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SOIL: GETTING IT RIGHT

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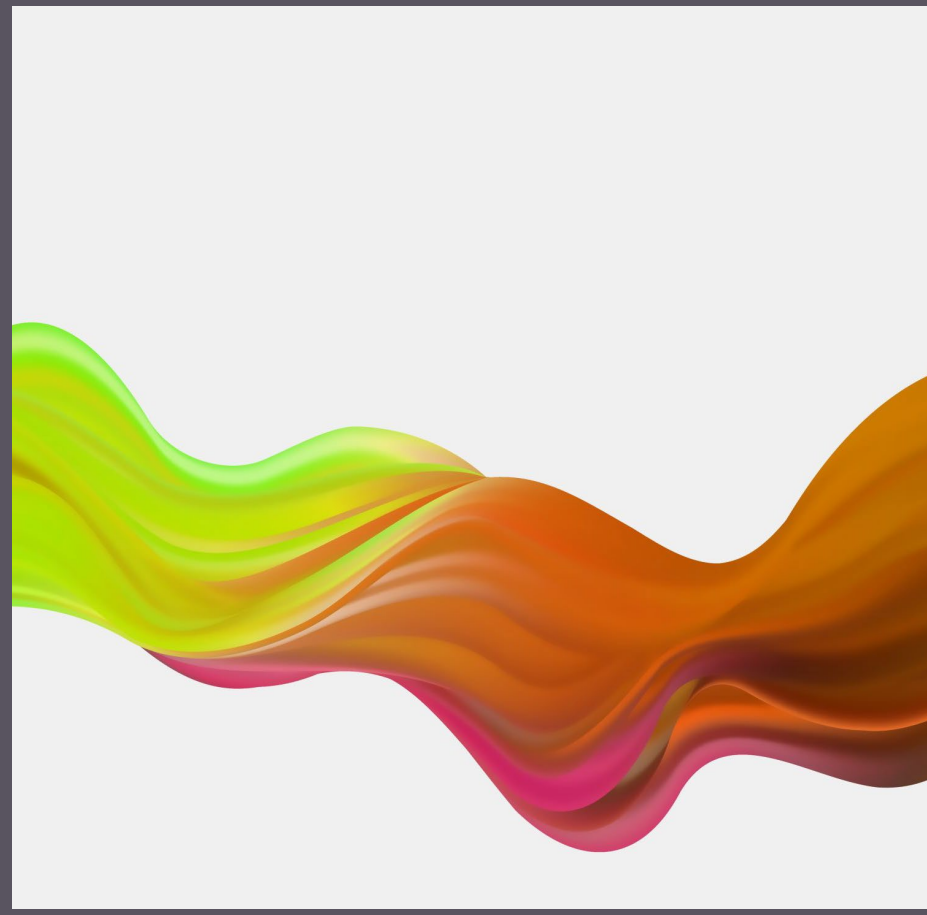

What is soil made of?

- Minerals
- Organic Matter (Living and Dead Organisms)
- Air
- Water

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- Soil is a living ecosystem.
- Soil sustains plants and animals.
- Soil is a filter that gives us clean fresh water.
- Most of our infrastructure is built on soil.
- Ideal soil:
    - 45% rock particles (sand, silt, and clay)
    - 25% water
    - 25 % air
    - 5 % organic matter (humus)
- Texture/Tilth (Healthy Soil Structure)

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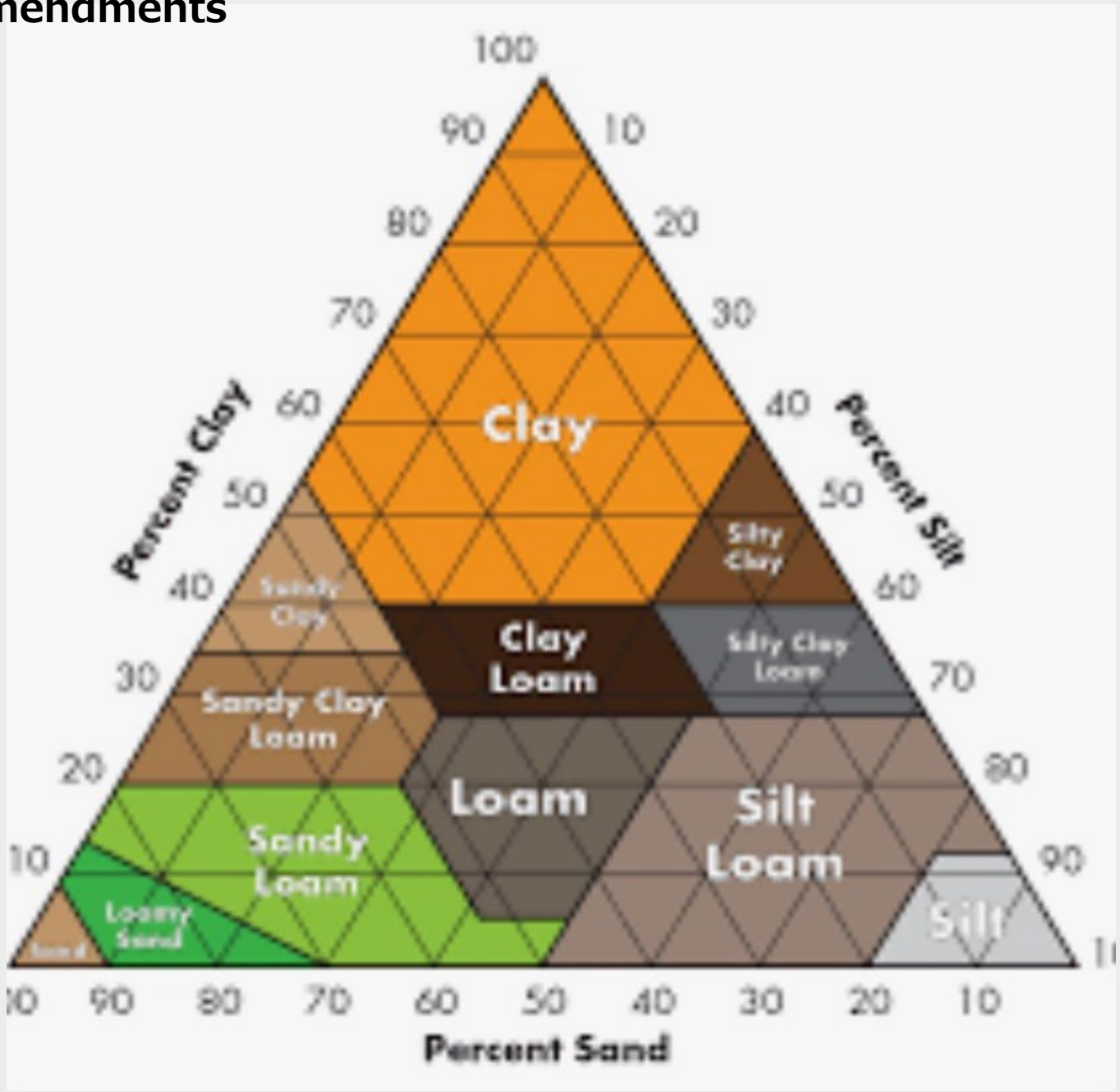
Soil With and Without Amendments

- Loamy Soil
- Clay Soil
- Dixon Soil



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OUR SOIL IS

SLIGHTLY ACIDIC
HIGHLY NUTRITIOUS
POORLY DRAINED
CLAY

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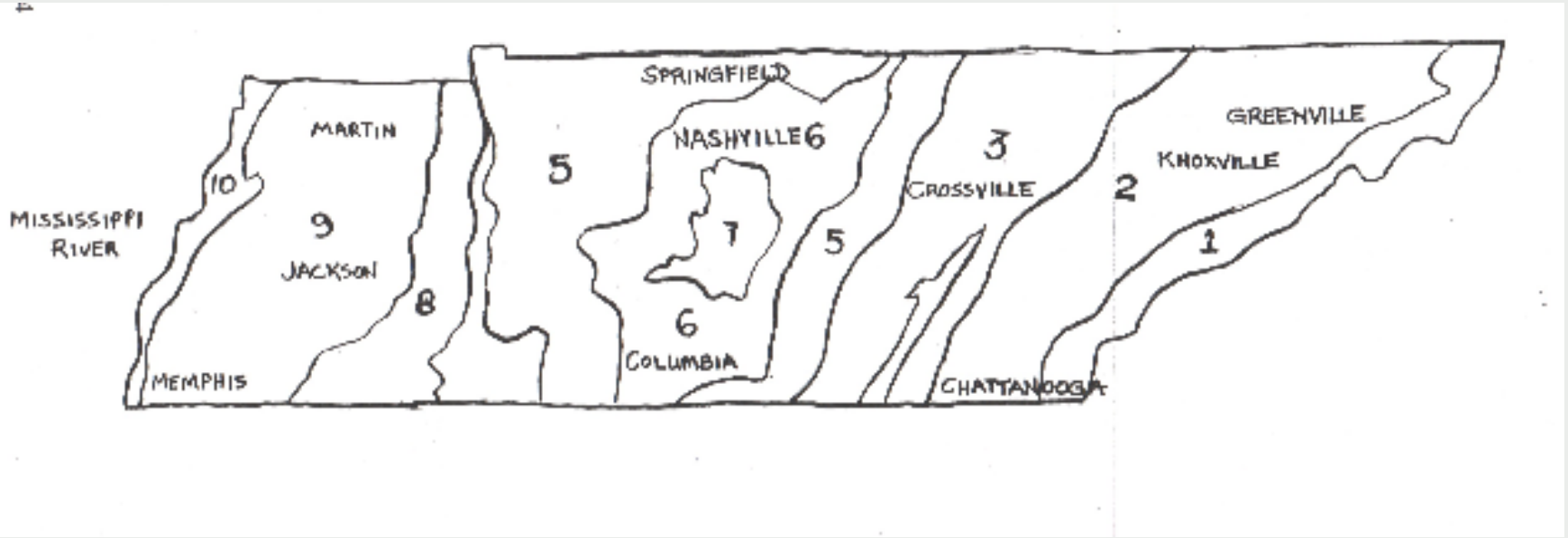
of loess which gave rise to soils with silty top soils and variable subsoils depending on the nature of the underlying marine deposits.

9) Deep Loess (16.5% of the State)

The soils of this region are derived from a moderately deep to deep layer (4-70 feet) of loess over Coastal Plains material. The western portion of the area is occupied by deep, well drained soils on rolling to hilly relief, however, the soils of most of the region are characterized by fragipans with varying depths and thicknesses. These restrict drainage, lower available water holding capacity and increase the erosion problem.

10) Mississippi River Flood Plains (2% of the State)

The soils of this region are derived from alluvium deposited by the Mississippi River and the tributary streams. The soils are generally fertile, and range from fine textured, firm and slowly drained, to loamy and well drained.



A description of all Tennessee soils can be found by searching

Overview of Tennessee Soils - UT Crops

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SOIL AMENDMENTS

Master Mix Blend

- Compost
- Soil Conditioner (Screened Pine Bark)
- Coarse red sand

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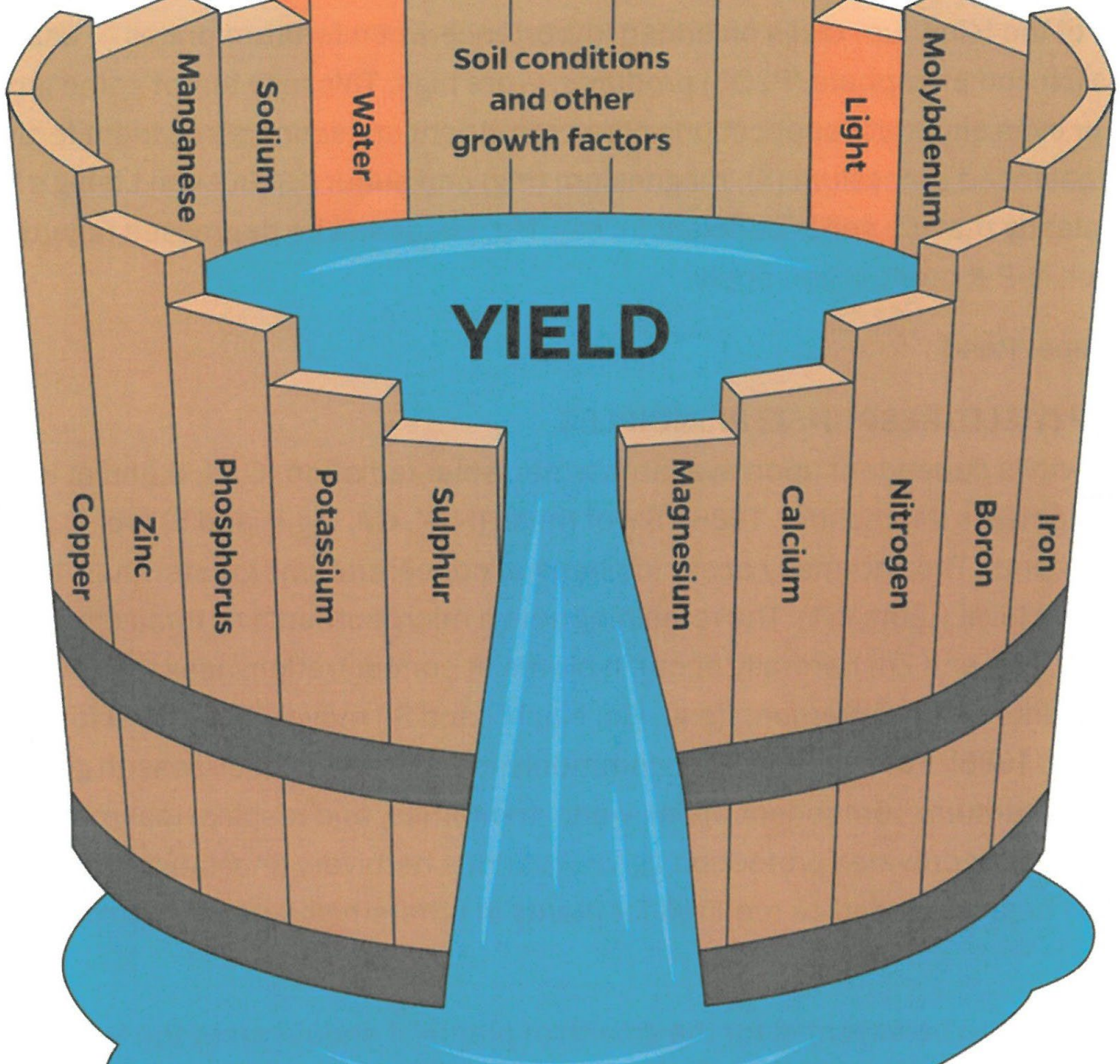

Liebig's Law of Minimum

If one of the essential plant nutrients is deficient, plant growth will be poor even when all other essential nutrients are abundant

TOO MUCH OF A GOOD THING IS NOT GOOD!

But how do you know?

THIS IS WHERE YOUR SOIL TEST IS CRITICAL

SOIL TESTING: tells you what nutrients are in your soil, pH, and if the soil has any harmful contaminants.

1. Shelby County Extension Service

2. Waypoint Analytical (formerly A & L Analytical)

**Do testing every three years.

Essential Elements for Plant Growth

- Macronutrients
  - Nitrogen
  - Phosphorus
  - Potassium
  - Sulfur
  - Calcium
  - Magnesium

- Micronutrients
  - Boron
  - Manganese
  - Chlorine
  - Copper
  - Iron
  - Zinc
  - Molybdenum

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An “Essential Element” should meet the following criteria:

1. The life cycle cannot be completed without the element.
2. The element doesn’t have a replacement.
3. The element must have a direct function.

HOW DO PLANTS GET THESE ESSENTIAL ELEMENTS?

LET ME COUNT THE WAYS…

FROM NATURALLY OCCURRING ELEMENTS IN THE AIR, SOIL, & WATER

FROM SOIL AMENDMENTS

FROM MICROORGANISMS

FROM FUNGI

WHAT ARE THE ESSENTIAL ELEMENTS?
There are 16 of them!

Primary nutrients – aka Macronutients – usually required in the largest amounts

- Carbon (Ca), hydrogen (H), nitrogen (N), oxygen (O), phosphorus (P), potassium (K)

Secondary nutrients – needed in moderate amounts

- Calcium, magnesium, sulfer

Micronutrients – needed in tiny amounts

- Boron, chlorine, copper, iron, manganese, molybdenum, zinc

A very few plants need these additional nutrients: cobalt, nickel, silicon, sodium, vanadium

ORGANIC AMENDMENTS

Benefits:
Soil Aggregation
Aeration and Water Penetration
Moisture Holding Capacity
Cation Exchange Capacity
pH buffer
Micronutrient Chelation
Plant Nutrient

Examples:

- Leaf Compost
- Cotton Burr Compost
- Black Kow Manure
- Worm Castings
- Soil Conditioner
- Pine Bark Mulch
- Hardwood Mulch
- Wood Chips
- Biochar (Lesco Carbon Pro G)
- Dixon Compost

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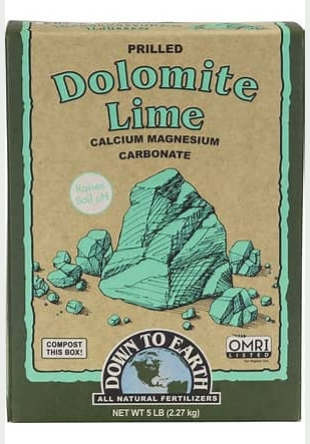
Non-Organic Amendments

- Coarse Red Sand
- Turface
- Permatill
- Dolomitic Lime
- Soil Perfector



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Soil Mix Recipes

Woodland Garden Mix

- 1 part leaf compost
- 1 part pine bark
- 1 part coarse red sand

Perennial Border/Tree/Shrub Mix

- 1 part cotton burr compost
- 1 part pine bark
- 1 part coarse red sand

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Preparing Bed for Planting

1. Layout the shape of the bed with garden hose and/or marking paint.

2. Remove sod, if good quality and usable elsewhere, or spray weeds and grass with chemical such as Round-Up or any product with glyphosate as the active ingredient.

3. Roto-till as deeply as possible; front-tine tiller is best.

4. Grade out bed and define edge.

5. Add layers of amendments like a soufflé:
    a. 3-4 inches of soil conditioner (processed pine bark)
    b. 2 inches of coarse red sand (not mason or white sand), available at mulch companies and construction supply companies
    c. 1-2 inches of compost or leaf mold or decomposed manure (Black Kow, for example)
    d. Cottonseed meal: heavy dusting
    e. Bone meal: dusting
    f. 1/8 inch of lime (dolomitic, which has magnesium)

6. Re-till, grade, level, and re-define edge.

7. Cover with less than ½ inch of mulch to minimize erosion. Rake back mulch to plant.

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Tools for Incorporating Amendments

Front Tine Tiller

vs

Rear Tine Tiller

Border/Spading Fork a/k/a

Four Tine Digging Fork

Auger (Vertimulching)

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