A Permaculture Approach to Soil Building

Presentation for Soil School, 2018

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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
- 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://www.geo.hunter.cuny.edu/tbw/ncc/Notes/chapter_4.outline.html
What would humus want?

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

Leave the Rhizosphere in place

Protect the rhizosphere by not tilling your soil.
SELECTED VEGETABLE ROOT SYSTEMS SHOWN IN SCALE

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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
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 map unit.

Description of Verboort

Setting
- Landform: Flood plains
- Landform position (three-dimensional): Tread
- Down-slope shape: Linear
- Across-slope shape: Linear
- Parent material: Stratified, 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)
How do you build good structure & porosity?
Add Organic Matter!
“Nature wastes nothing
Kitchen waste is a treasure
Worms are not picky”

Add 3 - 4” of Compost Annually
“Life is everywhere
Microbugs help make good compost
Sowbugs make good pets”

https://www.biologycorner.com/bio1/notes-arthropods.html
Protozoa

Testate Amoeba
(typically 100 µm long)

Naked Amoeba
(20 µm)

Flagellate
(10 µm)

Ciliate
(30 µm)
Nitrogen Fixing Plants

- Nodules on pea roots
- Nodules on clover roots
- Nodules 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
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”
Compost Accessories!