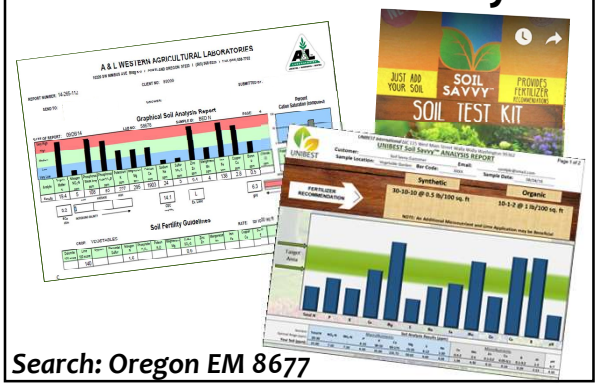
Improving Soils for Spring Planting

Claudia Groth
Horticulture Educator
claudia.groth.us@gmail.com

Know your soil

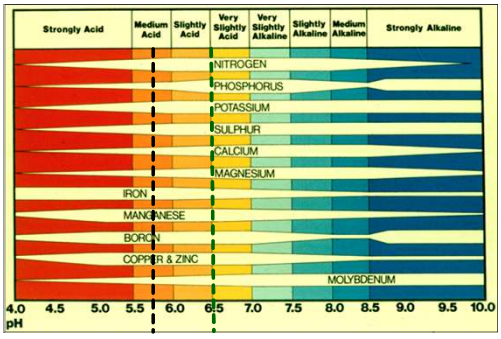
make it work for
<u>your</u> garden!

What's there already?



Search: Oregon EM 8677

pH and Nutrient Availability



How accurate is that?

Method	Soil 1	Soil 2	Soil 3
Laboratory	7.9	6.3	5.6
Portable pH meter	7.7	6.3	5.5
Color kit	8.0	6.5	5.5
pH probe	6.0	6.0	6.0

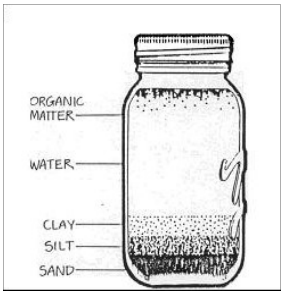
Changing Soil pH

- Raising pH
  - Lime (5 lb. per 100 sq.ft. per year)
  - Wood ashes (1.5 lb. per 100 sq.ft. per year)
- Lowering pH
  - Ammonium sulfate
  - Sulfur-coated urea
  - Aluminum sulfate
  - Sulfur

Texture via "Soil Shake"

- 1/3 to 1/2 soil
- Fill with water
- Shake 5 minutes
- Measure

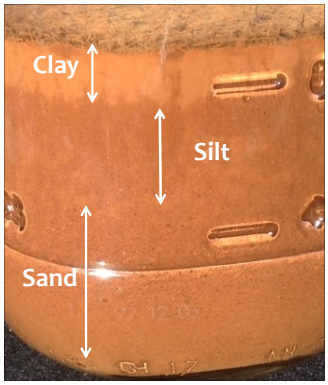
Mark/Measure Each Depth



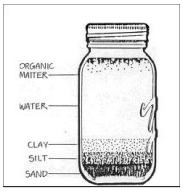
- Sand:
  40 seconds
- Silt:
  30 minutes
- Clay:
  24 hours

Search: soil jar test oregon edu

Soil Texture Method



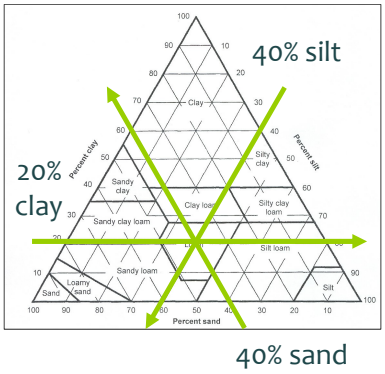
Calculate % of Each Particle



The math:

$$\frac{\text{Height of the layer}}{\text{Height of all layers}} \times 100$$

e.g.: (0.5 / 2.00) X 100 = 25%



Using the Soil Triangle

Sand: 40%
Silt: 40%
Clay: 20%

Loam

Is that water actually getting in?

1. Knock in your can or pipe
2. Drape with plastic
3. Fill with one inch of water
4. Remove plastic and start timing

Just how "well-drained" is that soil?

1. Dig a 12" diameter hole, 10" to 12" deep
2. Fill it with water and let it drain
3. Fill it with water again
4. Wait 1 hour
   ≈ 2" per hour seems to be consensus

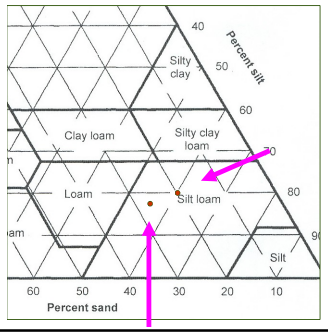
Just Add Sand??

10' x 10' = 100 sq ft.

particle	in.	percent
Sand	2.2	20%
Silt	6.6	60%
Clay	2.2	20%
	11.0	

Add 1 in. sand (830 lbs.)

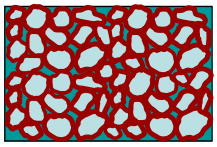
particle	in.	percent
Sand	3.2	27%
Silt	6.6	55%
Clay	2.2	18%
	12.0	



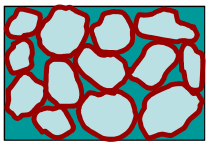
We Can't Change Soil Texture

We Can Change Soil Structure

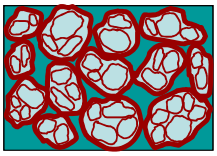
Improving Soil Structure



Clayey Soil

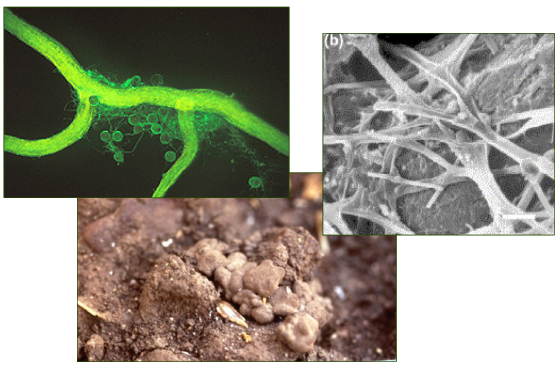


Sandy Soil

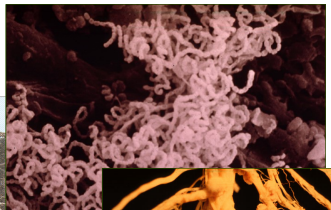


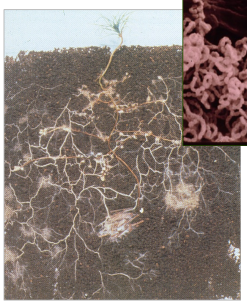
Well-aggregated Soil

Biology Helps Create Structure



Actinobacteria[1]





Mycorrhizae[3]

Rhizobia[2]

[1]No. 14 from Soil Microbiology and Biochemistry Slide Set. 1976. L.P. Martin, et al., eds. SSSA, Madison, WI
[2]Stephen Temple, New Mexico State University
[3]Mycorrhizal Applications, Inc., Grants Pass, Oregon

Organic Matter Feeds the Microbes!

- Increasing the aggregation of particles
- Increasing drainage (clay soils)
- Increasing water-holding (sandy soils)
- Increasing nutrient-holding

Organic Matter Amendments (soil conditioners)

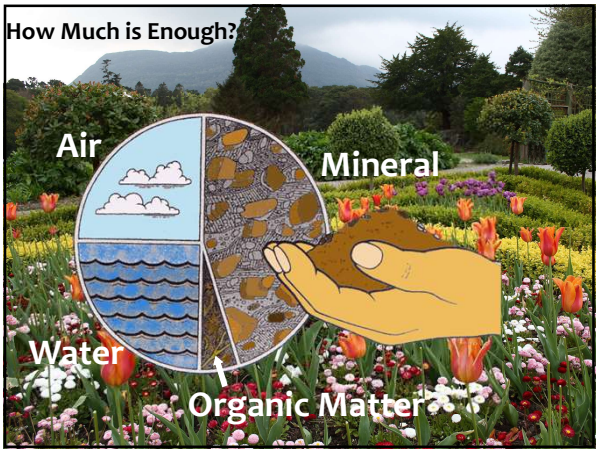
- Food/Yard waste compost
- Composted manures
  - Chicken, rabbit, steer, dairy
- Worm castings
- Grass clippings
- Peat moss/Coir
- Cover crops
- Engineered mixes

Inorganic Amendments (also soil conditioners)

- Hardened clay or diatomaceous earth
  - Turface/Profile
  - Amturf Ultra Soil Conditioner
  - AXIS
- Gravel
  - Quarter-ten (1/4 -10)
- Volcanic pumice

Are there "bad" amendments?

- Bark dust/sawdust/wood chips
  - Are you amending or mulching ?
  - Adding nitrogen when amending
- Top soil
  - Source???



Can You Have Too Much Organic Matter?

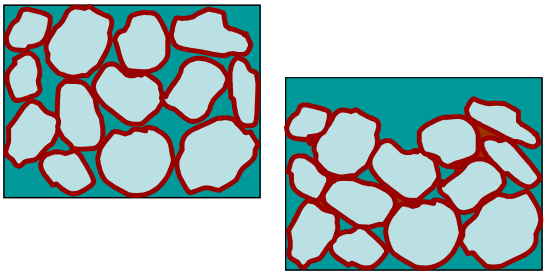
- Phosphorus build-up
- Uneven/unpredictable release of nitrogen
- Some lab testing may be unhelpful

Organic Mulches

Adding organic matter without digging

- Food for many soil dwellers
- Form aggregates during decomposition
- Plus:
  - Maintain **soil temperature** for microbe activity
  - Aid in **water penetration** (less run-off erosion)
  - **Conserve moisture** by reducing evaporation
  - Help **minimize compaction**

Compaction Destroys Structure



Prevent Compaction with Permanent Paths

- Don't dig in soggy soil
- Beware foot and equipment traffic
- Protect surface
- Avoid excessive tilling

Tilling vs. No-till

- Advantages
  - Fast mixing
  - Weed control
  - Faster decomp
  - Nutrient mixing
- Advantages
  - Microbes
  - Winter crops
  - Fewer weeds
  - Slower decomp

Why Soil Temperature Matters

Low temperatures mean:

- Nutrient availability is slow or stopped
- Roots don't develop - stunted all season
- Slow water uptake → slow nutrient uptake
- Little microbial activity
- Potential tissue damage

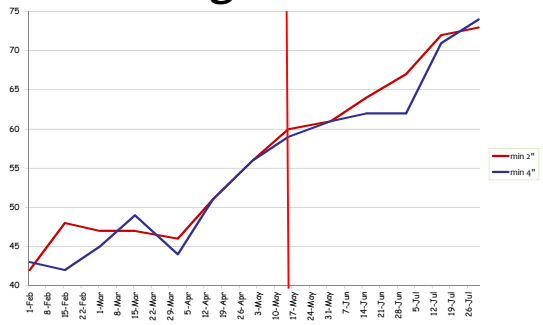
	minimum	optimum
Spinach	35	70
Tomato	50	85
Watermelon	60	95

Days it took seeds to come up

	32°	41°	50°	59°	68°	77°	86°	95°	104°
Spinach	62	22	12	7	6	56	x	x	x
Tomato	x	x	43	14	8	6	6	9	x
Watermelon	…	x	…	…	12	5	4	3	…

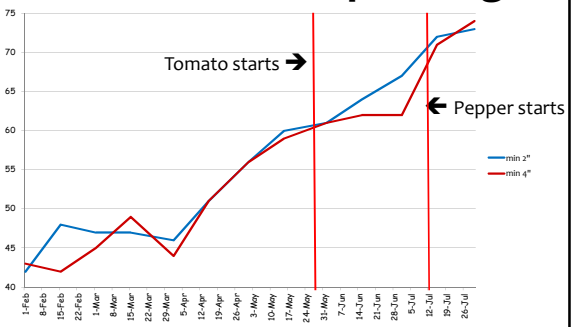
x little or no germination
… not tested

Planting Those Beans



Bean seeds

How about transplanting?



Your visual assessment of plant growth and fruiting can help you know how much to fertilize. If the plants are growing well, leaves look green, and yield is good, there's no need to worry about whether plants are getting enough nutrients.

Bernadine Strick

Know your soil

make it work for <u>your</u> garden!

Soil resources:

- Oregon State Extension publications:
  - *Improving Garden Soils with Organic Matter (EC 1561)*
  - *Laboratories Serving Oregon (EM 8677)*
  - *Cover Crops for Home Gardens (FS 304)*
  - *Mulching Woody Ornamentals with Organic Materials (EC 1629-E)*
- Web Soil Survey
  - *google: web soil survey*
  - *App: SoilWeb*
- Soil Biology Primer
  - *google: soil biology primer*
- Natural Resources Conservation Service (NRCS)
  - *google: Unlock the Secrets in the Soil or Soil Health NRCS*
- Books
  - *Elements of the Nature and Properties of Soils -- by Nyle C. Brady and Ray R. Weil*