

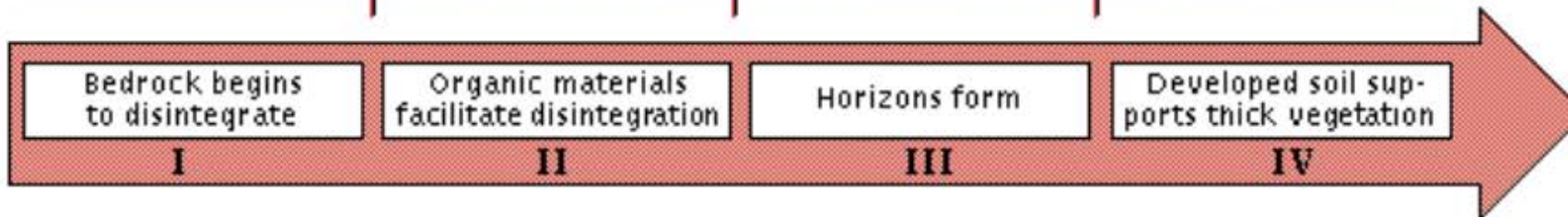
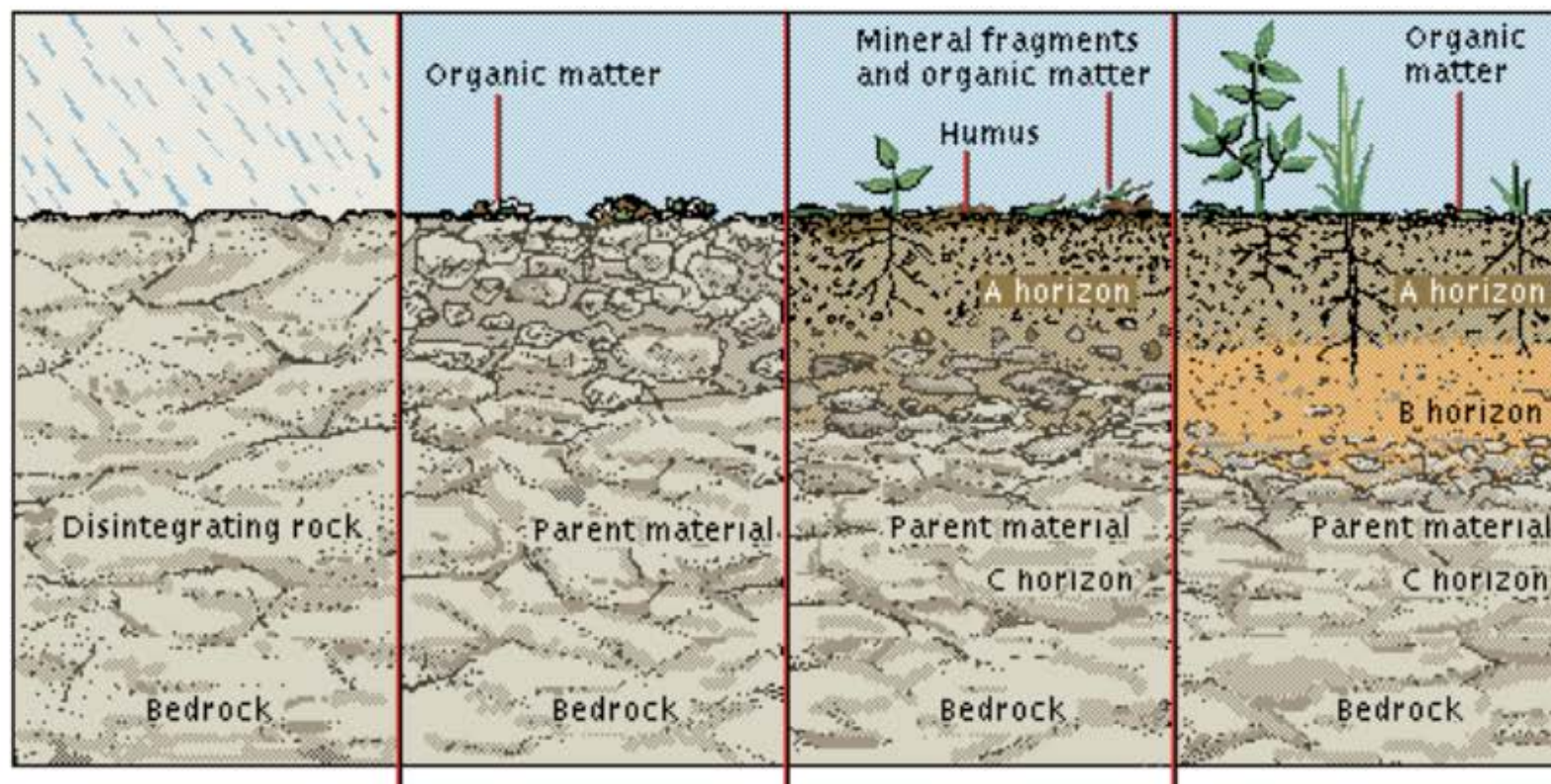
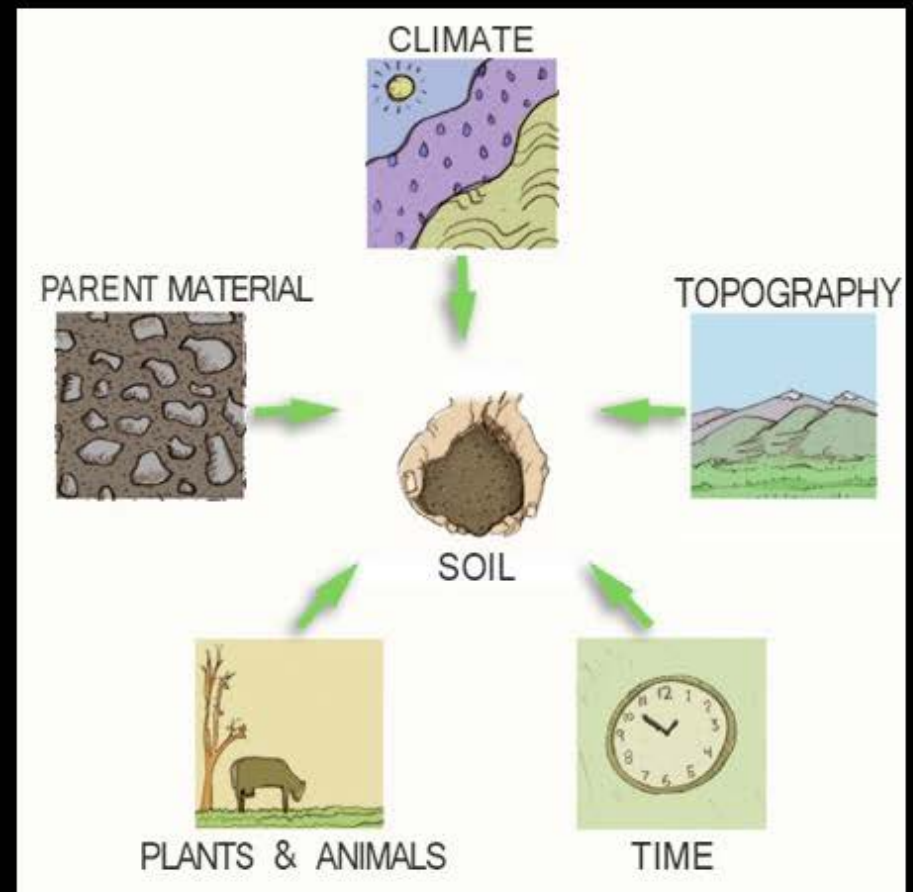
A Permaculture Approach to Soil Building

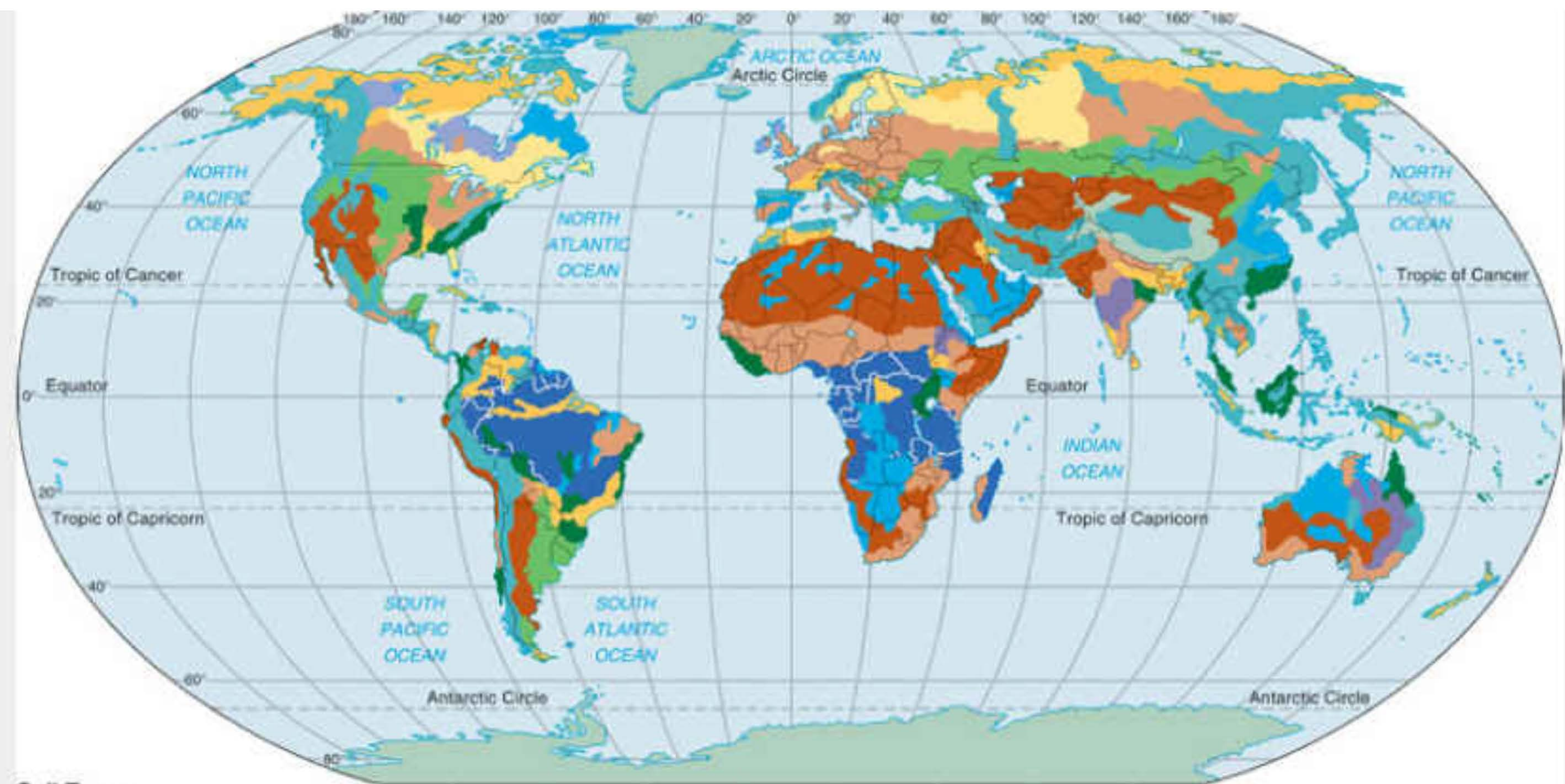
Presentation for Soil School, 2018

presentation by Marisha Auerbach
Marisha.permaculturerising@gmail.com
permaculturerising.com

soil (noun)

1. the portion of the earth's surface consisting of disintegrated rock and humus.
2. a particular kind of earth: sandy soil.
3. the ground as producing vegetation or as cultivated for its crops: fertile soil.
4. a country, land, or region: an act committed on American soil.
5. the ground or earth: tilling the soil.





Soil Types

Alfisols: gray to brown surface soils; medium to high base nutrients and organic content

Aridisols: dry or desert soils; high in base nutrients and low in organic content

Entisols: soils with poorly developed layers; typically wind-deposited soils

Histosols: swamps and bog soils; wet, highly organic (peat and muck) content

Inceptisols: weakly developed immature soils; typically tundra or volcanic soils

Mollisols: thick, dark soils of tallgrass prairies; high in organic content and base nutrients

Oxisols: tropical and subtropical highly weathered soils; low in organic and base nutrients

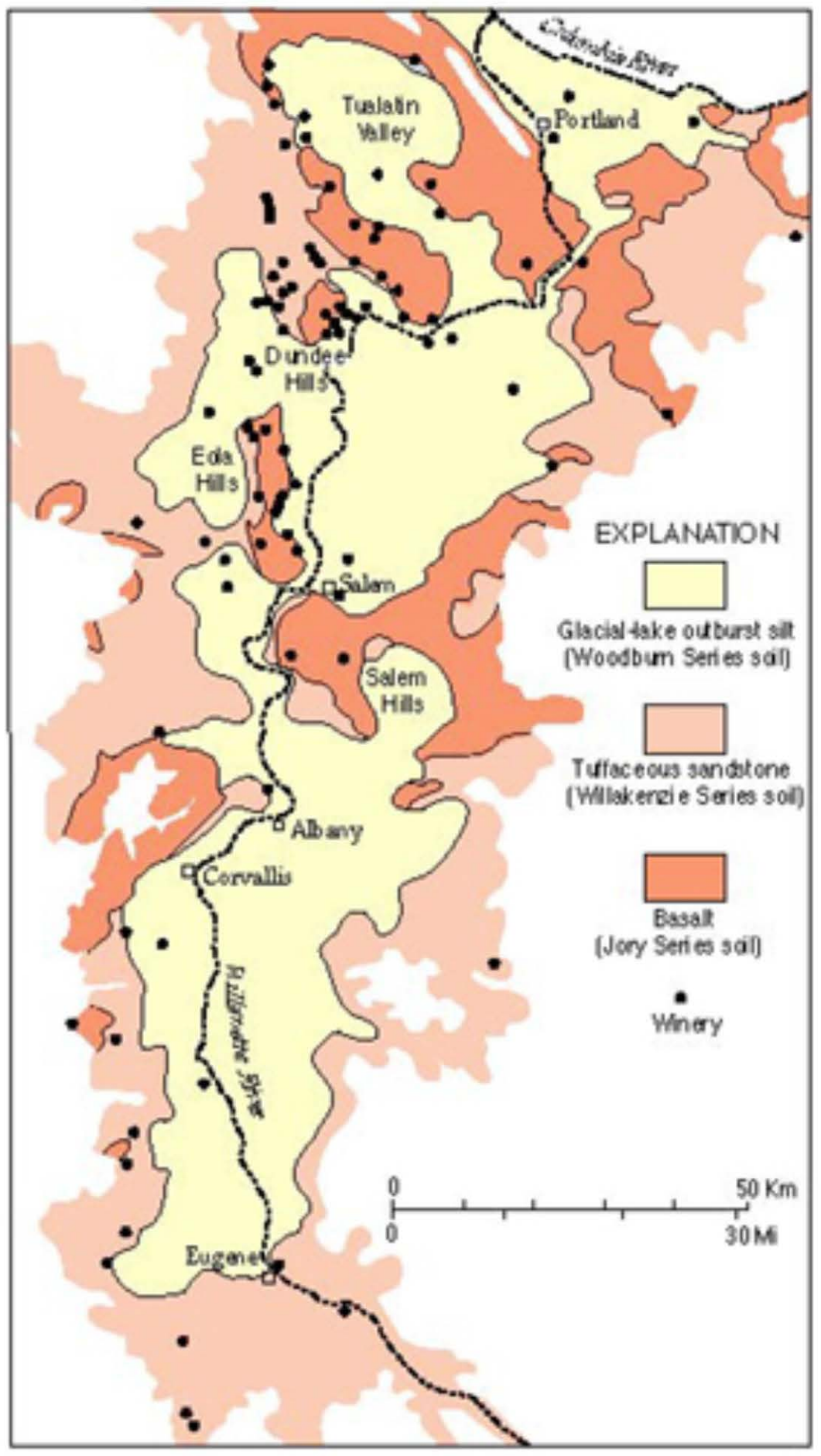
Spodosols: acidic soils of cool, moist forest regions; high in organic content and low in base nutrients

Ultisols: acidic and clayey soils of upland tropical savannas; medium base nutrients

Vertisols: clay soils of moist tropical savannas; tend to crack and swell when dry

Mountain soils: thin soils, tending toward acidic; mixed varieties based on vertical zonation

Little or no soil



<http://cmug.com/chintimp/Willamette.vineyards.htm>

THE DIRT ON Oregon Wine

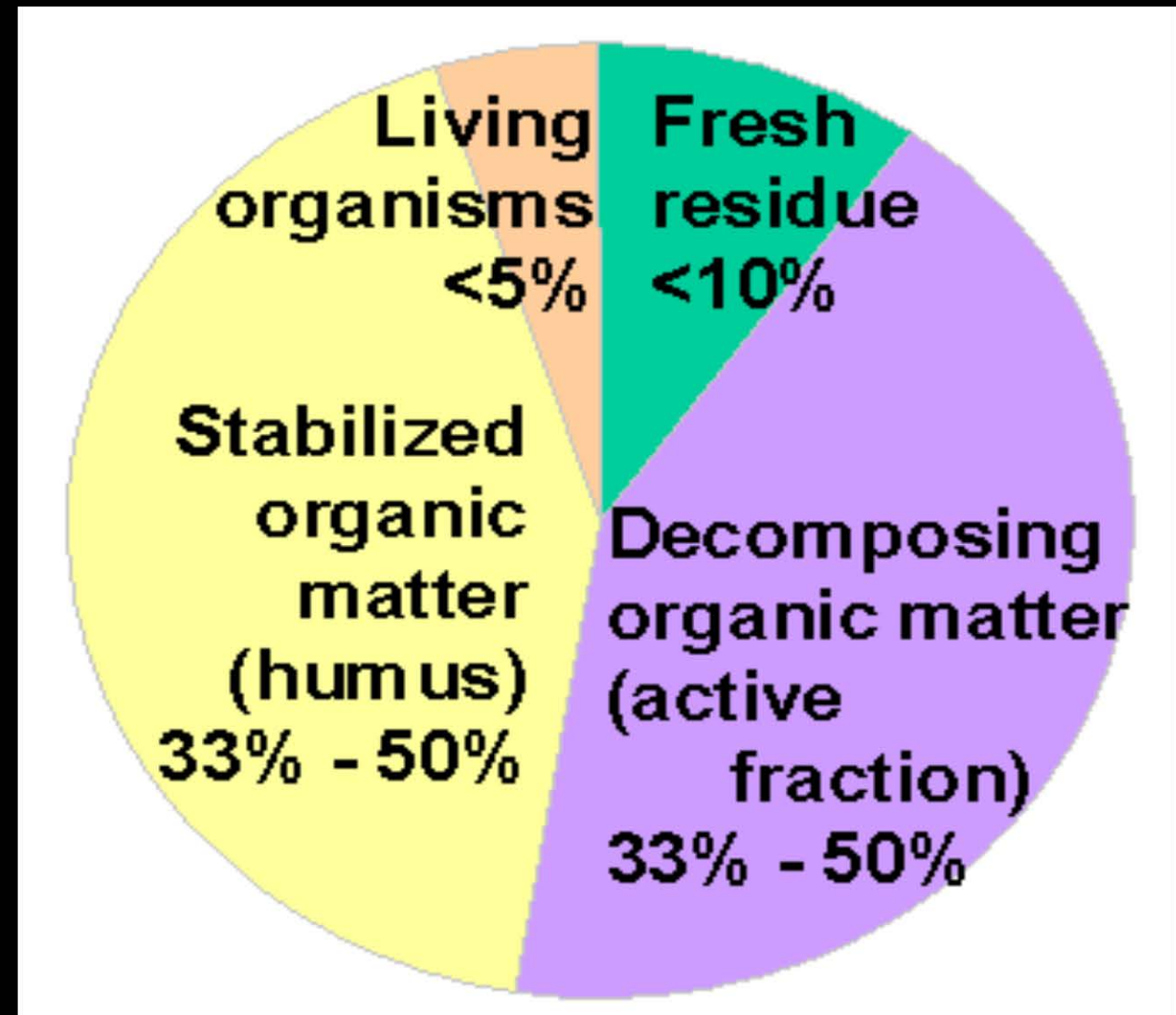


WHAT'S IN A NAME? The National Cooperative Root Nursery — is not merely a nursery of direct, regional, state and local growers, and private growers and institutions that work together to cooperatively investigate, identify, document, classify, improve, disseminate and publicize information about soils of the U.S. — but a diversified group of 20-300 different kinds of soils across the nation. Most soils are given a name — referred to as "soil names" — which generally comes from the locale where the soil was first sampled. For example, "Willamette" is named to honor the general area where the soil of the Willamette and Willamette River in Lane County, Willamette is a typical soil and is of the discovery zone in the Willamette Valley, OR.

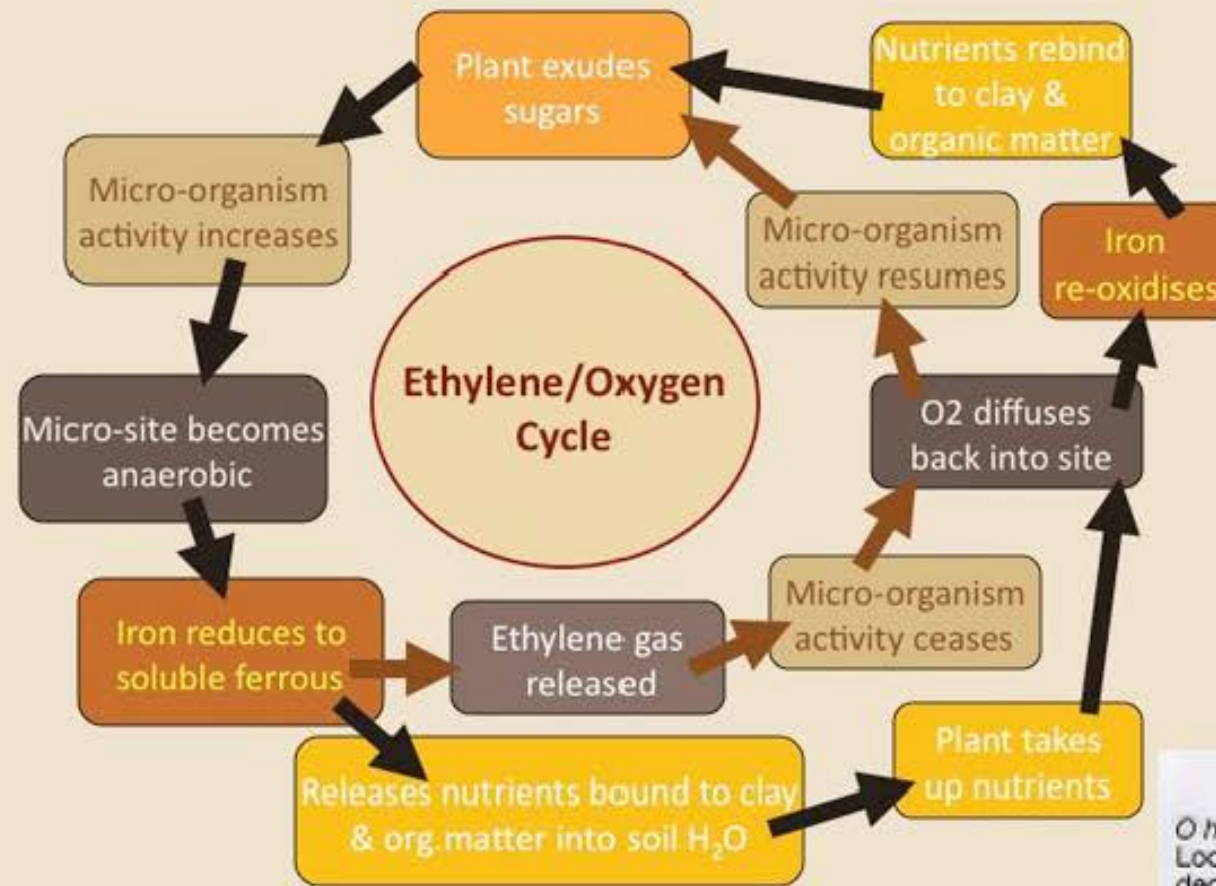
<http://www.oregonwinepress.com/dirtonava>

What would humus want?

- A blanket (mulch)
- To breathe (good structure & porosity)
- To grow & succeed
- Healthy animal interactions
- To not be disturbed



Leave the
Rhizosphere
in place



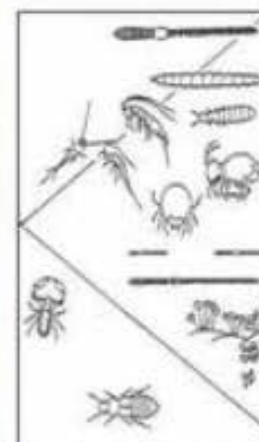
Protect the
rhizosphere
by not tilling
your soil.

The top layer is
occupied by aerobic
(air breathing)
microorganisms

The lower layer is an
anaerobic (air free
zone) where special
kind microorganisms
feel comfortable. They
cannot live in an air
rich environment.



Soil inhabitants:



O horizon
Loose and partly
decayed
organic matter

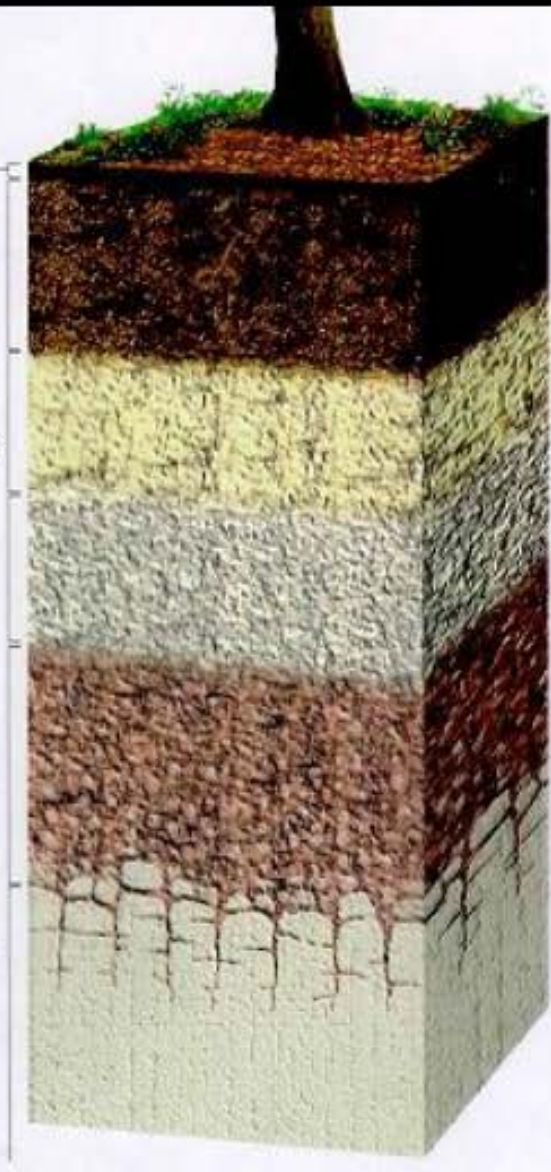
A horizon
Mineral matter
mixed with
some humus

E horizon
Light colored
mineral particles.
Zone of eluviation
and leaching

B horizon
Accumulation of
clay transported
from above

C horizon
Partially altered
parent material

Unweathered
parent material



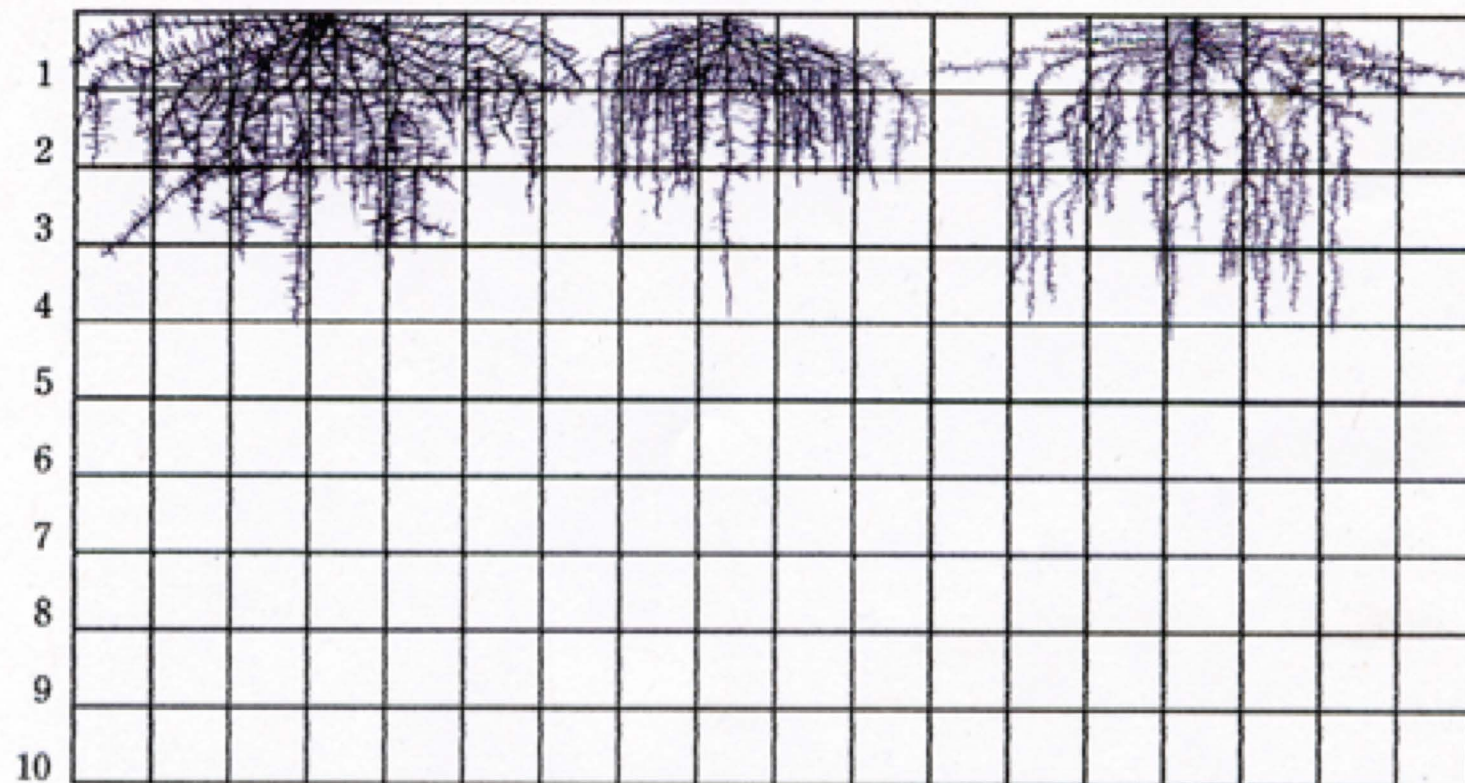
SELECTED VEGETABLE ROOT SYSTEMS SHOWN IN SCALE

Feet

sweet corn

lettuce

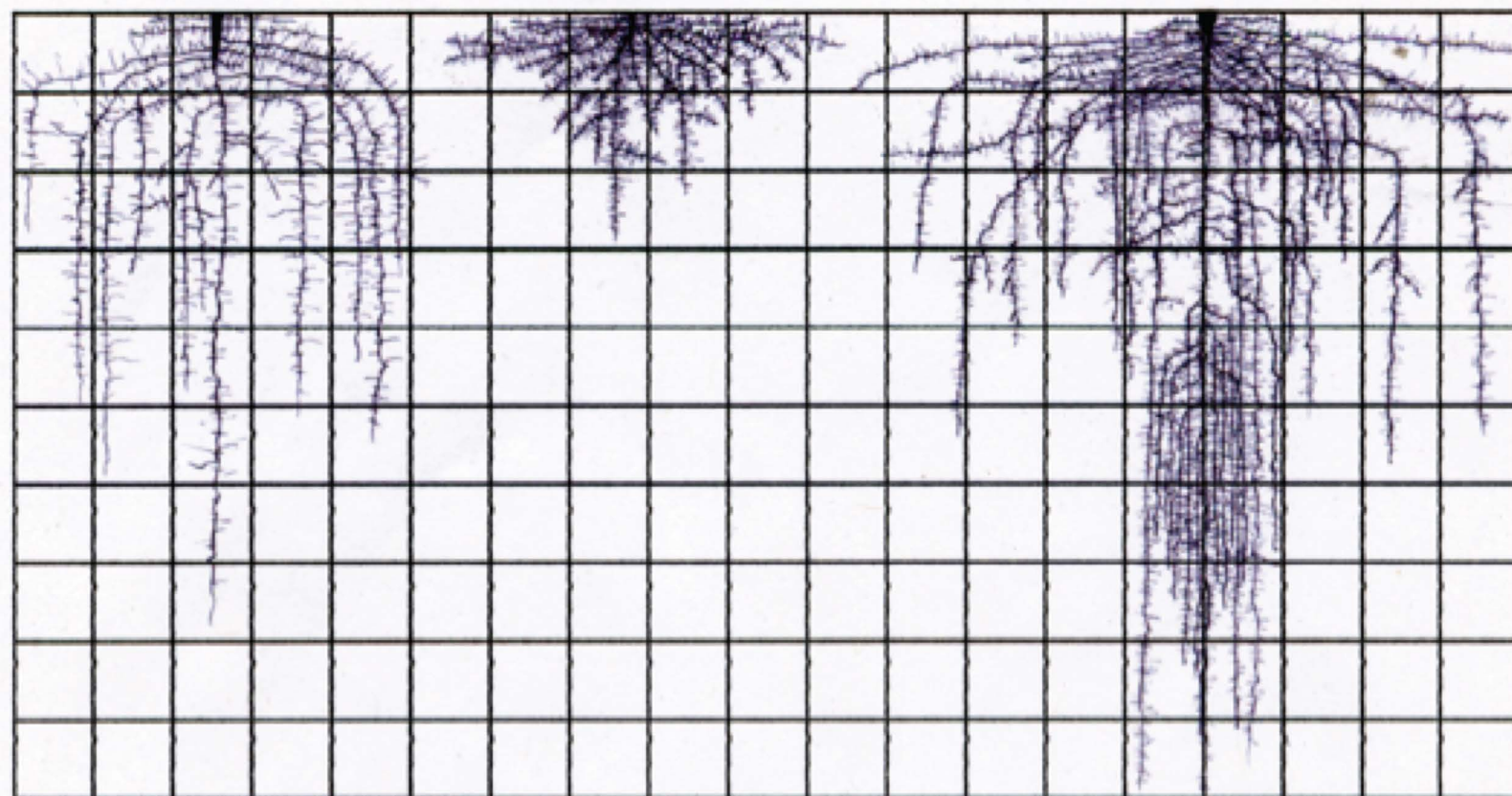
tomato



carrot

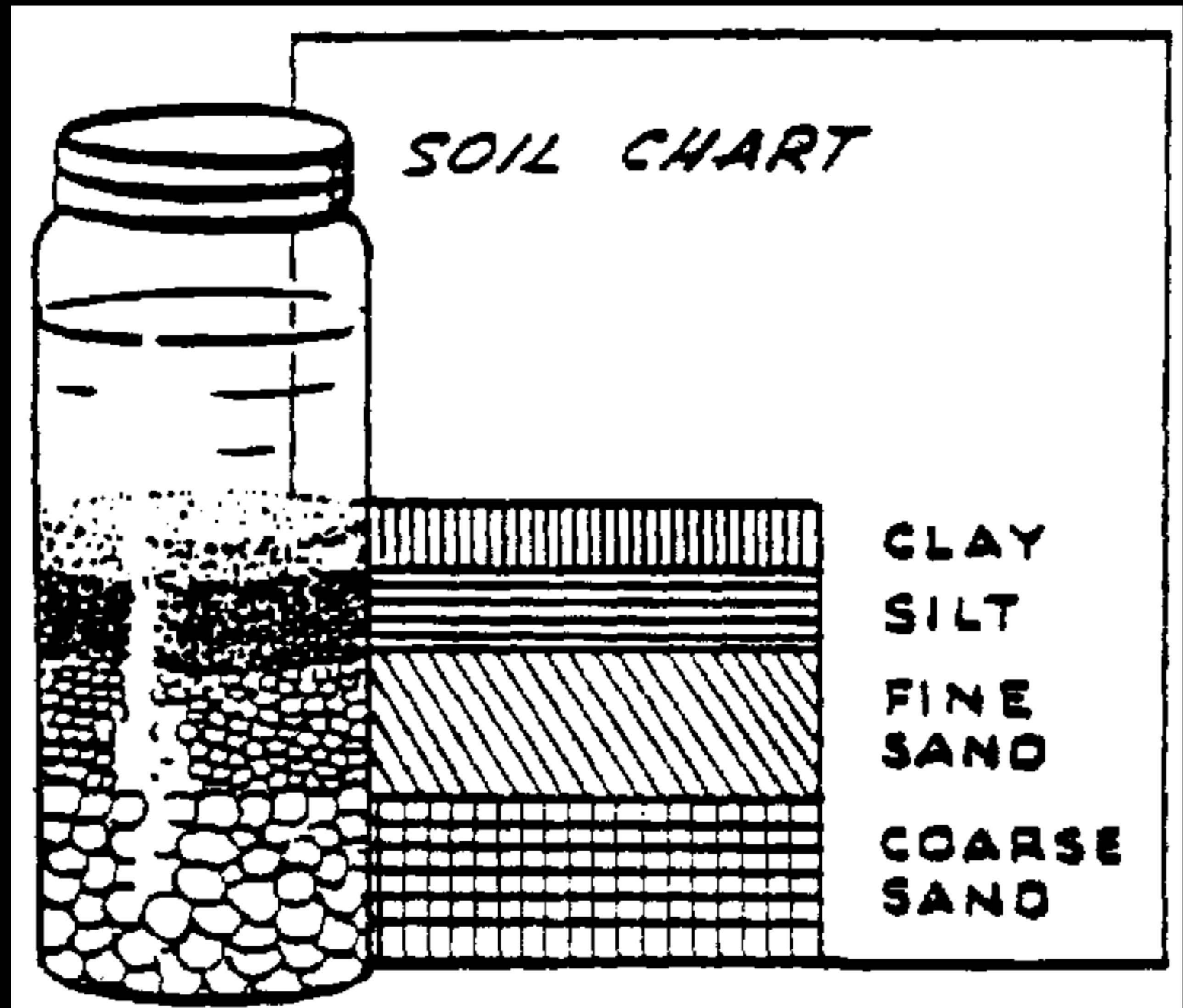
cauliflower

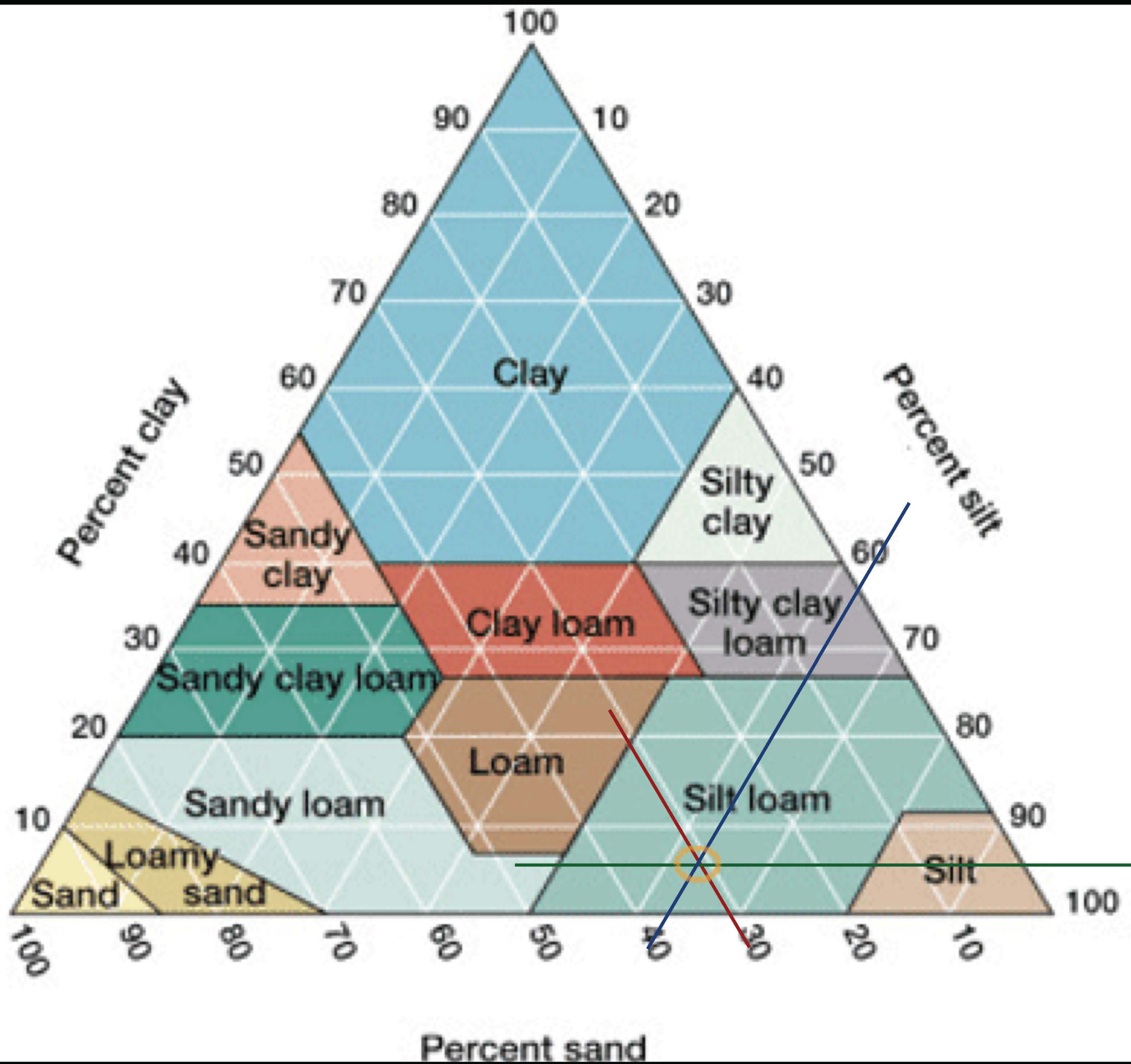
beet



Pictures Credit:
Robert Kourik, Understanding Roots

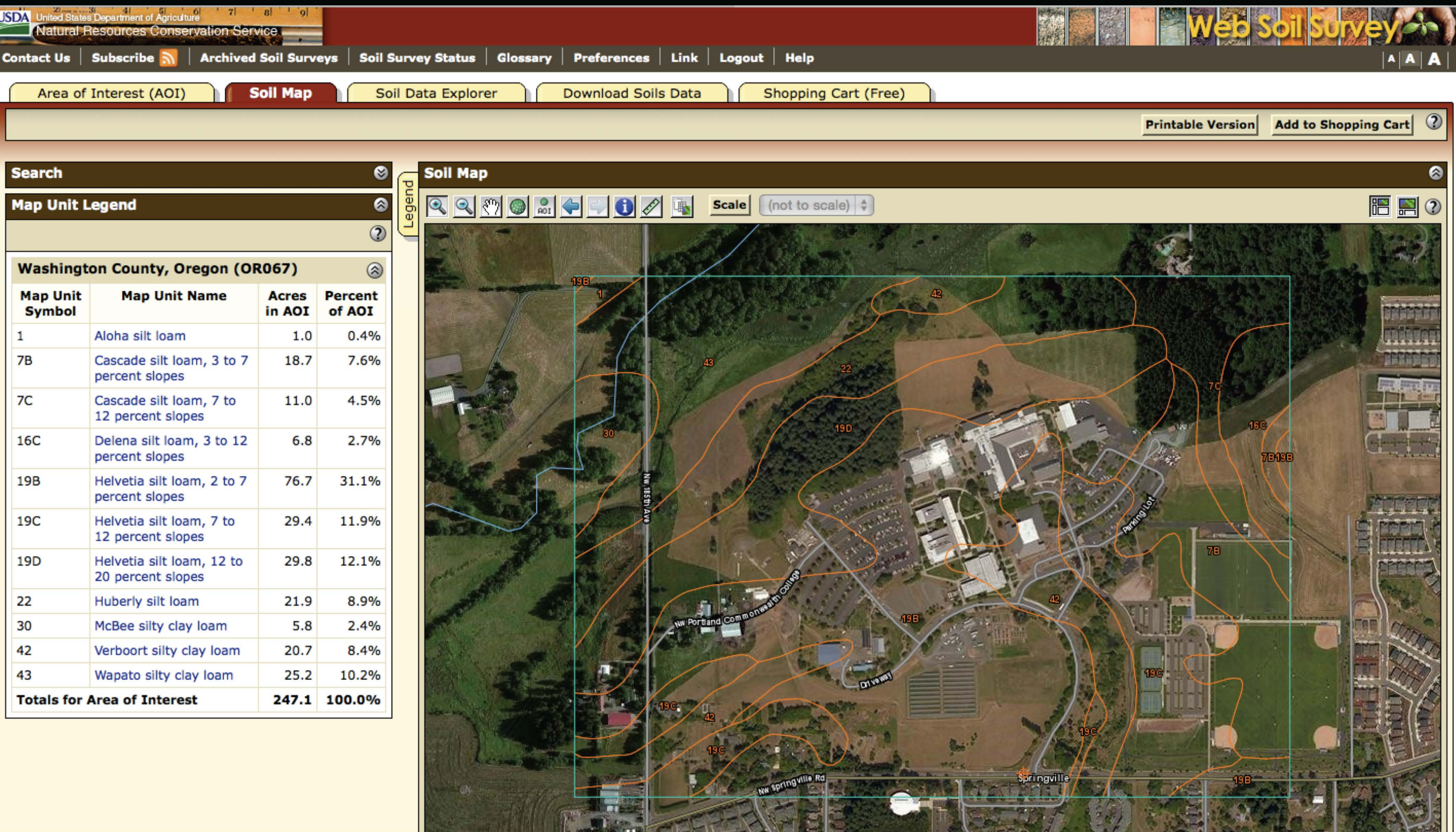
What is your soil type?
What is needed to make
good garden soil?





NRCS Web Soil Survey

<http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>



Search

Map Unit Legend

Washington County, Oregon (OR067)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Aloha silt loam	1.0	0.4%
7B	Cascade silt loam, 3 to 7 percent slopes	18.7	7.6%
7C	Cascade silt loam, 7 to 12 percent slopes	11.0	4.5%
16C	Delena silt loam, 3 to 12 percent slopes	6.8	2.7%
19B	Helvetia silt loam, 2 to 7 percent slopes	76.7	31.1%
19C	Helvetia silt loam, 7 to 12 percent slopes	29.4	11.9%
19D	Helvetia silt loam, 12 to 20 percent slopes	29.8	12.1%
22	Huberly silt loam	21.9	8.9%
30	McBee silty clay loam	5.8	2.4%
42	Verboort silty clay loam	20.7	8.4%
43	Wapato silty clay loam	25.2	10.2%
Totals for Area of Interest		247.1	100.0%

Report — Map Unit Description

Washington County, Oregon

42—Verboort silty clay loam

Map Unit Setting

National map unit symbol: 2202

Elevation: 100 to 400 feet

Mean annual precipitation: 40 to 60 inches

Mean annual air temperature: 50 to 54 degrees F

Frost-free period: 165 to 210 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Verboort and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Verboort

Setting

Landform: Flood plains

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Straified, moderately fine and fine textured alluvium

Typical profile

H1 - 0 to 19 inches: silty clay loam

H2 - 19 to 33 inches: clay

H3 - 33 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: 16 to 26 inches to abrupt textural change

Natural drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: About 0 to 24 inches

Frequency of flooding: Frequent

Frequency of ponding: None

Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): 3w

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: D

Other vegetative classification: Poorly Drained (G002XY006OR)

Minor Components

Dayton

Percent of map unit: 4 percent

Landform: Terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Other vegetative classification: Poorly Drained (G002XY006OR)

Wapato

Percent of map unit: 3 percent

Landform: Flood plains

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Other vegetative classification: Poorly Drained (G002XY006OR)

Printable Version

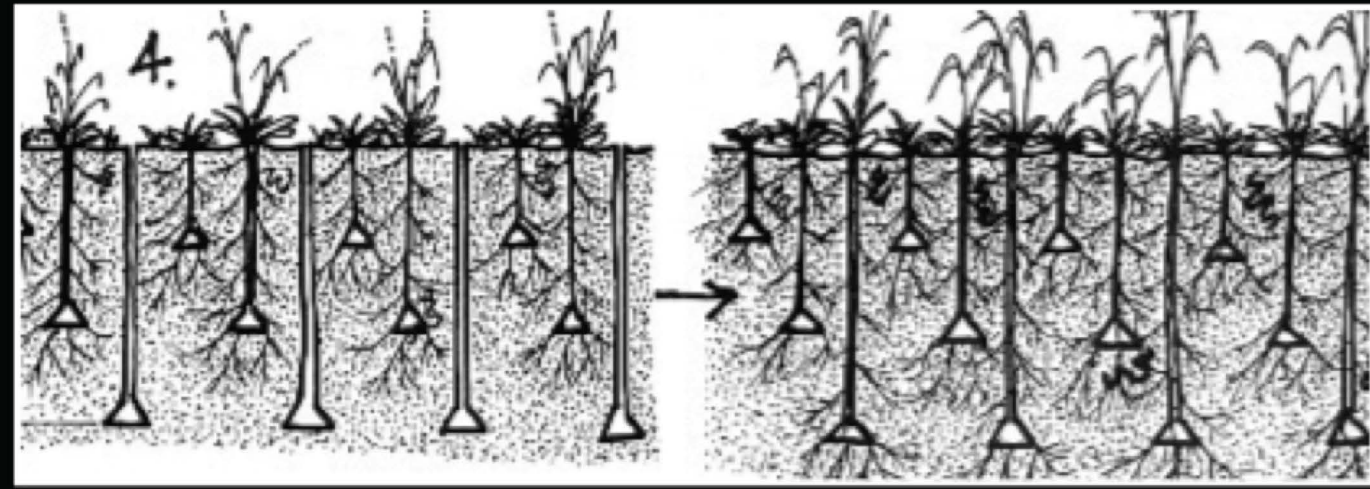
Add to Shopping Cart



to be used. Mapping of soils is done at a particular scale. The units and the level of detail shown in the resulting soil

detail of mapping and accuracy of soil line placement. at a more detailed scale.

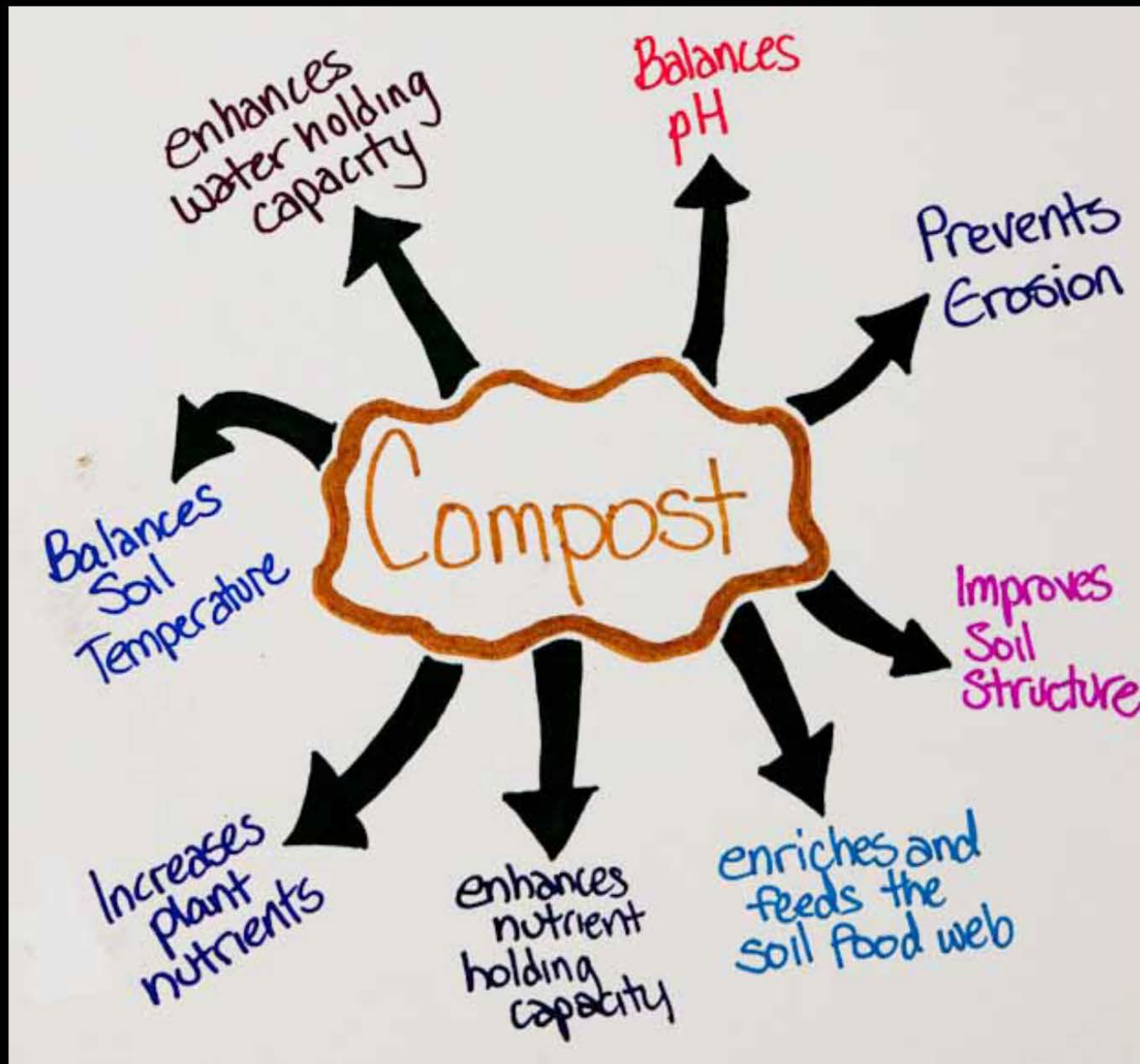
How do you build good structure & porosity?



Add Organic Matter!



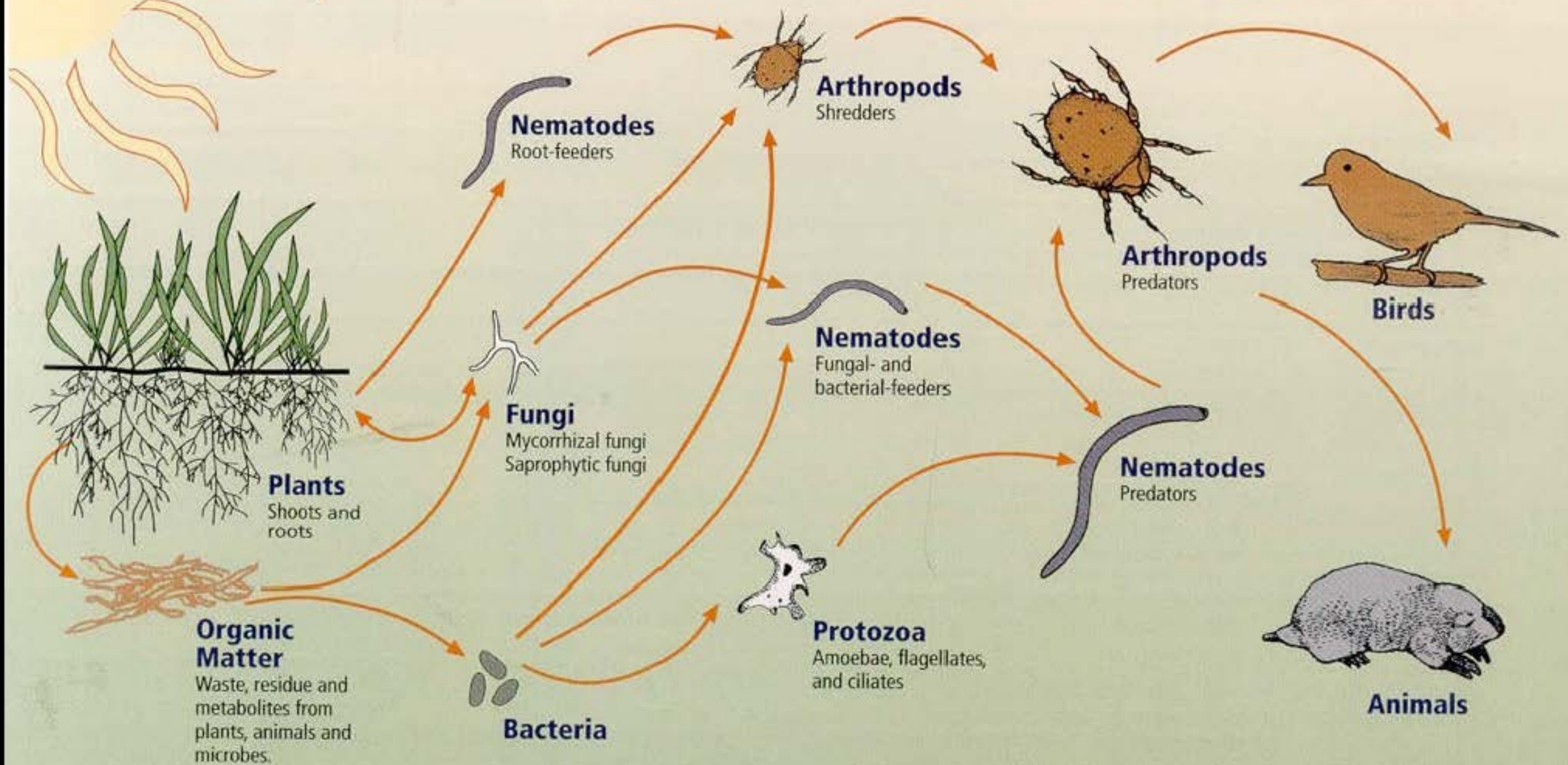
Compost



“Nature wastes nothing
Kitchen waste is a treasure
Worms are not picky”

Add 3 - 4” of
Compost Annually

The Soil Food Web



First trophic level:
Photosynthesizers

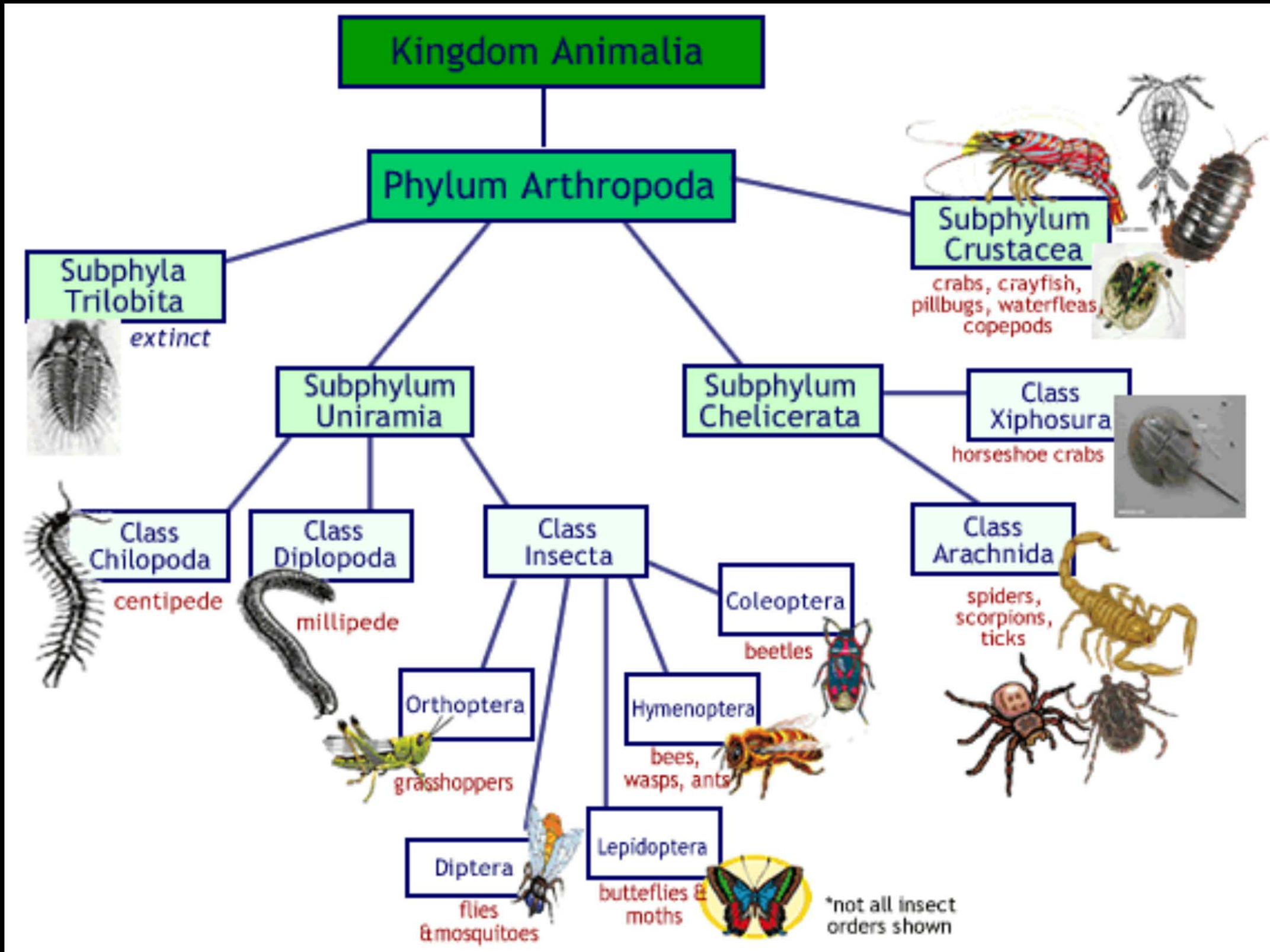
Second trophic level:
Decomposers
Mutualists
Pathogens, parasites
Root-feeders

Third trophic level:
Shredders
Predators
Grazers

Fourth trophic level:
Higher level predators

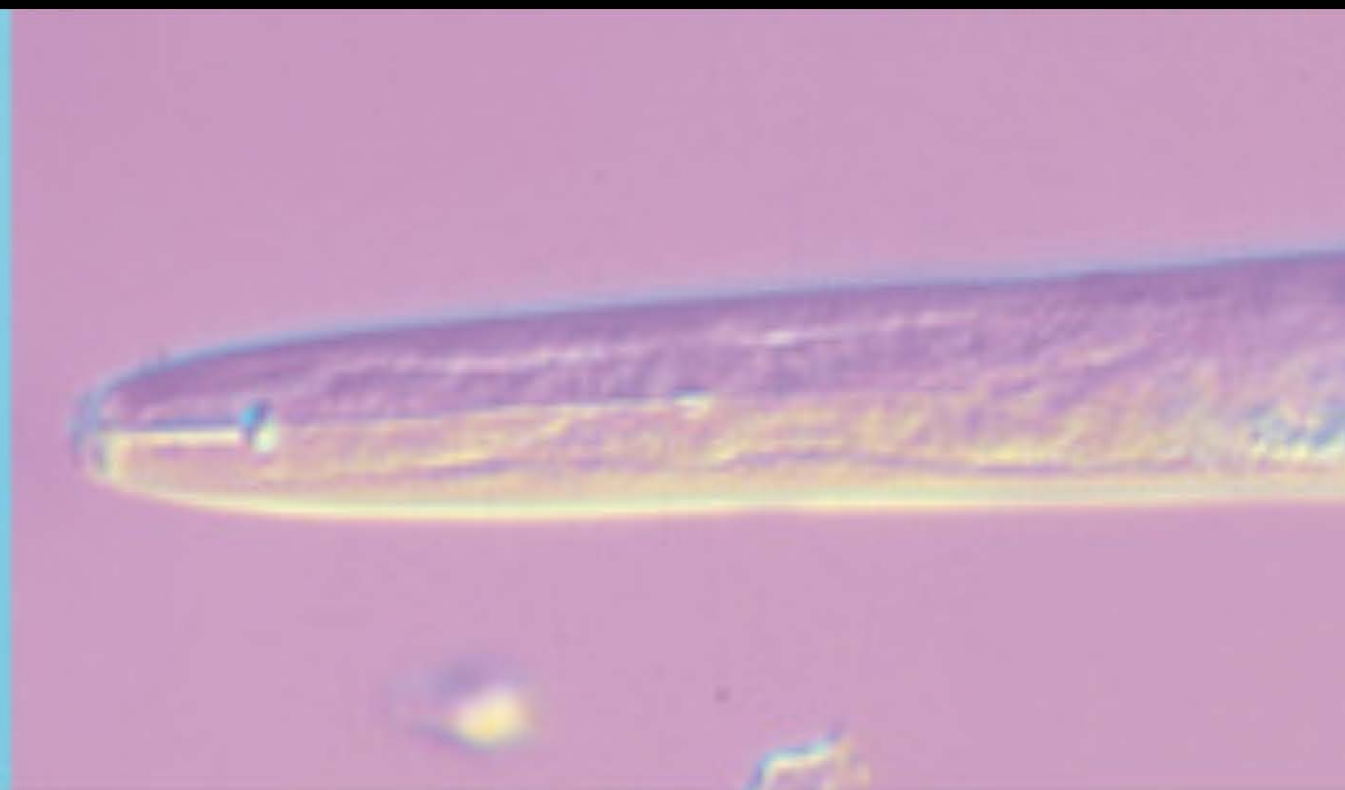
Fifth and higher trophic levels:
Higher level predators

“Life is everywhere
Microbugs help make good compost
Sowbugs make good pets”

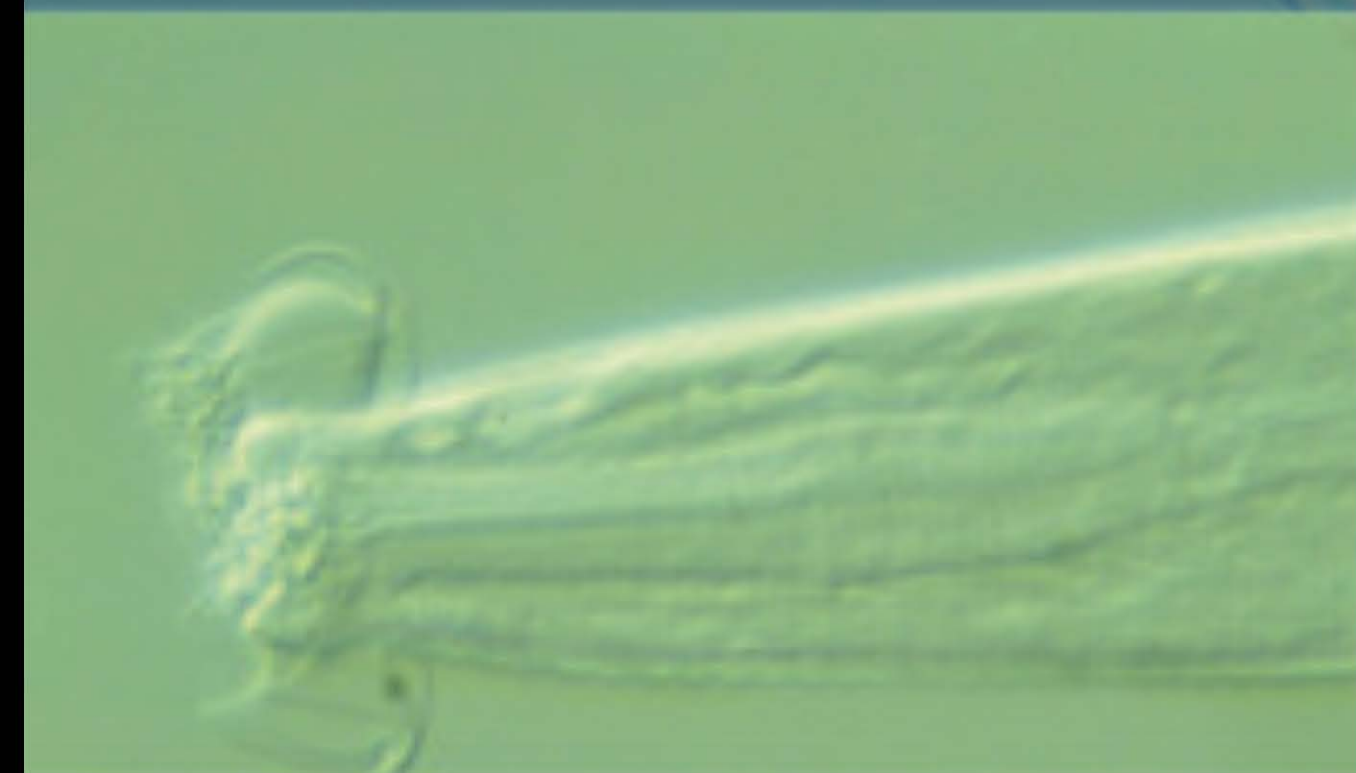




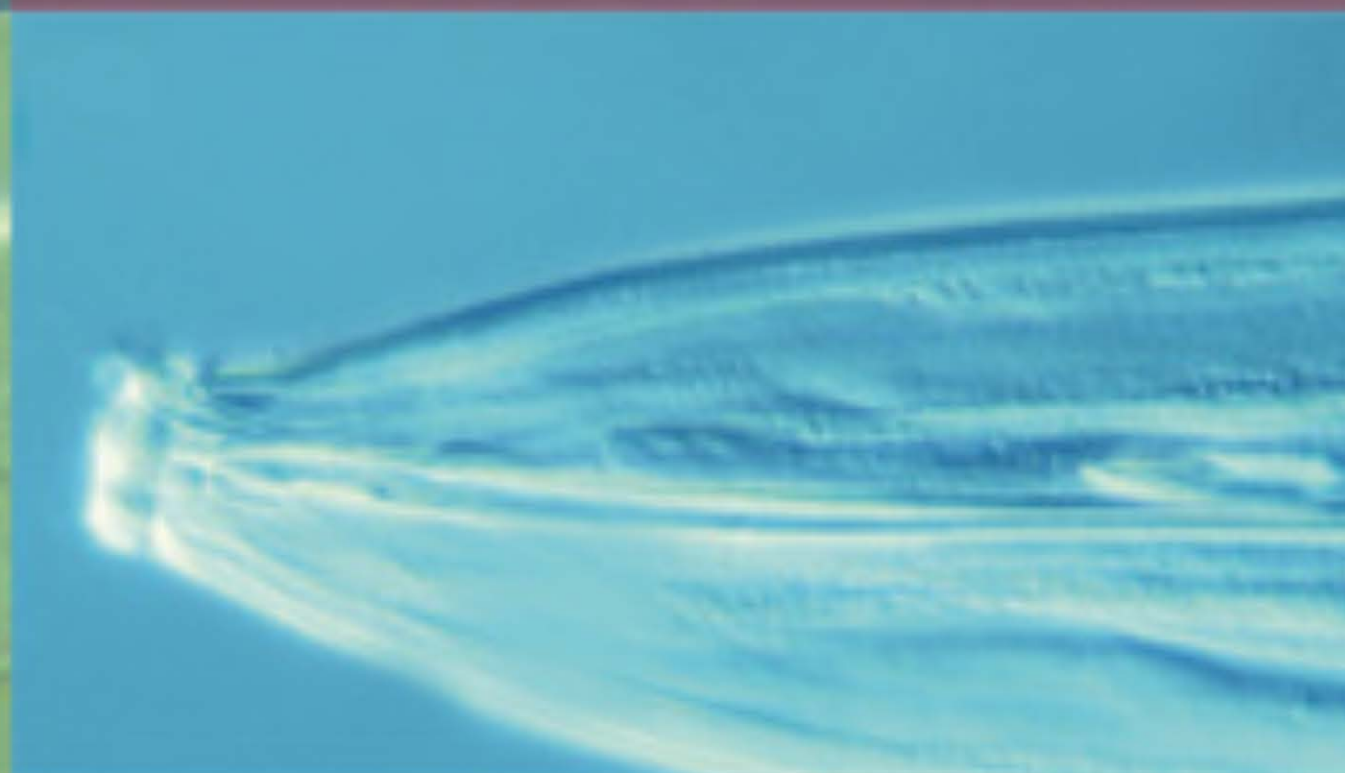
Predatory Nematode



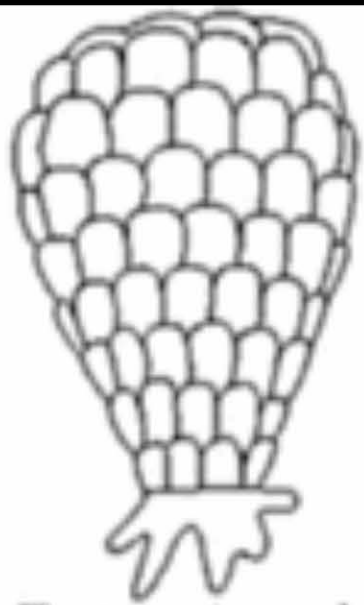
Parasitic Nematode



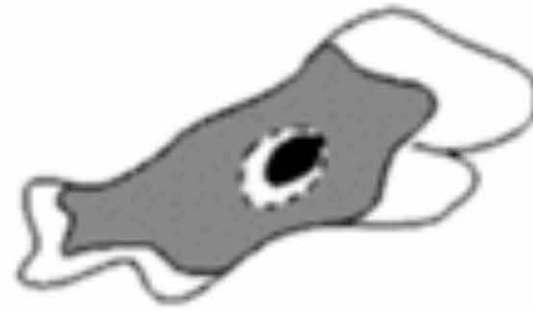
Bacterial Feeding Nematode



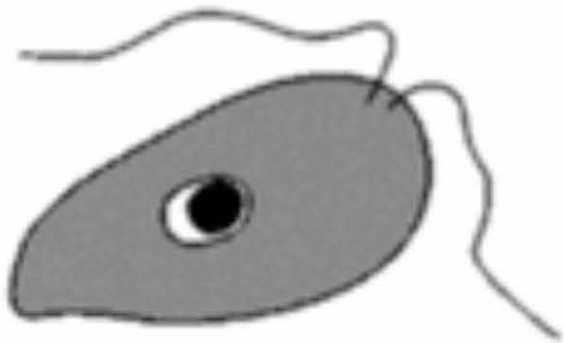
Fungal Feeding Nematode



Testate Amoeba
(typically 100 μm long)



Naked Amoeba
(20 μm)



Flagellate
(10 μm)



Ciliate
(30 μm)

Protozoa



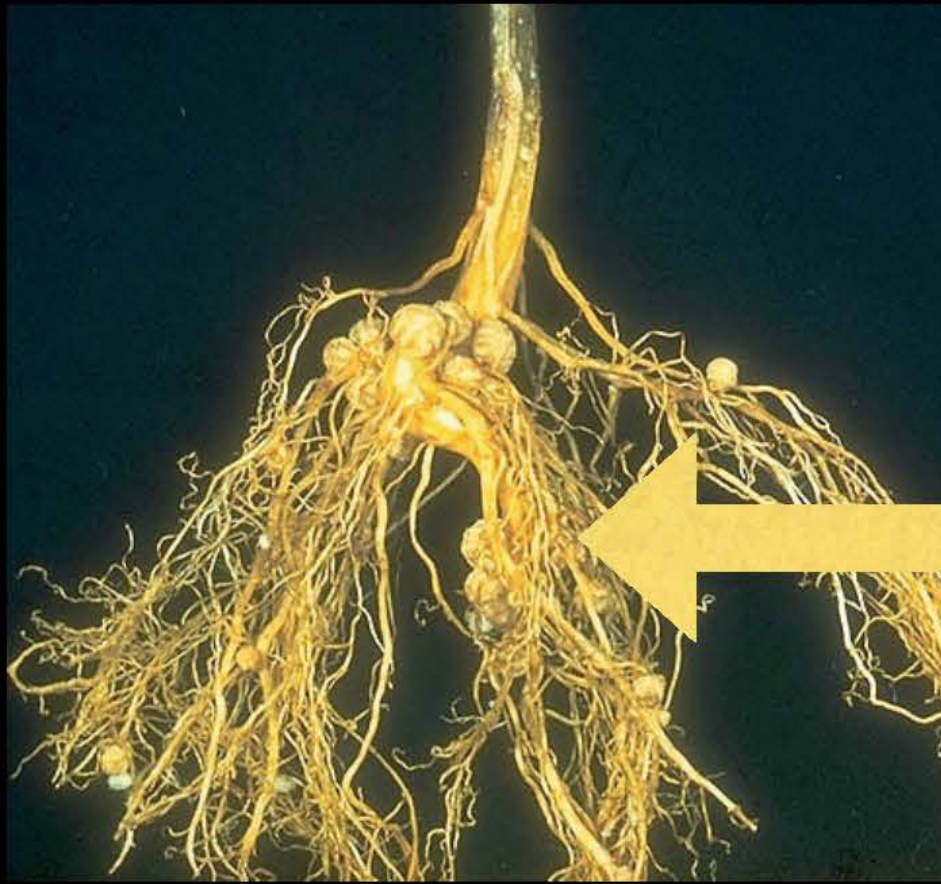
Mycorrhizal Fungi

Parasitic Fungi

Saprophytic Fungi



Nitrogen Fixing Plants



nodules on
pea roots

nodules on
clover roots



on fava beans

Compost Greens

“Nutrient -rich Juicies”

- * Weeds
- * Food Scraps
- * Grass
- * Tea Bags
- * Coffee Grounds
- * Manure
- * Seaweed
- * Bloodmeal
- * Fresh Tree Prunings



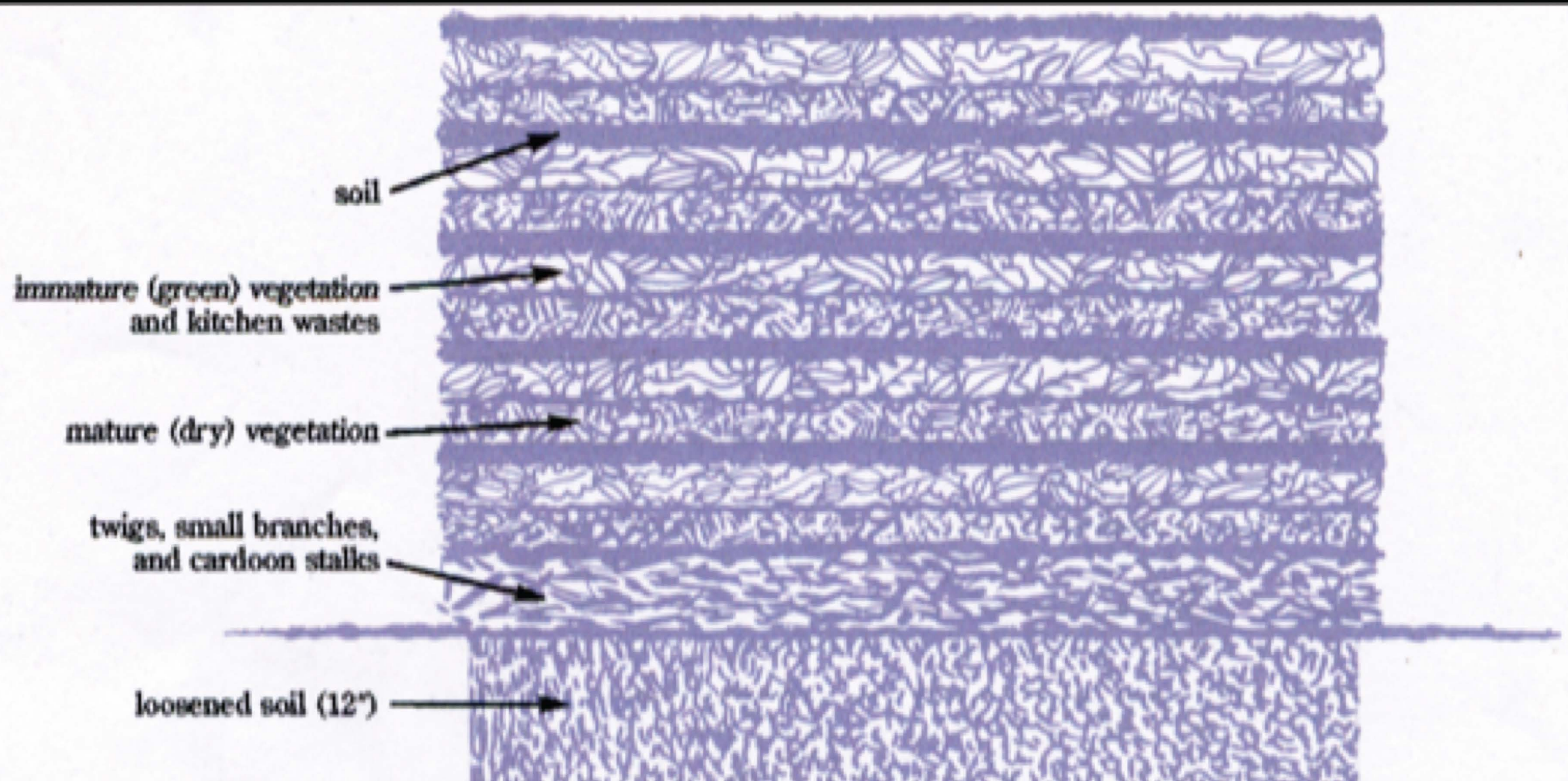
Compost Browns

“Carbon-rich Crunchies”

- * Leaves/Leaf mold
- * Sticks
- * Sawdust
- * Paper
- * Hay
- * Straw
- * Cardboard
- * Wood Chips
- * Deciduous Prunings
- * Nut Husks
- * Coco Husks
- * Ash
- * Pits
- * Peat



Balance greens & browns,
the mixture must be just right,
Goat poop also helps.





“Don’t just dump and run,
You’ll regret what is to come
Fruit flies are no fun”

Thermometer



Compost Accessories!

Compost Crank



