

The background features a close-up photograph of reddish-brown soil with small stones and organic matter. Overlaid on this are several semi-transparent green geometric shapes, including a large triangle on the right and a smaller one at the bottom right, creating a modern, layered design.

Soil Health

for Market Gardeners and Homesteaders

Soil's Ability to Support Plant Life

Myth Buster:

“I’m stuck with poor quality soil”

All Soils Can Be Improved!

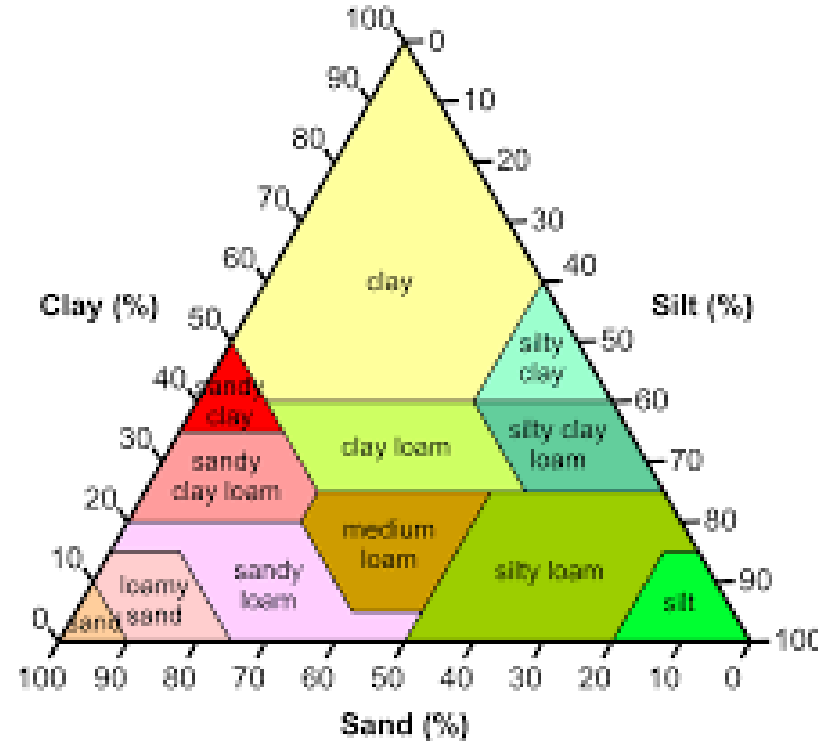


Mineral Portion of Soil (doesn't change)

- ▶ Sand - massive particles
 - ▶ Excessively porous
- ▶ Silt - average size particle
 - ▶ Good for Ag
- ▶ Clay - very tiny

(a clay particle is roughly a thousand times smaller than a sand particle)

- ▶ Small % is good but too much results in heavy, wet soil



What is Soil?

- ▶ 50% Mineral : Sand, **Silt**, and Clay
- ▶ 47% Air and/or Water
- ▶ 3-4% Organic Matter



Biological Components/Organic Matter

▶ Decaying organic material

- ▶ Plants and manures, insects, worms, microbes, etc.

▶ Living Organisms

- ▶ bacteria, fungus, molds, insects, nematodes, worms, salamanders, etc.



Biological/OM

- ▶ Soil Organic Matter = Resiliency
 - ▶ Holds moisture*
 - ▶ Contributes and Holds Nutrients*
 - ▶ Provides porosity*
 - ▶ Enhances Root Function

*better than mineral portion

How It Works

- ▶ Organic Matter has more sites that can hold cations like Calcium, Magnesium, and Potassium than mineral particles
- ▶ As organic matter breaks down, it releases the nutrients of which it is composed.
 - ▶ Organic Nitrogen
 - ▶ Phosphorus
 - ▶ Potassium
 - ▶ Sulfur
 - ▶ Micro nutrients: zinc, boron, iron, manganese, copper, molybdenum)

Increase & Preserve Organic Matter

- ▶ Add plant material
 - ▶ Manure: Cattle best, swine and poultry good short-term but not as good long-term benefit
 - ▶ Cover crops: more mature is better. Always have something growing on the soil
 - ▶ Organic mulches like straw
- ▶ Reduce tillage when possible
 - ▶ No-till, reduced tillage
 - ▶ Reduced cultivations
 - ▶ If you need to till; use the practices above



How it Works

- ▶ Increase OM from 2% to 3% results in significant plant benefits
- ▶ Increase OM from 4% to 5% results in some benefit
- ▶ Increase OM from 6% to 7% results in slight benefit



Supplying Plant Nutrition

- ▶ pH is critical
 - ▶ Most crops thrive when pH is 6.0-7.0
 - ▶ Too low or too high nutrients become unavailable to the plant
 - ▶ Few exceptions: blueberries require a pH around 4.5-5.0
- ▶ Long term storage of nutrients
 - ▶ Phosphorus very long
 - ▶ Potassium and micro-nutrients medium long
- ▶ Short term storage of Nitrogen

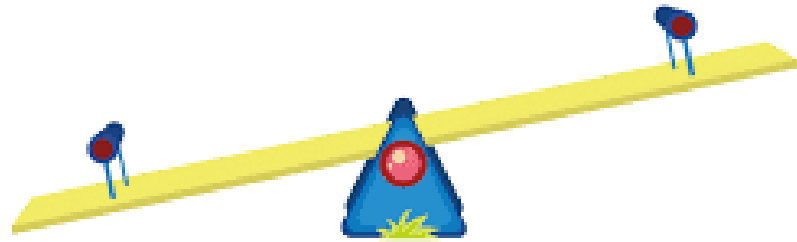
Where Farmers Tend to Go Wrong

- ▶ Excessive amounts of manure/compost to meet N requirements
 - ▶ Excessive nutrients result in pollution
 - ▶ Excessive P ties up micro-nutrients
 - ▶ Nutrients become terribly out of balance - **More is not better**
- ▶ Relying exclusively on purchased fertilizer
- ▶ Don't apply lime or enough lime
 - ▶ pH
 - ▶ Best, most economical source of Ca and Mag



If You've Over-done It

- ▶ Stop applying manure/compost!
- ▶ Incorporate legumes into crop rotation or use purchased fertilizer to supply N without adding additional P and K.
- ▶ Crop removal pulls down excessive levels over time



It's a Balancing Act

You Want All the Benefits
without Over Doing It

Conclusion: Use Best Practices

- ▶ Apply Low to Moderate amounts of Manure and Compost
- ▶ Reduce Tillage when Possible
- ▶ Use Cover Crops
- ▶ Use Legumes when Possible
- ▶ If nutrients become excessive, use nitrogen sources that don't
- ▶ Have significant amounts of P & K, use N alone
- ▶ Soil Test - Don't Guess (include organic matter)