Essential Components of a Healthy Productive Soil

Biological & Physical Factors of Soil Health and Soil Quality

Good Quality Organic Content

Build a Healthy Soil using Good Quality Amendments to add Organic Matter

**Best ->** Cover Crops (Any) - but Legume cover crops supply the most Nitrogen

**Good ->** Compost - but use in moderation to avoid excess phosphorus

**Good ->** Leaves - best to till in fall, instead of spring

**OK ->** Animal Manures - can contain weed seed if uncomposted

**Marginal ->** Peat Moss, Humates - little useable carbon (food) for microbes

**Not ->** Sawdust, Shavings, or Straw - will tie up all available Nitrogen

Good Biological Activity

Robust Population of Beneficial Microbes, fed by Good Quality Organic Matter (above)

- Cycle and release nutrients from amendments in plant-available form
- Promote the formation of Soil Aggregates (see below)
- Compete with & Suppress Pathogenic disease organisms
- Degrade and Neutralize Synthetic Contaminants - Pesticides, Hydrocarbons
- Promote Adaptability & Resiliency in the Soil Environment

Good Nitrogen Supplying Potential

Properly Fed microbial population will supply sufficient Nitrogen for Plants

**Good ->** Legume cover crops - Clovers, Vetch, Field peas

**Good ->** Plant & Animal Meal Fertilizers - Blood, Soy, Fish, Feather

**Marginal ->** Compost - releases Nitrogen VERY slowly

**Poor ->** Wood, Bark, or Straw tie up Nitrogen, robbing it from plants

**Timing ->** Delay application of fast release fertilizers (if needed) 3-4 weeks after planting for vegetable production

(OVER)
**Strong Soil Aggregates (Crumb Structure)**

**Benefits:**
- Improved Drainage
- Better Aeration
- Improves Water Infiltration
- Greatly Improves Workability (Tilth)
- Prevents Crusting after rainfall
- Minimizes Compaction (below)
- Better Root Growth & Depth of Penetration

**Encouraged by:**
- Cover Crops or Sod Crops in Rotation
- Regular Additions of Good Quality Organic Matter

**Preserved by:**
- Minimal Tillage or No-till

**Minimal Soil Compaction**

Penetration Resistance measured with Small metal rod, Bamboo stake, or Penetrometer
  - Push into the soil as far as possible (or 300 psi Penetrometer reading)
  - Ideal depth to compacted layer 18 + inches
  - Determines Effective Rooting Depth for access to Water and Nutrients

**Compaction causes:**
- Working wet soil
- Tillage - compresses soil layer just beneath
- Poor or Weak Aggregation (above)

**Prevention/Remediation:**
- Mechanical ripping - Yoemans plow or other Shank ripper
- Deep rooted cover crops - Sweet Clover, Tillage radish, Canola (rape)
- Minimal Tillage or No-till

Bruce Hoskins
Maine Soil Testing Service