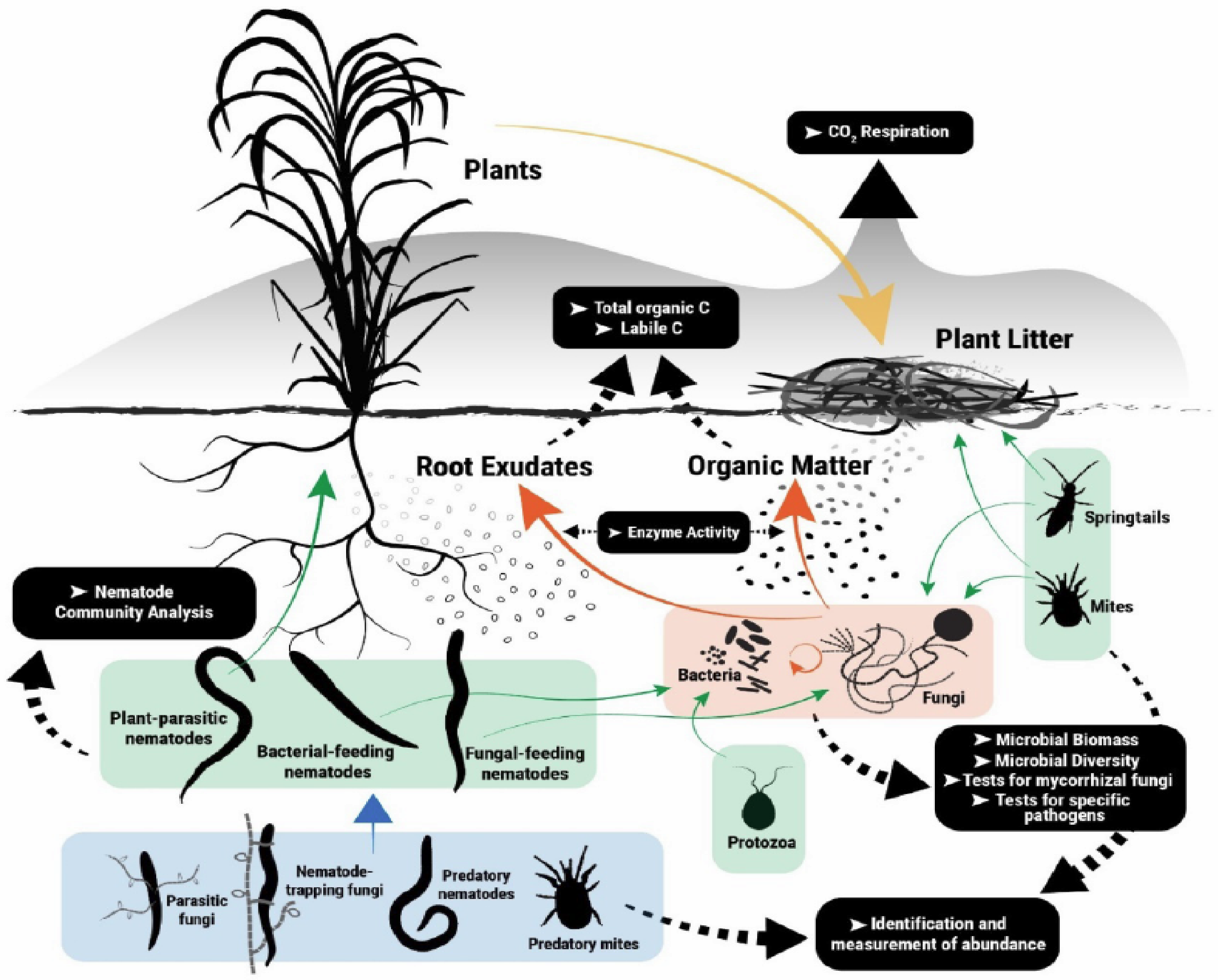


Fig. 2—The soil food web with various indicators of soil health overlaid (black boxes).

Image credit: Richard Brackin, et al. – Soil biological health – what is it and how can we improve it?

With **ecology**, we acknowledge events, the dynamic relationships between **diverse** fauna, flora and their interactions with the soil environment.

DECOMPOSITION

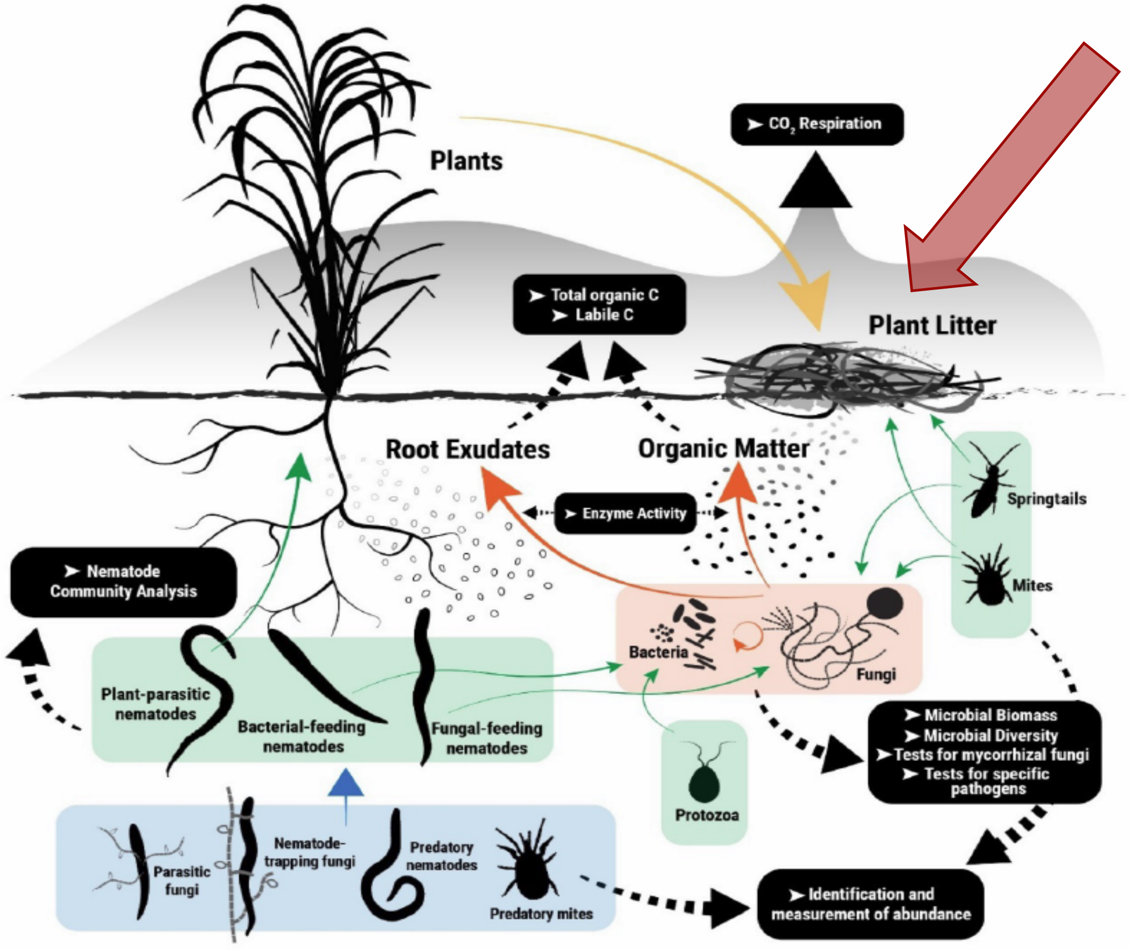


Fig. 2—The soil food web with various indicators of soil health overlaid (black boxes).

Image credit: Richard Brackin, et al. – Soil biological health – what is it and how can we improve it?

- **What** is it?
- **How** does it work?
- **Why** is it important?
- **How** can we support this process?

DECOMPOSITION – WHAT IS IT?

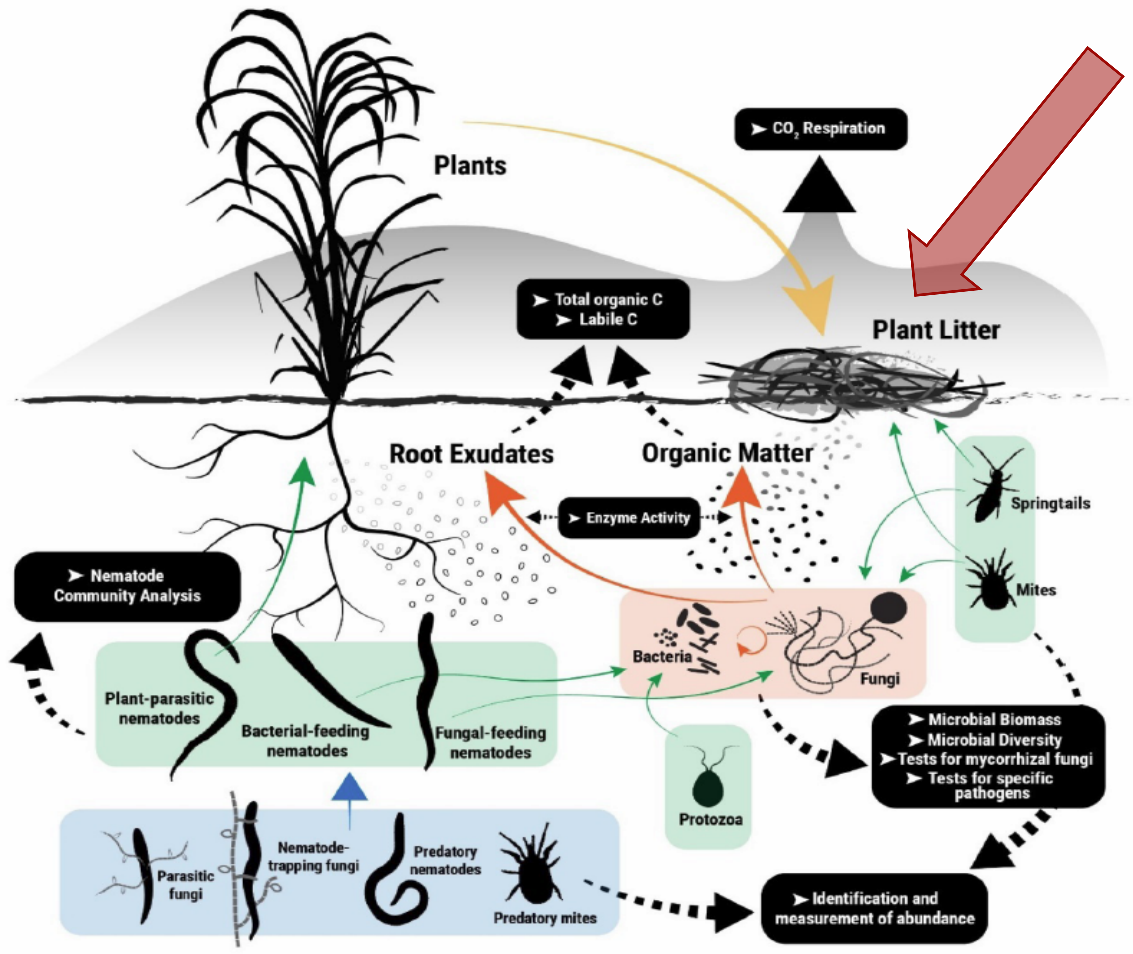


Fig. 2—The soil food web with various indicators of soil health overlaid (black boxes).

Image credit: Richard Brackin, et al. – Soil biological health – what is it and how can we improve it?

- Breakdown or disappearance of **organic matter**.
- **Alternative** process for releasing nutrients into the soil food web.
- Fuels formation of **soil structure**.

DECOMPOSITION – HOW DOES IT WORK?

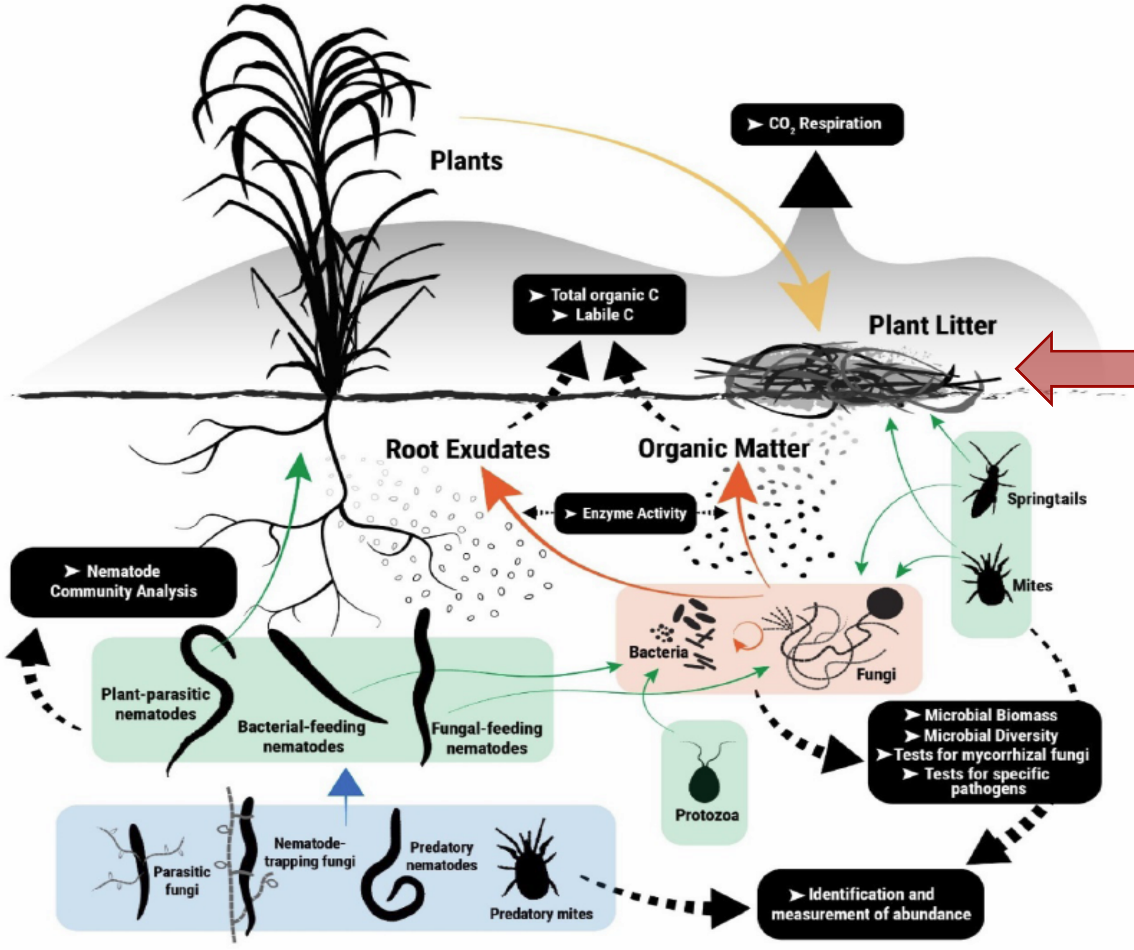


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Image credit: Richard Brackin, et al. – Soil biological health – what is it and how can we improve it?

climate

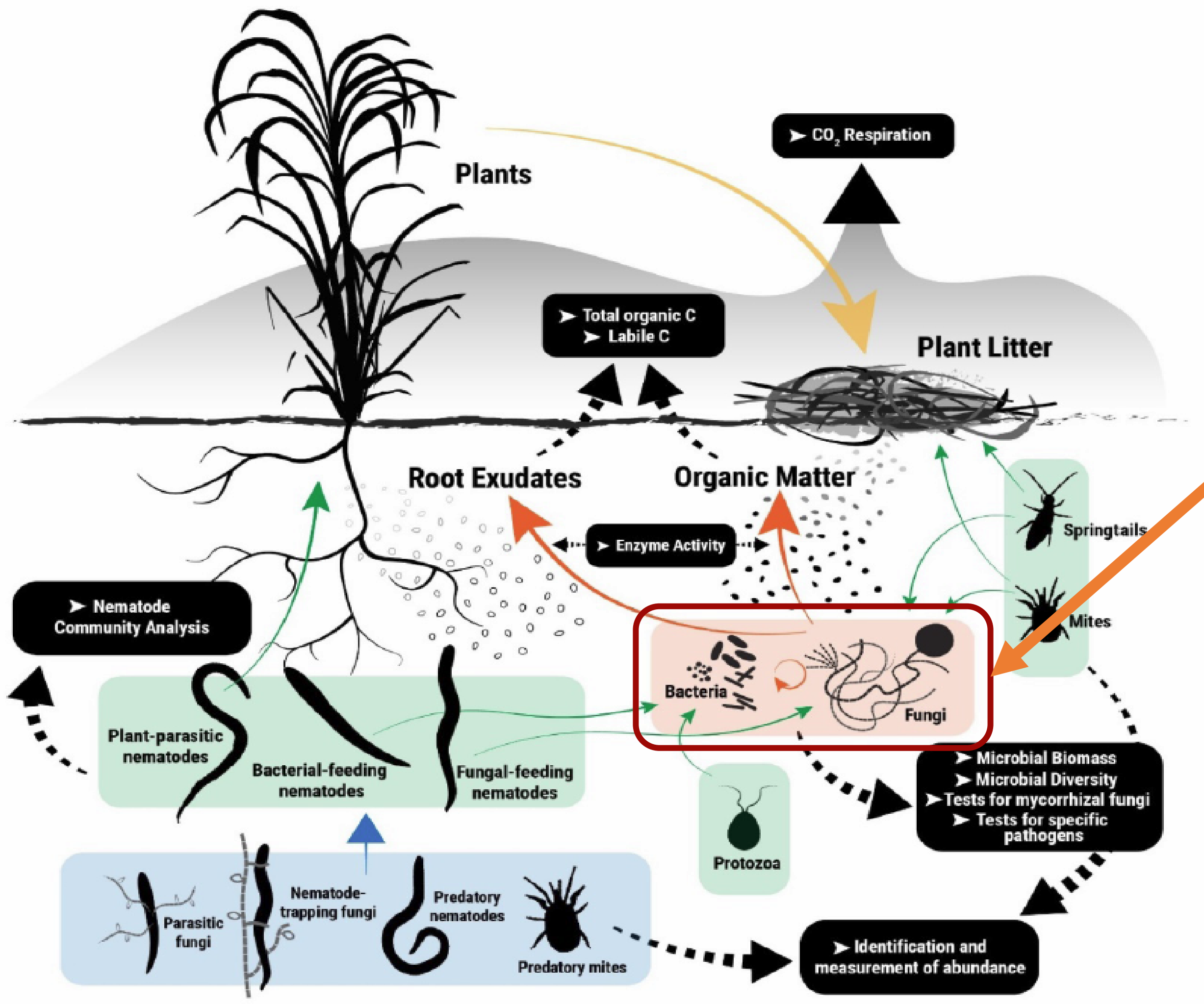
soil fauna and microbes

substrates varying quality

soil properties

- Labile, recalcitrant, intermediate
- Microclimates – temperature, moisture

DECOMPOSITION – HOW DOES IT WORK?



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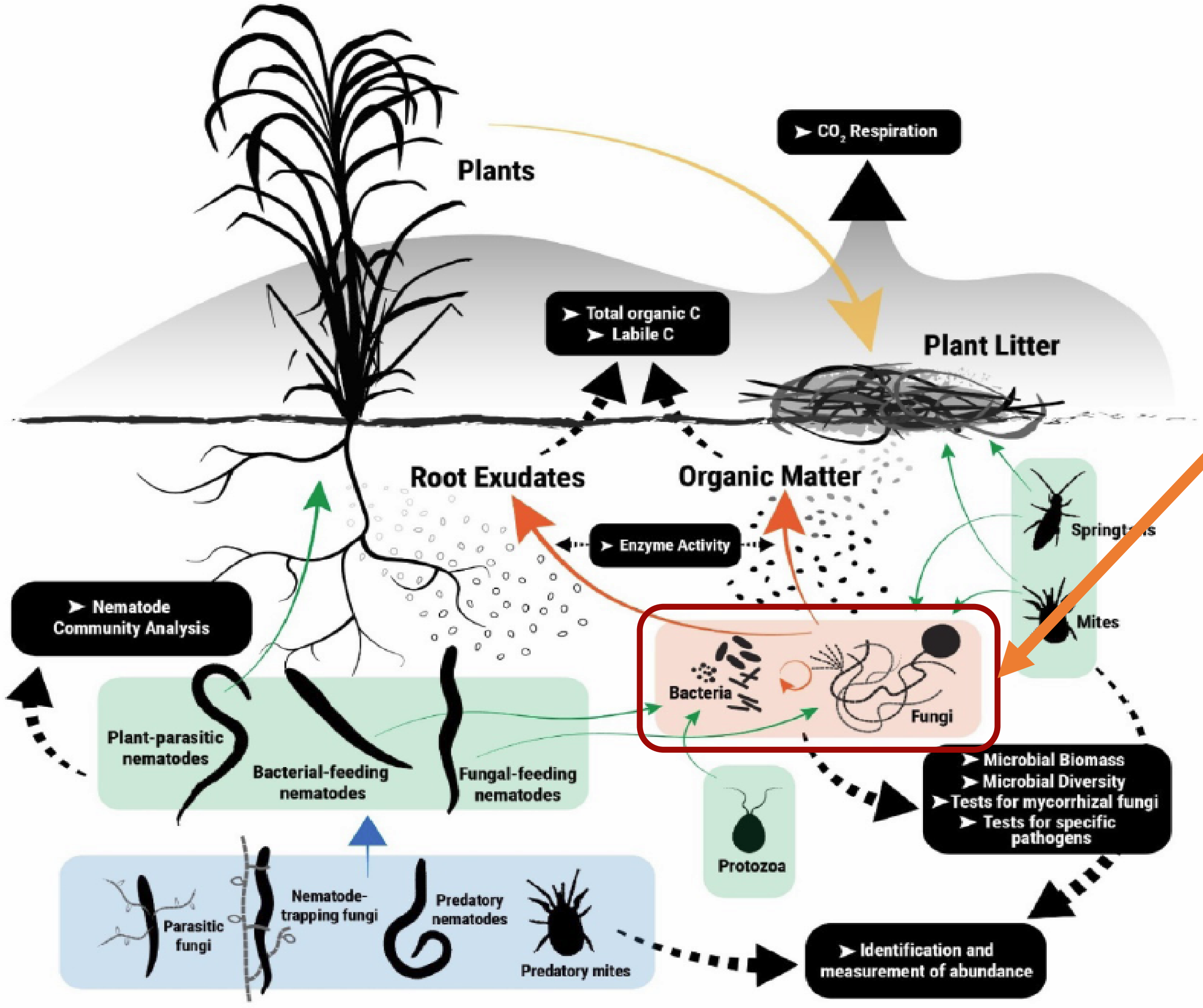
Microorganisms

ULTIMATE DECOMPOSERS

bacteria and fungi

DECOMPOSITION – HOW DOES IT WORK?



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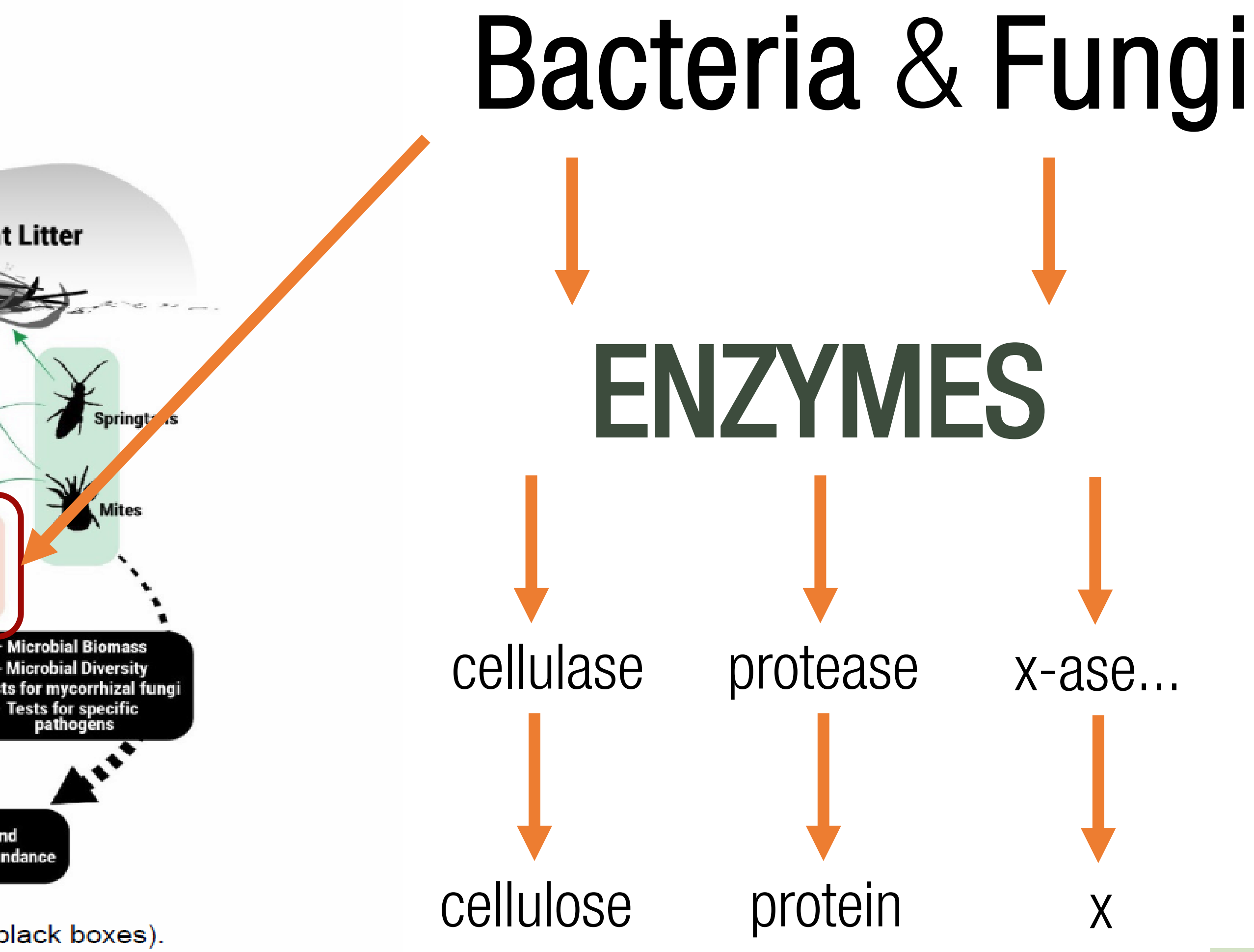
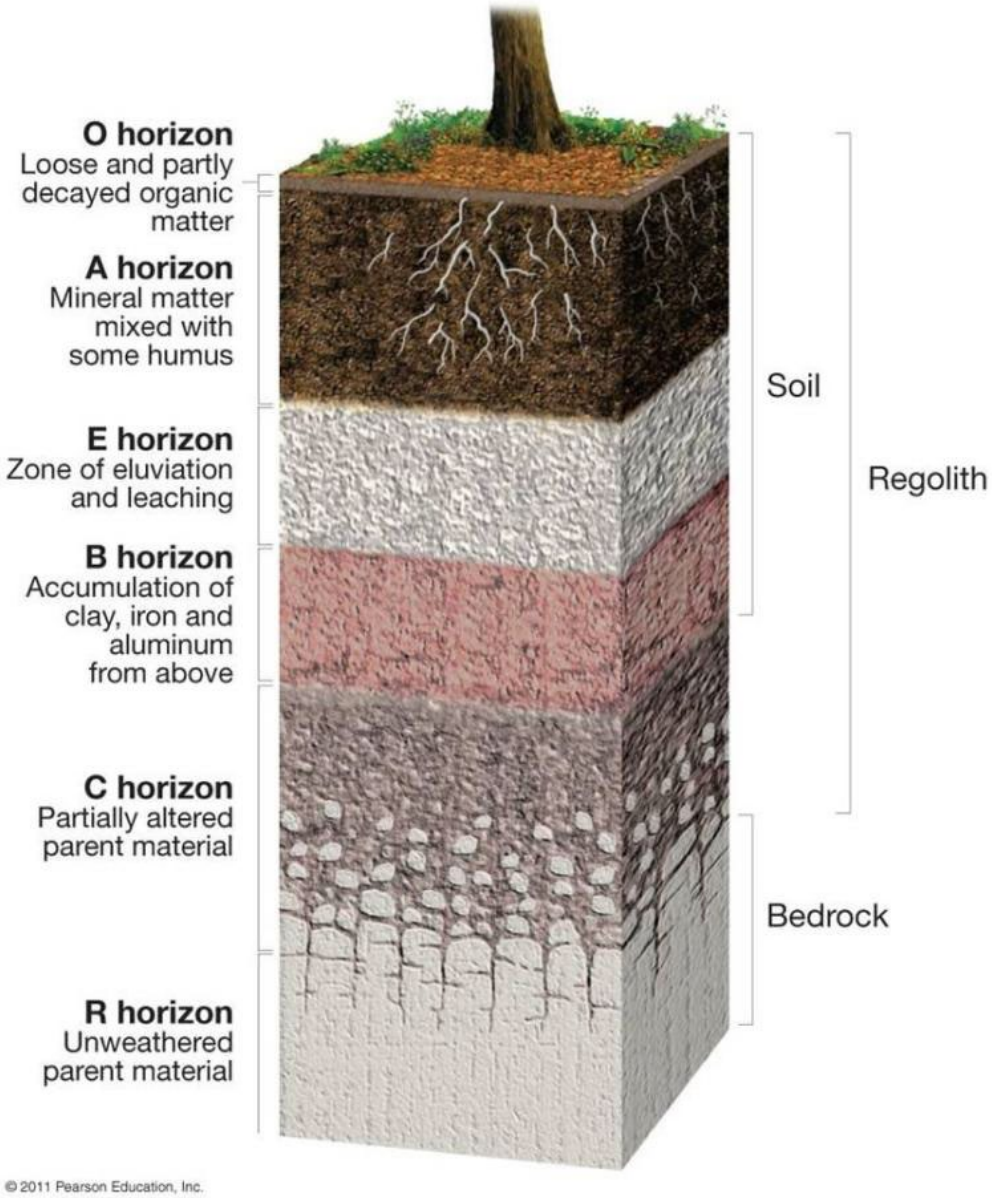


DECOMPOSITION – HOW CAN WE SUPPORT THIS PROCESS



- Increase diversity above and below ground.
- Reduce disturbance
- Keep soil covered
- Incorporate **native** plants

DECOMPOSITION – WHY IS IT IMPORTANT?

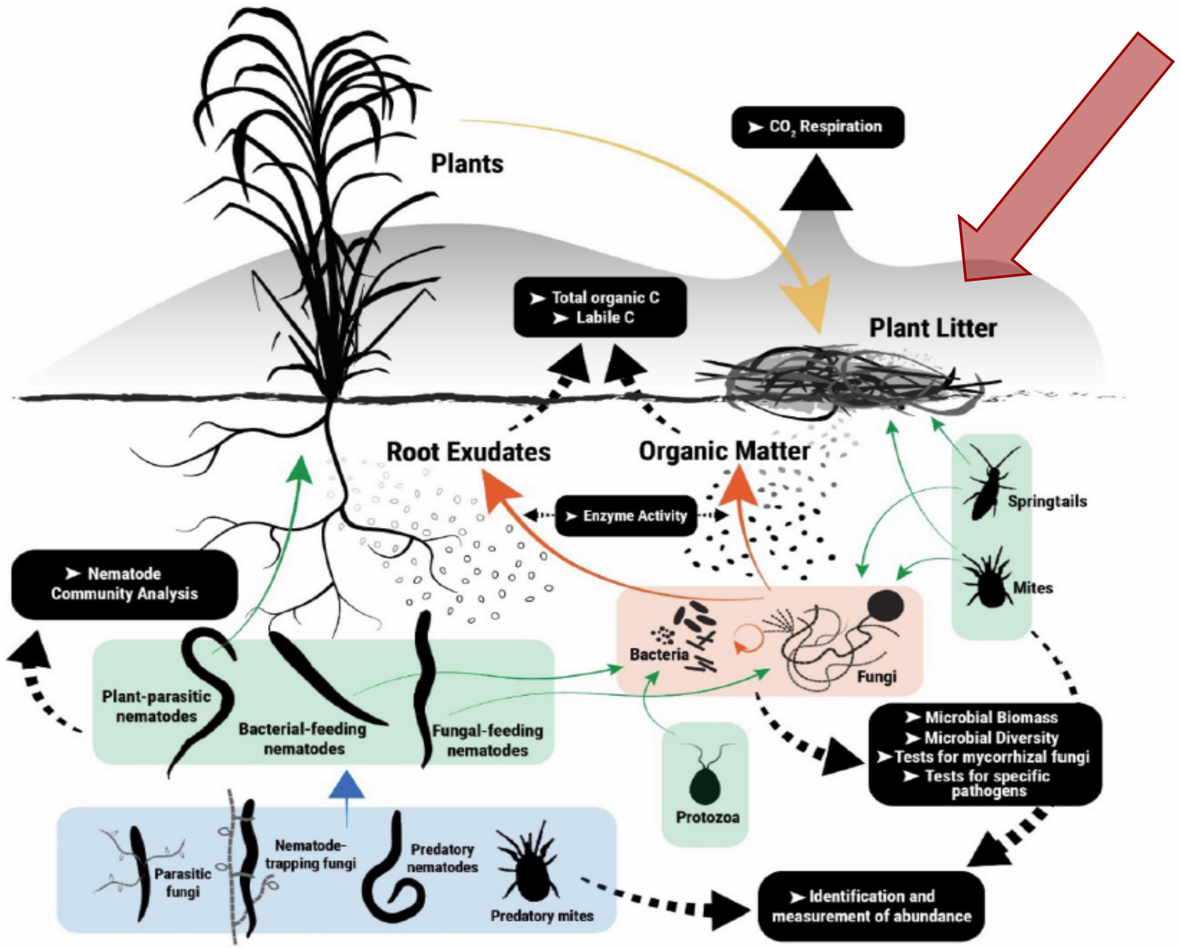


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Image credit: Richard Brackin, et al. – Soil biological health – what is it and how can we improve it?

- Soil structure formation.
- Suppression of diseases, pests and pathogens.
- Reduce dependence on chemical inputs.
- *Responsible for the creation of different forms of organic matter.

Soil organic matter

Sum of all naturally and thermally altered biologically-derived organic materials found in the soil or on the soil surface

Living organic matter

- **Phytomass**
  Living tissues of plant origin
- **Microbial biomass**
  Organic materials associated with living soil microorganisms
- **Faunal biomass**
  Organic materials associated with living soil animals

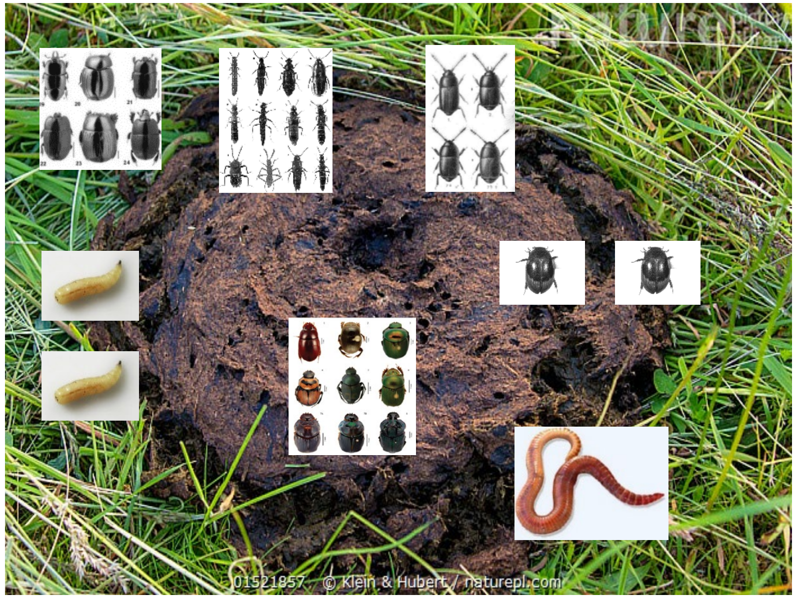
Non-living organic matter

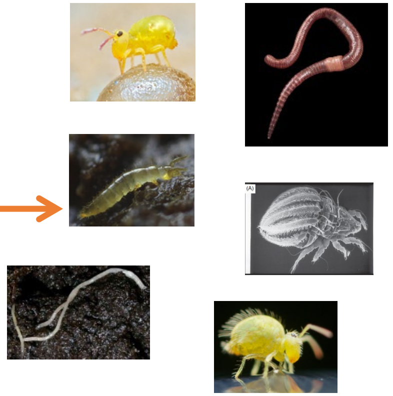
- **Dissolved organic matter**
  <0.45 µm diameter organic materials in solution
- **Particulate organic matter**
  Organic fragments with a recognizable cellular structure
  - **Litter**
    Organic materials located at the soil surface and devoid of mineral particles
  - **Macro-organic matter**
    Fragments of organic material > 50 µm diameter
  - **Light fraction**
    Organic materials separated from soils by flotation
- **Humus**
  Amorphous organic materials
  - **Non-humic biomolecules**
    Organic molecules with identifiable chemical structures which can be placed into discrete classes of biopolymers
    - polysaccharides
    - proteins
    - waxes
    - lignin
  - **Humic substances**
    Organic molecules that do not have chemical structures similar to discrete biopolymers
    - humic acid
    - fulvic acid
    - humin
- **Inert organic matter**
  Highly carbonized organic materials including charcoal and charred plant materials

SOM vary in:
- Physical size
- Chemical composition
- Degree of association w/ soil minerals
- Extent of decomposition

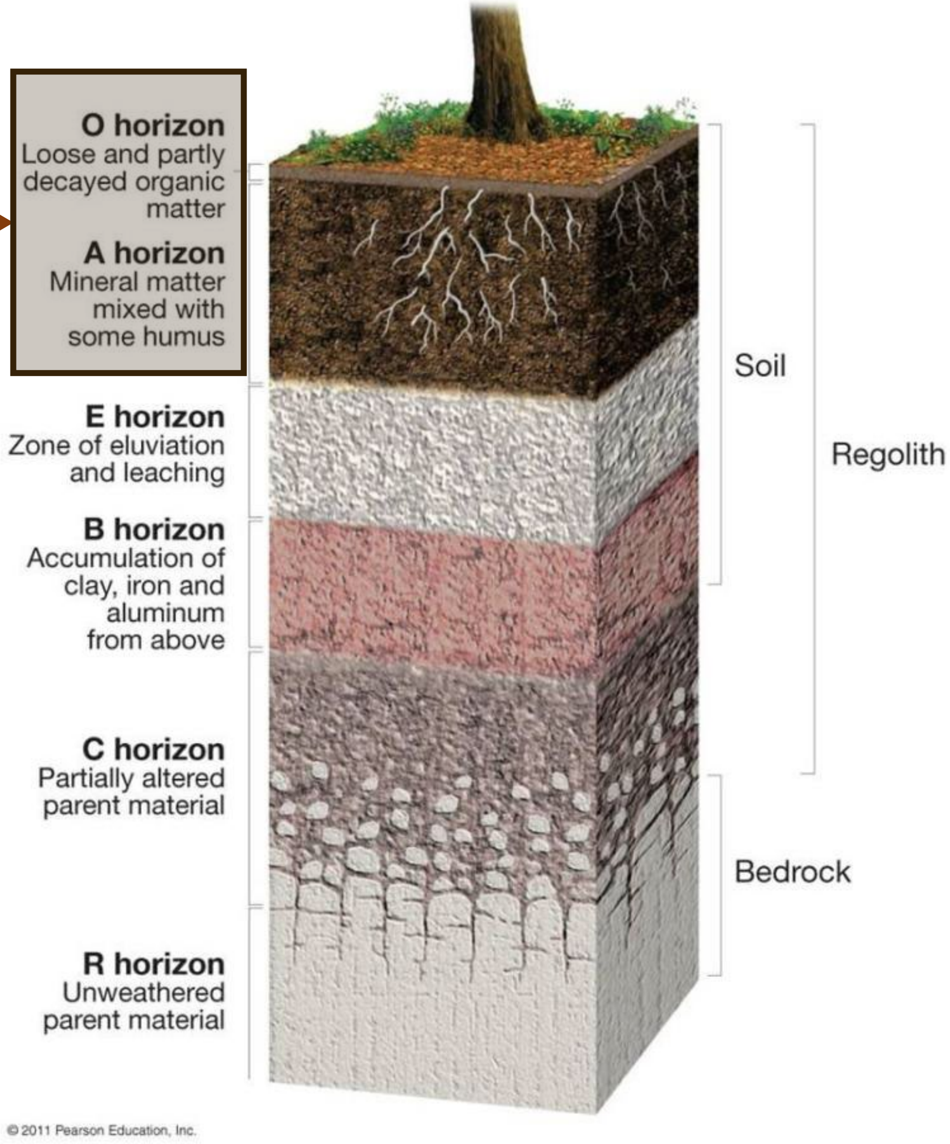
Image credit: A definition of soil organic matter and descriptions of its various components (From Baldock and Skjemstad, 1999)

DECOMPOSITION - ORGANIC MATTER





These surface layers, which are usually no more than 10-15 cm deep, are the **most functionally important zones** as they determine a soil's capacity to respond to environmental stresses and carry out ecosystem functions.



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    - proteins
    - waxes
    - lignin
  - **Humic substances**
    Organic molecules that do not have chemical structures similar to discrete biopolymers
    - humic acid
    - fulvic acid
    - humin
- **Inert organic matter**
  Highly carbonized organic materials including charcoal and charred plant materials

** How long does it take for things to break down and become available to be used again? **

RootShoot

DECOMPOSITION - ORGANIC MATTER - IMPORTANCE

Impacts of Organic Matter on Soil Properties

BIOLOGICAL
- Increases the biomass and diversity of the microbial community
- Provides the underlying substrate for the entire soil food web
- Influences nutrient cycling
- Enhances suppressiveness to soilborne pathogens

PHYSICAL
- Stabilizes soil structure
- Promotes aggregation of mineral particles
- Reduces bulk density
- Increase $H_2$0 infiltration rates
- Improves $H_2$0–holding capacity
- Moderates fluctuations in temperature

CHEMICAL
- Stores and releases nutrients
- Enhances nutrient availability via microbial activity
- Contributes to cation exchange capacity (CEC)
- Enhances pH buffering
- Adsorbs organic compounds (eg. Pesticides, toxins)
- Affects the mobility of heavy metals

Image Credit: Impacts of organic matter on various soil properties. The solid arrows indicate that each soil property can be affected by other properties.
Graham R. Stirling – Soil Ecosystem Management in Sustainable Agriculture

RootShoot

QUESTIONS?

SOIL AGGREGATES

AGGREGATION ➔ "The formation of things into a cluster" – Dictionary.com

SOIL AGGREGATES ➔

- Naturally occurring cluster or group of soil particles in which the forces holding the particles together are much stronger than the forces between adjacent aggregates *(Martin et al., 1955)*
- Aggregates are the basic units of soil structure.

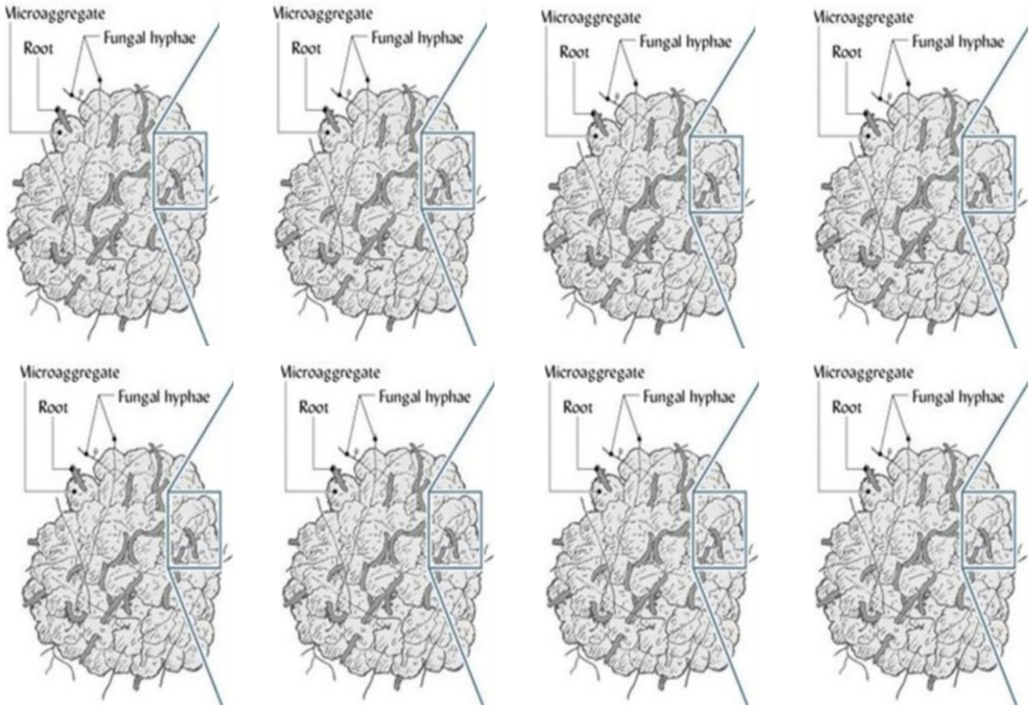
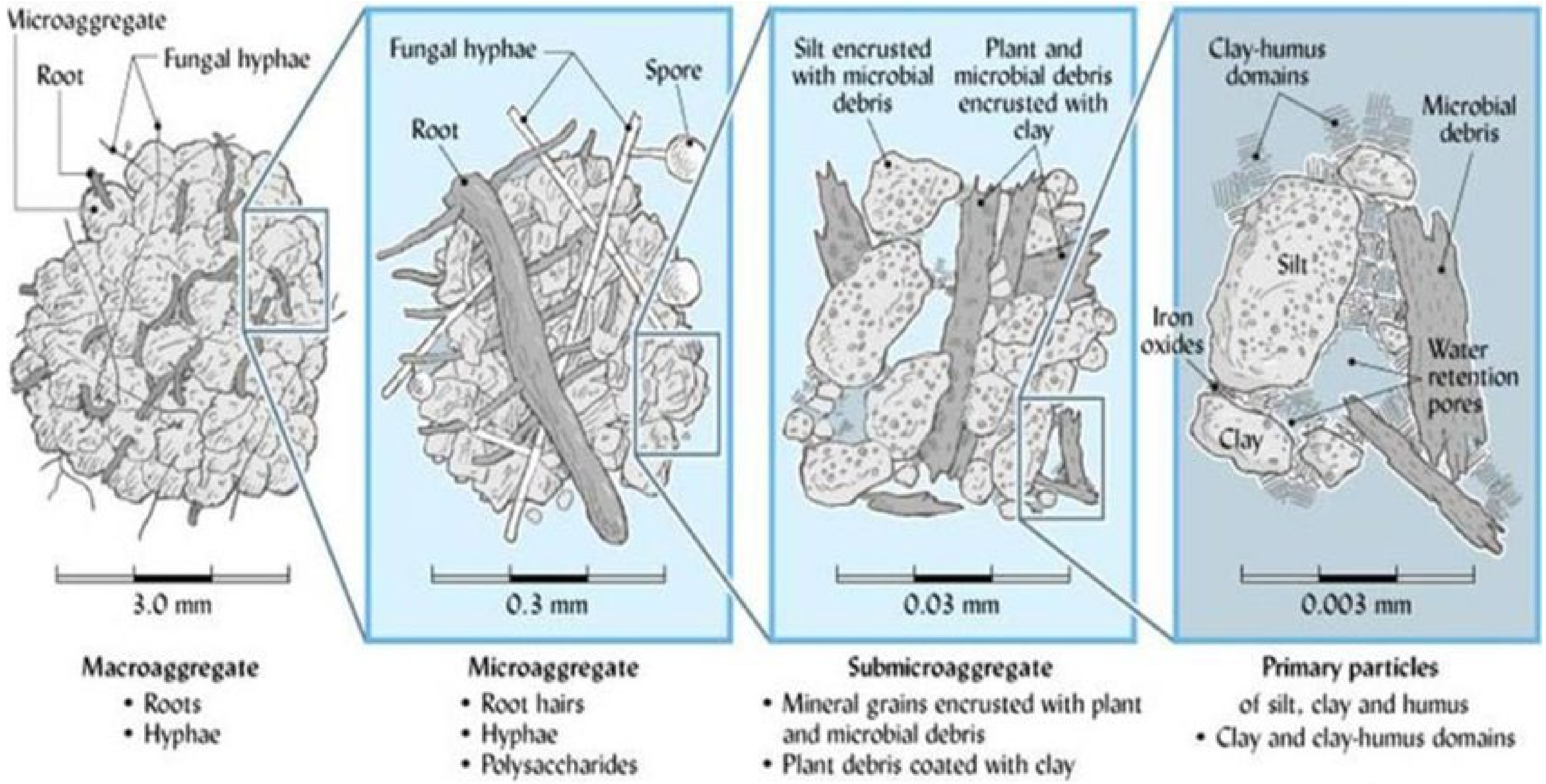


Image credit: Soil aggregate size and composition; Brady, N. C., and Weil, R. R. (2010). Elements of the nature and properties of soils. Upper Saddle River, NJ: Pearson Prentice Hall.

SOIL AGGREGATES



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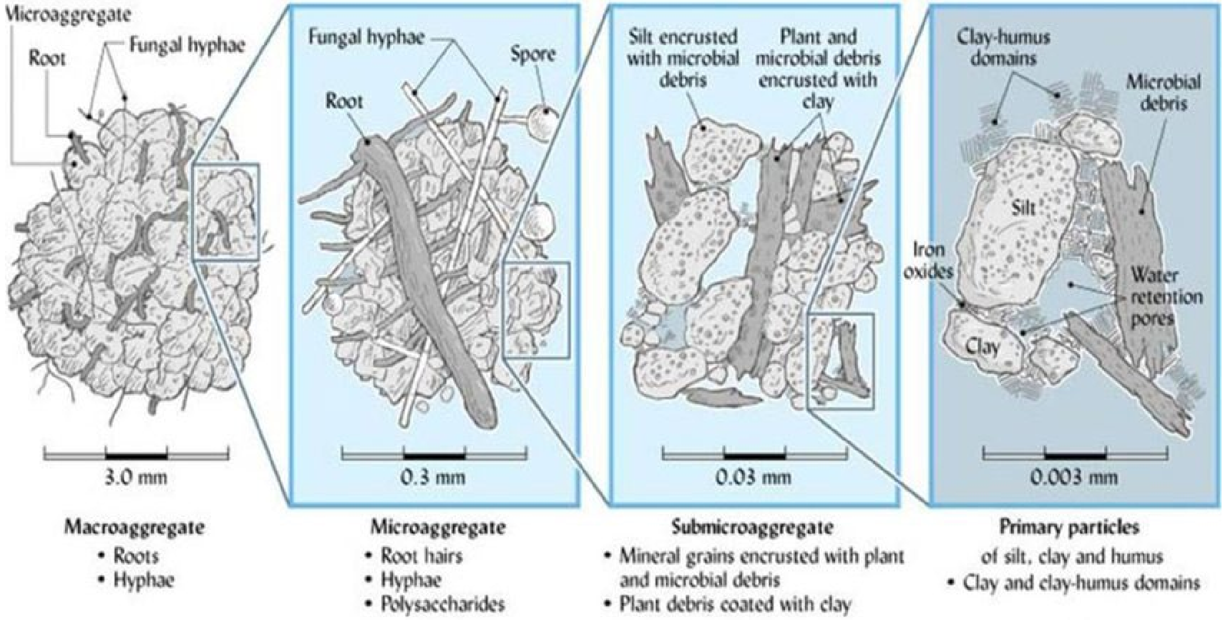
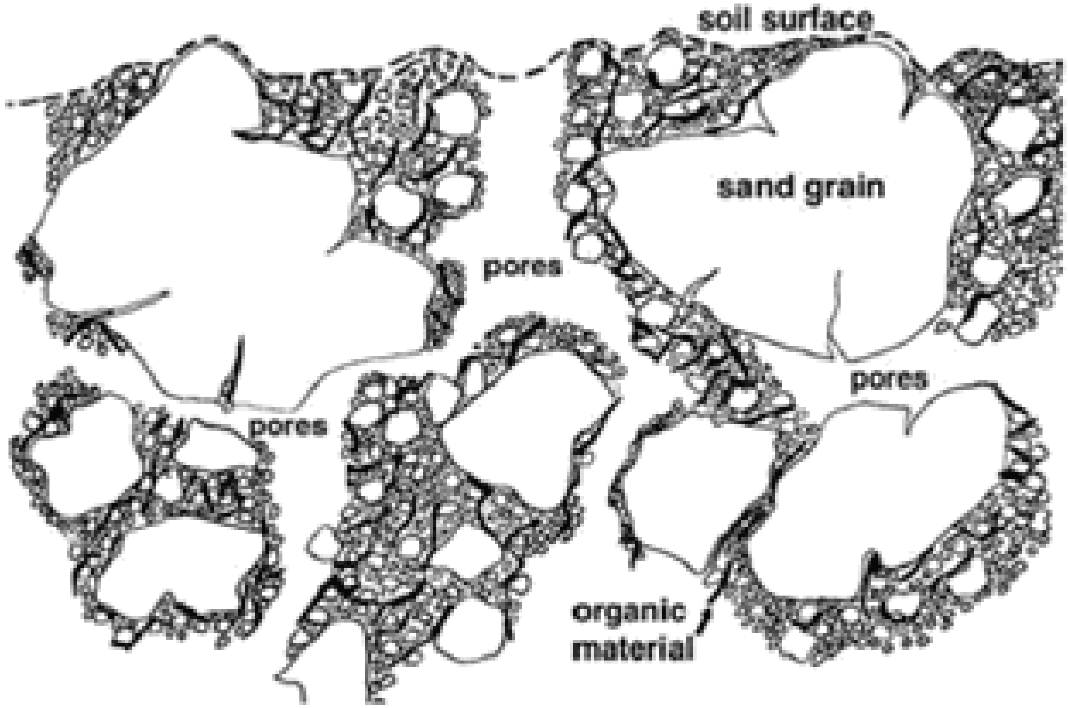
WHY SOIL AGGREGATES?

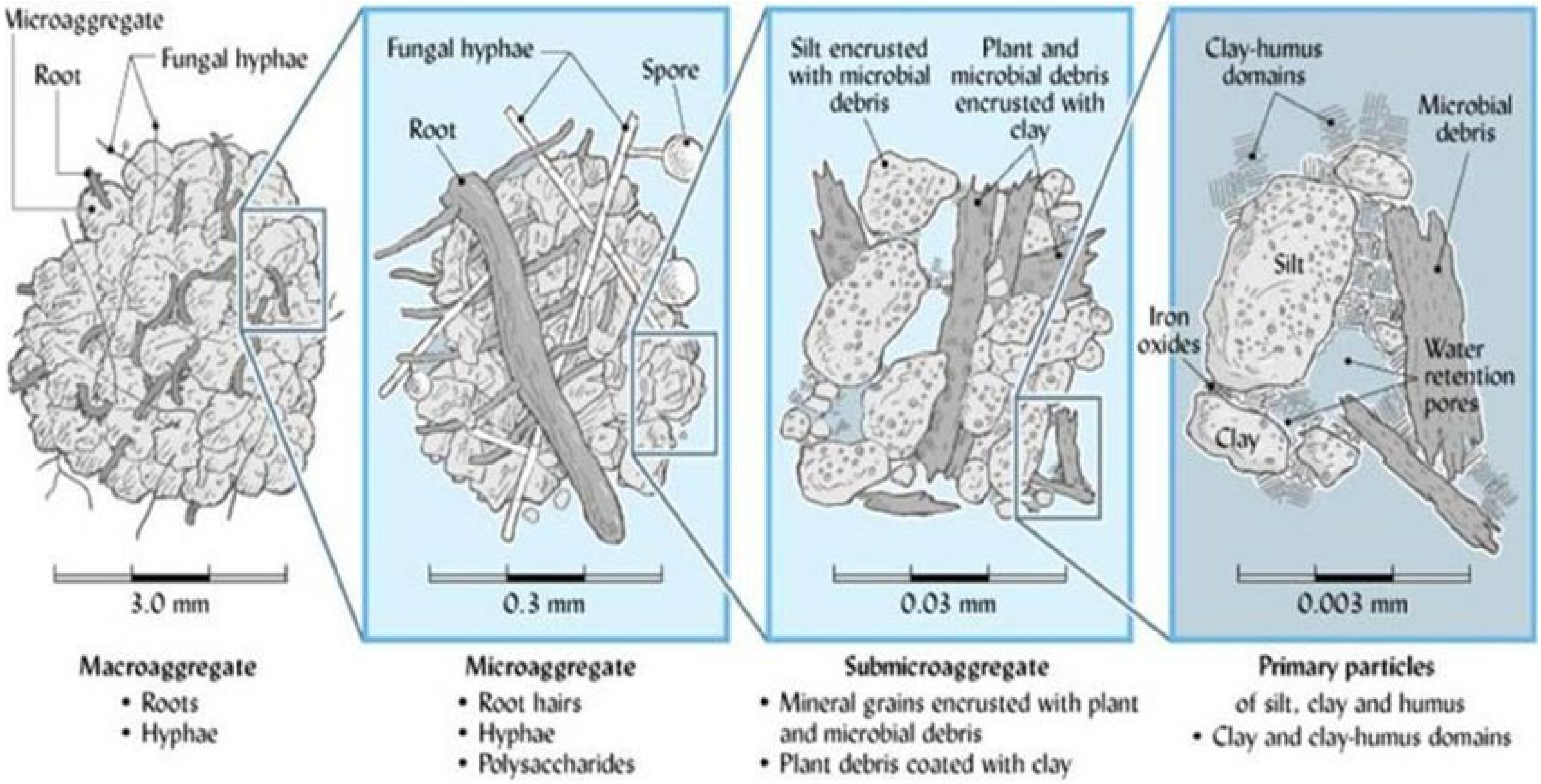




Walter Jehne – soil carbon sponge; add nothing

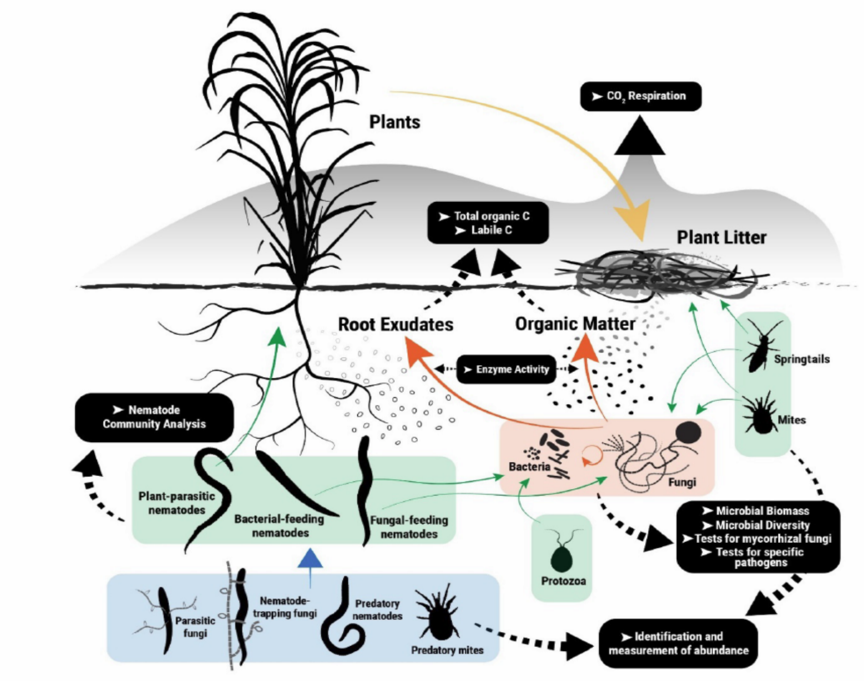
- Soil aggregates **store** and **supply** organic matter.

WHY SOIL AGGREGATES?



- Soil aggregates provide **large** and **small** pore spaces.

SOIL AGGREGATES



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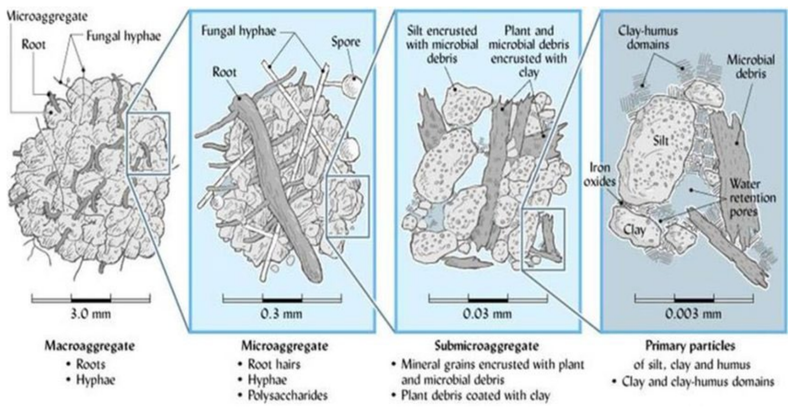
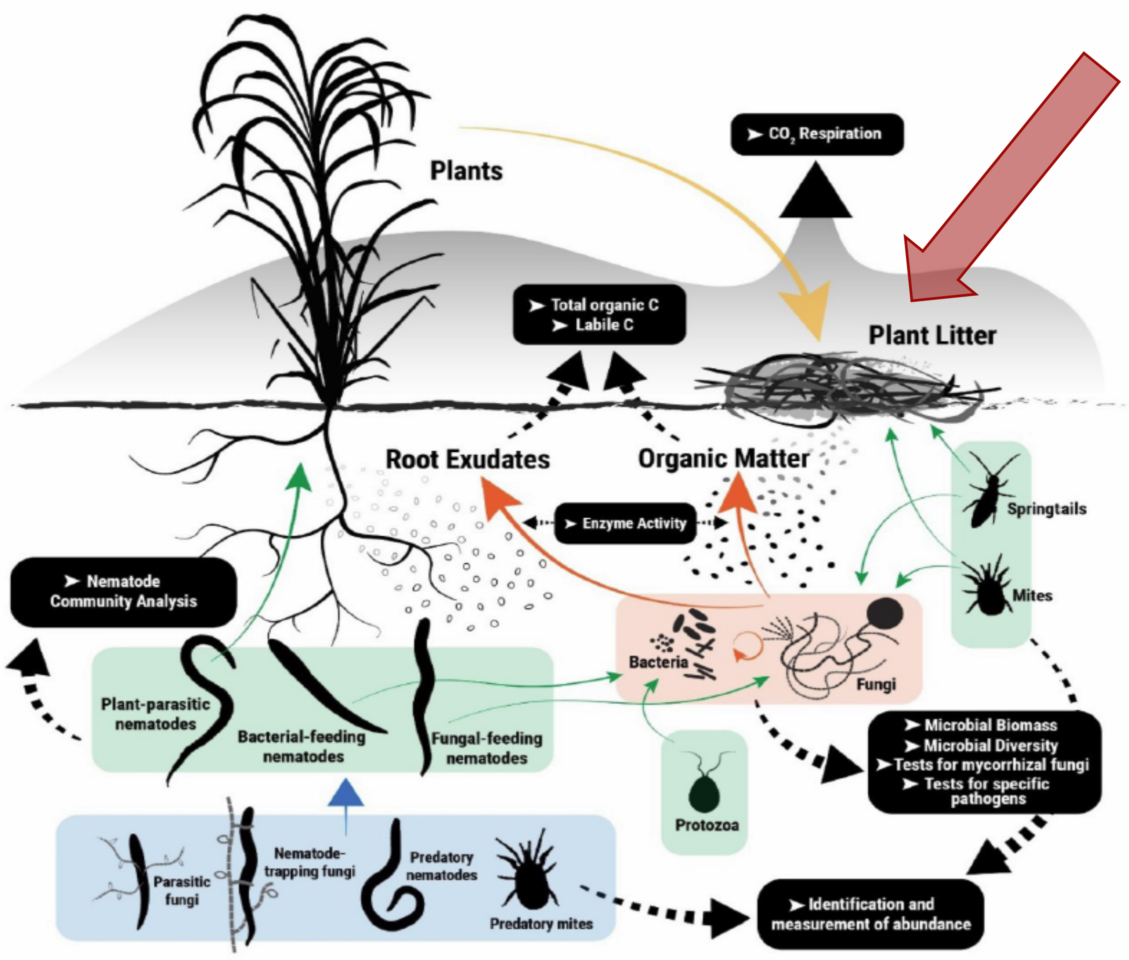


AGGREGATE FORMATION

↑ ↑ ↑

BIOLOGY	CHEMISTRY	PHYSICS
↑	↑	↑
Input of fresh organic matter	**Decomposition** of organic matter	**Formation** of mineral + organic compound

NUTRIENT CYCLING



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WHAT IS NUTRIENT CYCLING

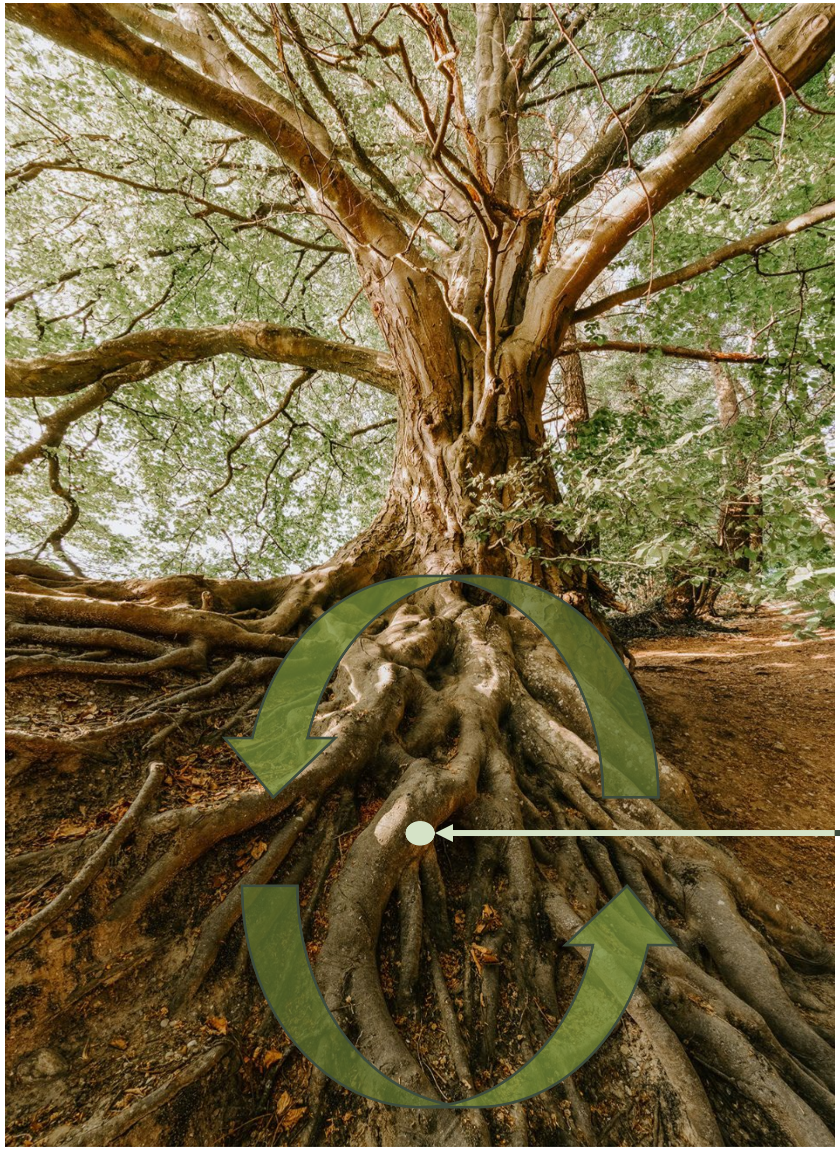


Image credit: Felix Mittermeier

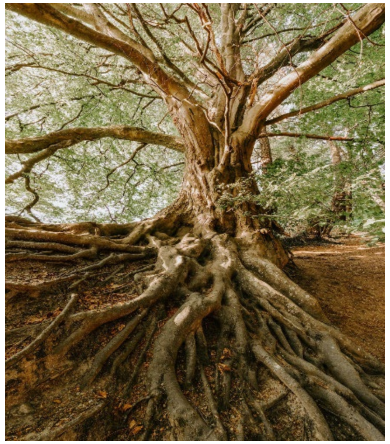
NUTRIENT CYCLING

Use, movement and recycling of nutrients in the environment

Restore process of DECOMPOSITION

NUTRIENT CYCLING AND DECOMPOSITION

Bacteria and fungi need more than just root deposits.

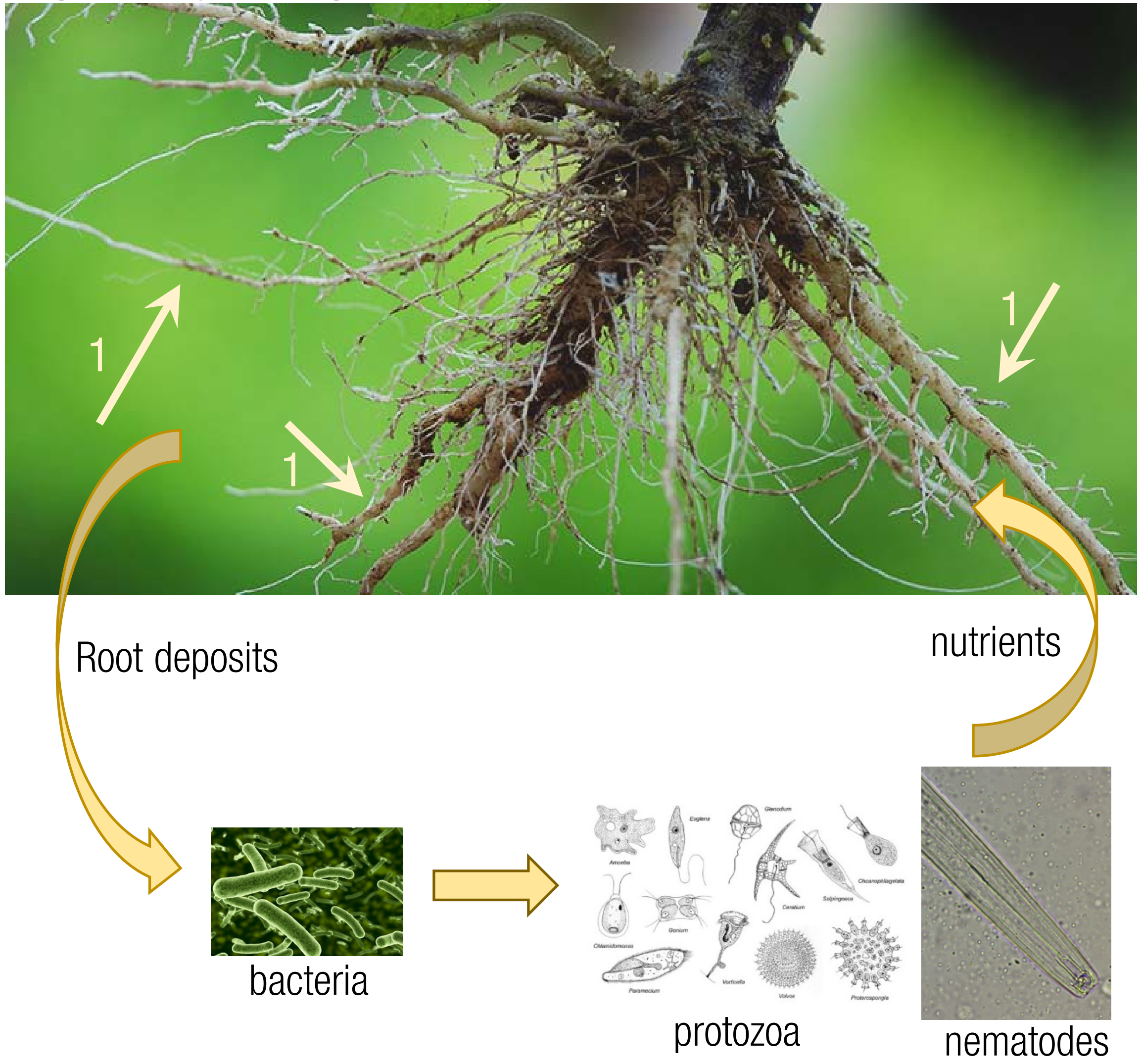






Through decomposition, nutrients are released from organic matter and cycled back into the system.

NUTRIENT CYCLING – HOW DOES IT WORK?

Image credit: https://morningchores.com/plant-roots/



1. Plants release carbon from their roots, also called ‘rhizodeposition’.

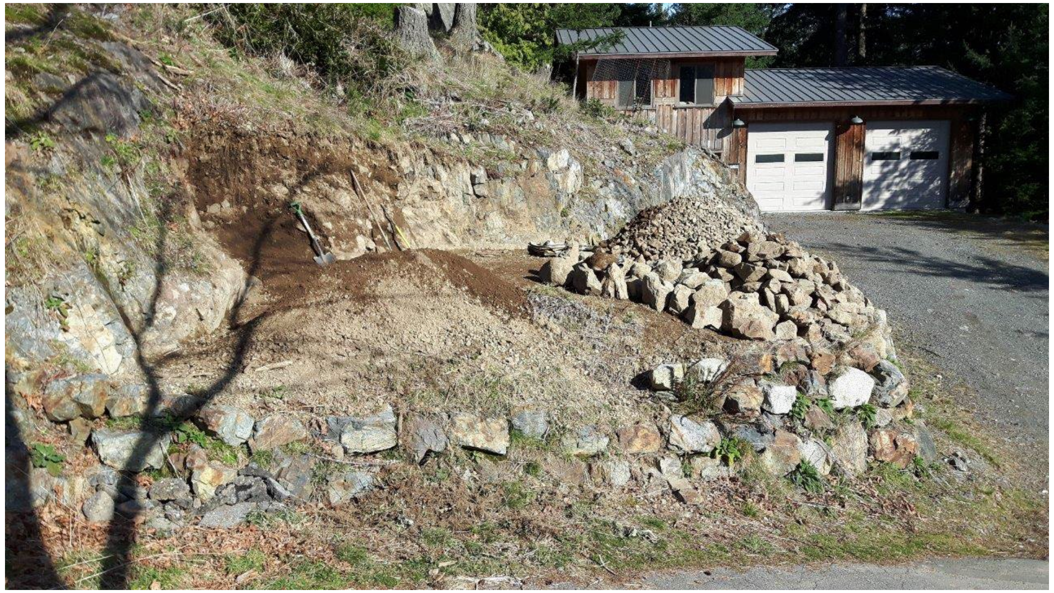
2. Bacteria is stimulated by plant roots.

3. Stimulation of bacterial-feeders (protozoa – amoeba, flagellates and nematodes)

4. Nutrients are released by predators from grazing on bacteria. 💩 Cycle.
   - e.g. NO_3- (nitrate) – form of nitrogen that our vegetable crops need.

QUESTIONS?

CASE STUDY – HOLLY CLEATOR



SITE SUMMARY

- First year veggie garden.
- Raised boxes built last year (July – August)
- Located on a slope at the base of a cliff. Slope had been blasted ~10 years ago. Rock wall constructed, and added fill.

CASE STUDY – HOLLY CLEATOR

SITE SUMMARY

- Last September, planted field peas + straw mulch
- Recently, field peas were chopped, dropped and lightly turned in.

CASE STUDY – HOLLY CLEATOR

SITE SUMMARY

- For 10+ years, area was left alone. Grew mostly weeds.
- Last year, Holly excavated out as much of the fill and levelled to height of the rock wall.
- Built raised based using lasagna technique.

RootShoot

CASE STUDY – HOLLY CLEATOR

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Fungal to Bacterial Ratio (F:B)	(µg/g)	**0.38:1**		***0.5:1 - 0.8:1***	Acceptable	Great first year!
Total Fungi	(µg/g)	760	270	*135 - 360*	Very Good	Diverse fungal biomass present
Total Bacteria	(µg/g)	2,000	885	*170 - 450*	Acceptable	
Fungi Avg. Diameter	(µm)	2.74		> *2.5*	Acceptable	May benefit from a fungal inoculation using fungal spawn.
Actinobacteria	(µg/g)	0.74	1.17	*1 - 6*	Acceptable	
* Oomycete	(µg/g)	0	0	< *10*	Acceptable	

Protozoa

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Flagellates	(numbers/g)	285,320	111,625	*10,000 - 50,000*	Very Good	Diverse population observed
Amoeba	(numbers/g)	179,344	61,815	*10,000 - 50,000*	Very Good	
* Ciliates	(µg/g)	24,456	22,325	< *100*	Acceptable	May benefit from broadforking in the late fall.

RootShoot

CASE STUDY – HOLLY CLEATOR

General Nematode Population

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Total Free Living Nematodes	(numbers/g)	350		*100*	Good	
Bacterial Feeders	(numbers/g)	350		*100*	Good	At least three different species of bf-nematodes observed.
Fungal Feeders	(numbers/g)	0		*10*	Acceptable	
Predatory (Animal Predation)	(numbers/g)	0		*1*	Acceptable	

CASE STUDY – HOLLY CLEATOR

General Nematode Population

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
* Plant-feeder	(numbers/g)	0		*0*	Good	

Other

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Microarthropod Observed?	N/A	No	N/A	N/A	Acceptable	

Supplemental Interpretation

Sufficient predators

• Sufficient population of diverse beneficial, predatory organisms such as protozoa and nematodes will contribute to nutrient mineralization such as nitrogen. Their grazing stimulates bacterial activity and in doing so, will improve the structure of the soil when this material is used as an amendment.

Fungi

• Diverse fungal population observed but they are not forming macroaggregates. This indicates that they may not have sufficient food or aeration to sustain their population.

CASE STUDY – HOLLY CLEATOR

General Nematode Population

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
* Plant-feeder	(numbers/g)	0		*0*	Good	

Other

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Microarthropod Observed?	N/A	No	N/A	N/A	Acceptable	

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• Diverse fungal population observed but they are not forming macroaggregates. This indicates that they may not have sufficient food or aeration to sustain their population.

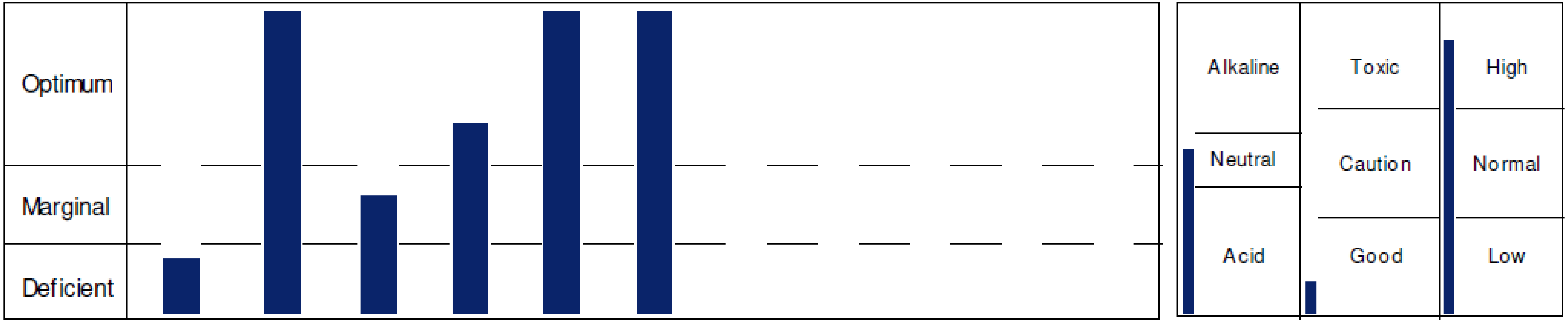
Recommendations

• Plant deep-rooted plants in the fall/winter season so the biology can infiltrate below the organic matter layer. You can pass a broadfork multiple times in the late fall.

CASE STUDY – HOLLY CLEATOR

Nutrient Analysis (p.p.m.) / Soil Quality

	N*	P1	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn	pH	EC (dS/m)	OM (%)
	6	400	115	12	4185	319	n/a	n/a	n/a	n/a	n/a	7.3	0.396	18.5



Additional (ppm)

Cl	P0	NH4-N	Mo
20	26.5	n/a	n/a
Al	**C**	**TN**	**TS**
n/a	n/a	n/a	n/a

			Ca	Mg	Na	K
H+ (cmol[+]/kg)	0.0		Ca	Mg	Na	K
BS (%)	99.7	Actual (%)	87.5	11.0	0.3	1.2
CEC (cmol[+]/kg)	23.9	Suggested***	65-75	5-20	0-5	3-10
P Index	n/a	ppm			18.7	

K:Mg ratio: 0.11 **N:S ratio:** 0.49 **C:N ratio:** n/a

Soil Texture

Sand: n/a Silt: n/a Clay: n/a

Lime: n/a **Buffer pH:** 6.6 **Moisture:** 62.9 % **Density:** 0.66 g/cc

CASE STUDY – HOLLY CLEATOR

REMEDIATION PLAN

- In the fall, when soils are a bit drier, pass a broadfork multiple times → increase air exchange between soil surface and environment.
- Incorporate deep-rooted plants, carrots, parsnips, turnips, etc. in fall/winter.

RootShoot

CASE STUDY – HOLLY CLEATOR

REMEDIATION PLAN

- Inoculate with fungally-dominated compost extract or use fungal spawn (garden giants) to help decompose recalcitrant OM.
- Long term, try to reduce, if not eliminate disturbance. Use plant roots and biology to build structure.

CASE STUDY – GRAFTON G

SITE SUMMARY

- A field for at least two decades.
    - Grass
    - Dandelions
    - Clover and other field plants.
- Soil is sandy with a good selection of rocks.

CASE STUDY – GRAFTON G

GOALS

- Put up a greenhouse
- Vegetables in the soil.

CASE STUDY – GRAFTON G

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Fungal to Bacterial Ratio (F:B)	(µg/g)	**0.06:1**		***0.5:1 - 0.8:1***	Poor	
Total Fungi	(µg/g)	103	32	*135 - 360*	Very Poor	Very low fungal biomass present
Total Bacteria	(µg/g)	1,665	510	*170 - 450*	Poor	Bacterial-dominated soil.
Fungi Avg. Diameter	(µm)	2.11		> *2.5*	Poor	
Actinobacteria	(µg/g)	1.69	2.41	*1 - 6*	Acceptable	
* Oomycete	(µg/g)	0	0	< *10*	Acceptable	

Protozoa

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Flagellates	(numbers/g)	16,300	22,325	*10,000 - 50,000*	Poor	Refer to *StdDev* above.
Amoeba	(numbers/g)	0	0	*10,000 - 50,000*	Poor	
* Ciliates	(µg/g)	0	0	< *100*	Acceptable	

CASE STUDY – GRAFTON G

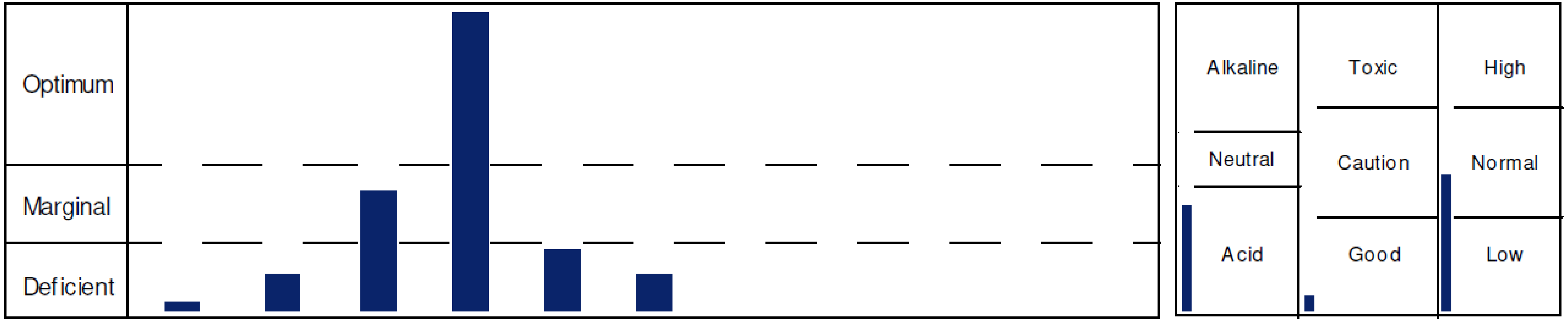
Detailed Nematode Population

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Total Free Living Nematodes	(numbers/g)	**42**		***100***	**Very Poor**	Very low free-living nematode community present.
Bacterial Feeders	(numbers/g)	17		*100*	Very Poor	
Fungal Feeders	(numbers/g)	25		*10*	Acceptable	Fungal feeders present may also feed on plant parts. Refer to Interpretation below.
Predatory (Animal Predation)	(numbers/g)	0		*1*	Acceptable	
Plant-Feeder	(numbers/g)	13		*N/A*	Poor	Plant-feeding nematode group makes up 30% of the population.

CASE STUDY – GRAFTON G

Nutrient Analysis (p.p.m.) / Soil Quality

	N*	P1	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn	pH	EC (dS/m)	OM (%)
	1	19	119	65	319	36	n/a	n/a	n/a	n/a	n/a	5.8	0.205	9.4



Additional (ppm)

Cl	**P0**	**NH4-N**	**Mo**
30	2.0	n/a	n/a
Al	**C**	**TN**	**TS**
n/a	n/a	n/a	n/a

Soil Texture

Sand: n/a Silt: n/a Clay: n/a

			Ca	Mg	Na	K
H+ (cmol[+]/kg)	0.8					
BS (%)	70.0	**Actual (%)**	50.8	9.5	3.7	9.7
CEC (cmol[+]/kg)	3.1	**Suggested*****	65-75	5-20	0-5	3-10
P Index	n/a	**ppm**			26.6	

K:Mg ratio: 1.02 **N:S ratio:** 0.02 **C:N ratio:** n/a

Lime: n/a **Buffer pH:** 6.3 **Moisture:** 23.5 % **Density:** 0.86 g/cc

CASE STUDY – GRAFTON G

REMEDIATION PLAN

- Broadfork, multiple passes
- Apply compost extract that contains bacterial predators
    - Add kelp or alfalfa as microbial food in the compost extract
    - Apply 3x, every 7-10 days
- Allow plants in the area to grow.

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CASE STUDY – GRAFTON G

REMEDIATION PLAN

- Biological test – summer after treatments
  - Comprehensive Nematode Analysis
- Fall:
  - Mow plants

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CASE STUDY – GRAFTON G

REMEDIATION PLAN

- Fall (repeat treatment):
  - Broadfork, multiple passes
  - Apply compost extract
  - Cover plant seeds
- Spring
  - Chemical + Biological Test

CASE STUDY – JOHN PARKER

RootShoot

CASE STUDY – JOHN PARKER

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Fungal to Bacterial Ratio (F:B)	(µg/g)	**0.07:1**		***2:1 - 5:1***	Poor	
Total Fungi	(µg/g)	135	80	*270 - 2,700*	Poor	Very low fungal biomass present
Total Bacteria	(µg/g)	1,930	420	*135 - 1,350*	Poor	Bacterial-dominated soil. More info on page 2
Fungi Avg. Diameter	(µm)	2.35		> *2.5*	Poor	Increase and diversify recalcitrant organic matter
Actinobacteria	(µg/g)	0.37	0.84	*0 - 1*	Acceptable	
* Oomycete	(µg/g)	0	0	< *10*	Acceptable	

Protozoa

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Flagellates	(numbers/g)	4,076	9,114	> *50,000*	Poor	Low beneficial predatory population.
Amoeba	(numbers/g)	8,150	11,160	> *50,000*	Poor	
* Ciliates	(µg/g)	4,076	9,114	< *100*	Acceptable	

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CASE STUDY – JOHN PARKER

Detailed Nematode Population

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Total Free Living Nematodes	(numbers/g)	**48**		***200***	**Very Poor**	Diverse species observed, but their biomass is very low which can indicate poor nutrient cycling and decomposition rates in this area.
Bacterial Feeders	(numbers/g)	48		*200*	Very Poor	
Fungal Feeders	(numbers/g)	0		*20*	Poor	
Predatory (Animal Predation)	(numbers/g)	0		*4*	Poor	
Plant-Feeder	(numbers/g)	0		*N/A*	Acceptable	

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CASE STUDY – JOHN PARKER

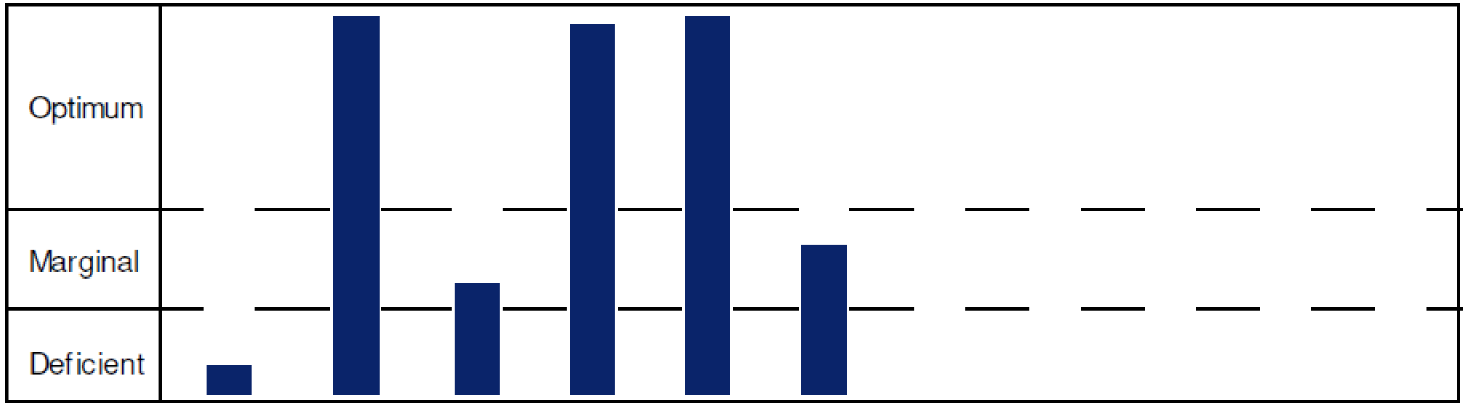
Detailed Nematode Population

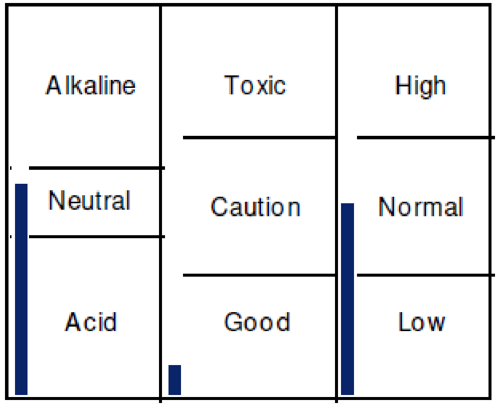
Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Total Free Living Nematodes	(numbers/g)	**48**		***200***	**Very Poor**	Diverse species observed, but their biomass is very low which can indicate poor nutrient cycling and decomposition rates in this area.
Bacterial Feeders	(numbers/g)	48		*200*	Very Poor	
Fungal Feeders	(numbers/g)	0		*20*	Poor	
Predatory (Animal Predation)	(numbers/g)	0		*4*	Poor	
Plant-Feeder	(numbers/g)	0		*N/A*	Acceptable	

CASE STUDY – JOHN PARKER

Nutrient Analysis (p.p.m.) | Soil Quality

	N*	P1	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn	pH	EC (dS/m)	OM (%)
	3	191	88	19	3857	118	n/a	n/a	n/a	n/a	n/a	7.4	0.295	9.6





Additional (ppm)

Cl	**P0**	**NH4-N**	**Mo**
23	2.4	n/a	n/a
Al	**C**	**TN**	**TS**
n/a	n/a	n/a	n/a

Soil Texture

Sand: n/a Silt: n/a Clay: n/a

			Ca	Mg	Na	K
H+ (cmol[+]/kg)	0.0					
BS (%)	99.6	**Actual (%)**	93.8	4.7	0.4	1.1
CEC (cmol[+]/kg)	20.5	**Suggested*** **	65-75	5-20	0-5	3-10
P Index	n/a	**ppm**			19.3	

K:Mg ratio: 0.23 **N:S ratio:** 0.13 **C:N ratio:** n/a

Lime: n/a **Buffer pH:** 6.6 **Moisture:** 23.6 % **Density:** 0.99 g/cc

CASE STUDY – JOHN PARKER

REMEDIATION PLAN

- Mulch with recalcitrant organic matter
    - Diverse woodchips
- Inoculate woodchips with diverse fungal spawn to encourage decomposition.

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CASE STUDY – JOHN PARKER

REMEDIATION PLAN

- Apply compost extract that contains diverse biology.
- Best done in the fall.

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PREMIUM SOILS – ORGANIC VEGGIE MIX

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Fungal to Bacterial Ratio (F:B)	(µg/g)	**0.07:1**		***0.5:1 - 0.8:1***	Acceptable	Although bacterial-dominated, this compost can still provide benefits to the soil.
Total Fungi	(µg/g)	384	64	*135 - 360*	Acceptable	Low diversity present, but good biomass.
Total Bacteria	(µg/g)	5,180	1,300	*170 - 450*	Acceptable	Bacterial-dominated compost.
Fungi Avg. Diameter	(µm)	2.66		> 2.5	Acceptable	Organic matter present may not be suitable to grow diverse fungal population.
Actinobacteria	(µg/g)	1.12	2.51	*1 - 6*	Acceptable	
* Oomycete	(µg/g)	0	0	< *10*	Acceptable	

Protozoa

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Flagellates	(numbers/g)	57,064	22,325	*10,000 - 50,000*	Good	
Amoeba	(numbers/g)	16,300	22,325	*10,000 - 50,000*	Poor	Refer to *Standard Deviation* above.
* Ciliates	(µg/g)	0	0	< *100*	Acceptable	

PREMIUM SOILS – ORGANIC VEGGIE MIX

General Nematode Population

Organism Biomass	Units	Results	Standard Deviation	Minimum Desired	Quality	Data Interpretation
Total Free Living Nematodes	(numbers/g)	1,000		*100*	Very Good	Diverse nematodes present.
Bacterial Feeders	(numbers/g)	600		*100*	Very Good	
Fungal Feeders	(numbers/g)	400		*10*	Acceptable	
Predatory (Animal Predation)	(numbers/g)	0		*1*	Acceptable	

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SOIL TEXTURE

- Participants performed "Texture by Feel" procedure and all results came back as "Sandy Loam"
- Sand: 70-90%
- Silt: 0 – 50%
- Clay: 0 – 20%

THANK YOU