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Soil: The Foundation of the Garden

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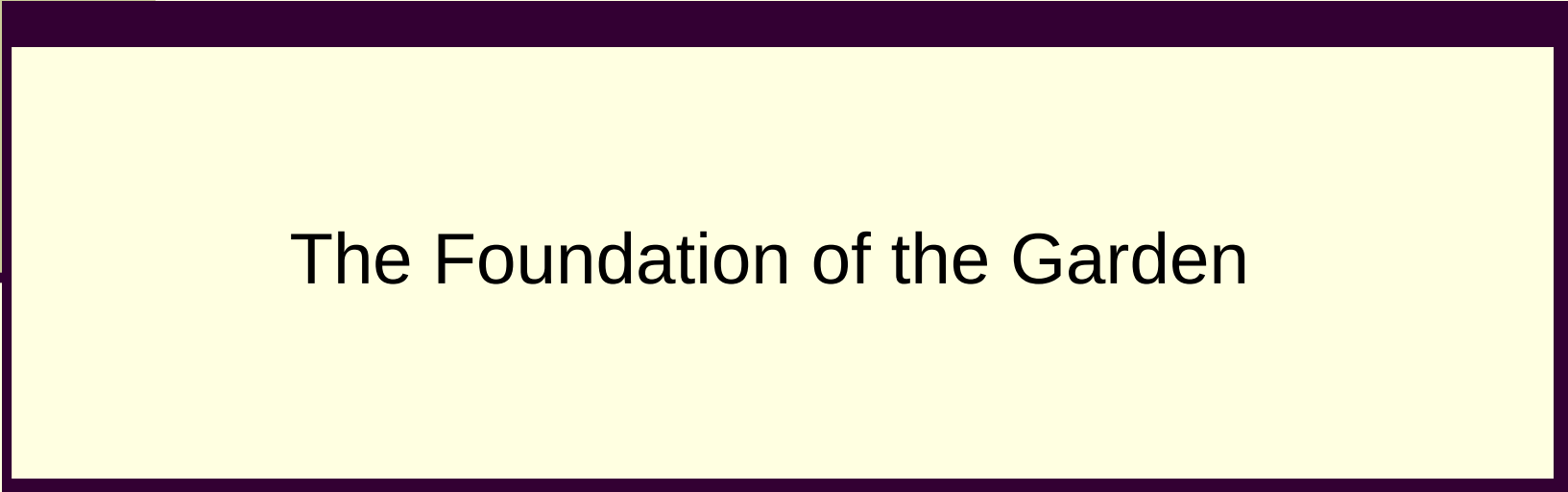
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Soil

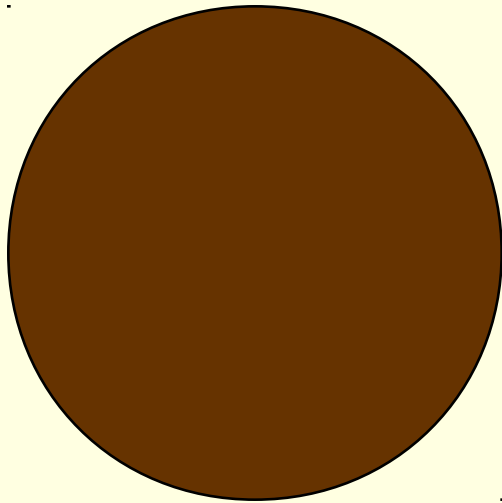


The Foundation of the Garden

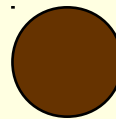
Soil

- Type
- pH
- Soil Tests
- Soil Compaction and Drainage
- Soil Improvement
- Macro and Micro Nutrients
- Macro and Micro Organisms

Soil Particles



Sand



Silt



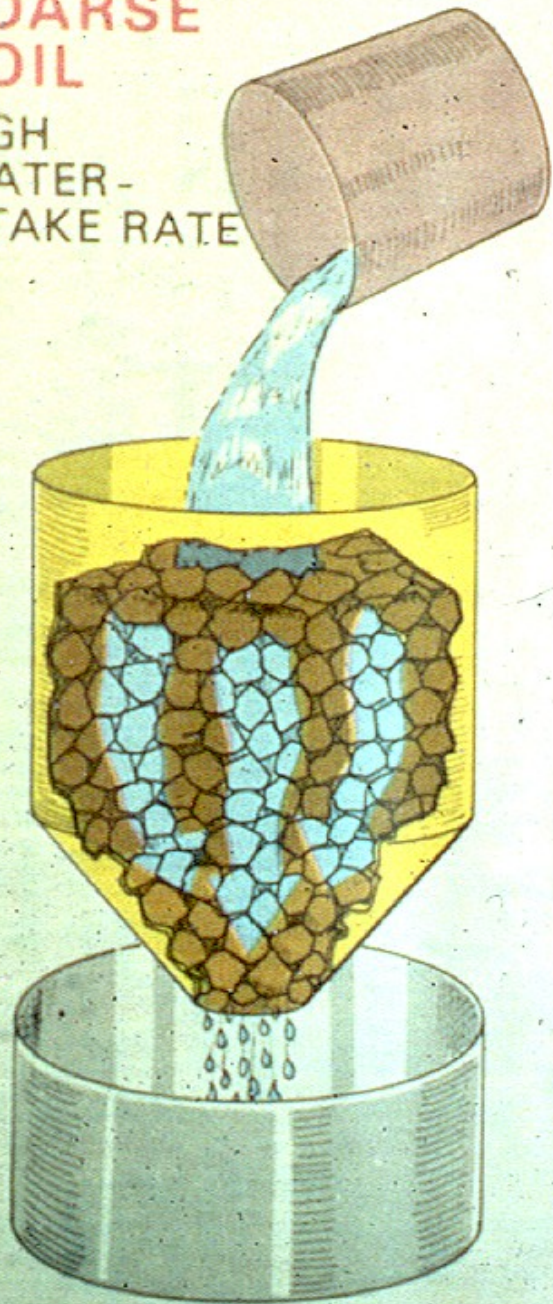
Clay

Soil Type

- Mostly sand
 - Does not retain water or nutrients
- Mostly clay
 - dries rock hard (compaction)
 - does not absorb water
 - increases problems such as root rot
- Loam (20% clay, 40% silt, 40% sand)

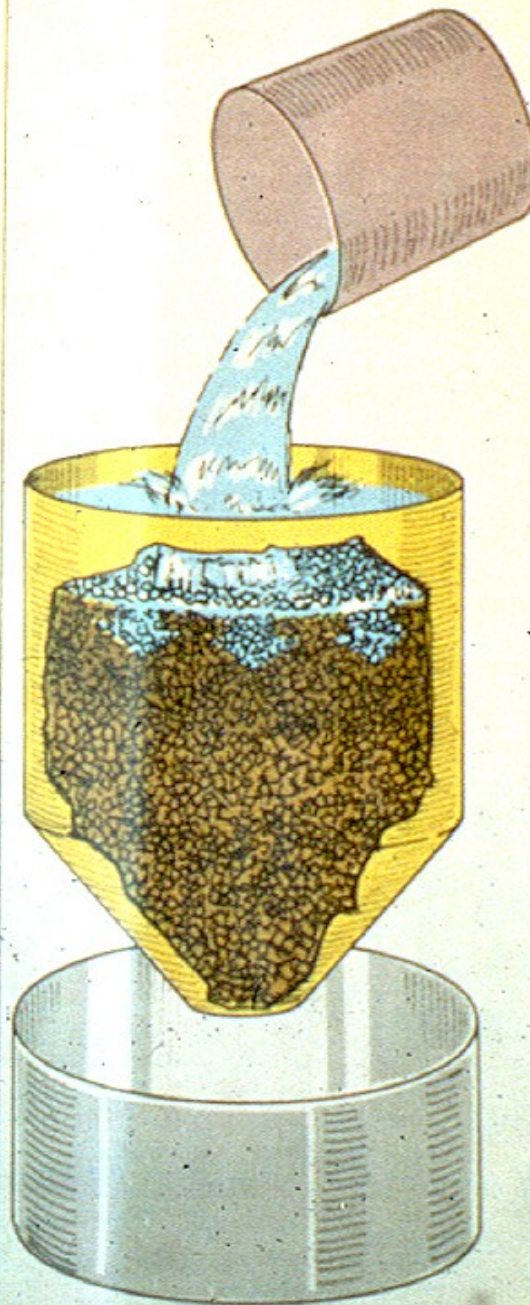
COARSE SOIL

HIGH
WATER-
INTAKE RATE



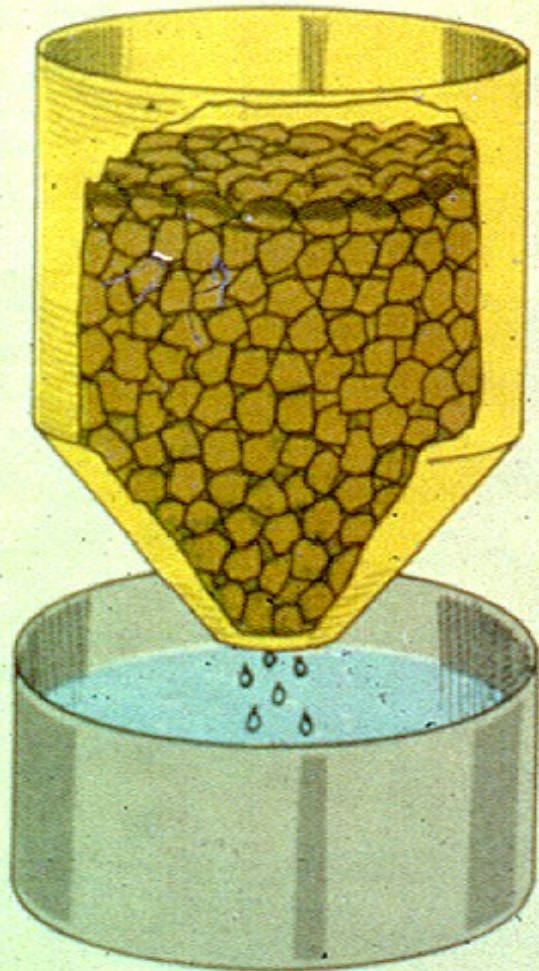
FINE SOIL

LOW
WATER-
INTAKE
RATE



COARSE - TEXTURED SOIL

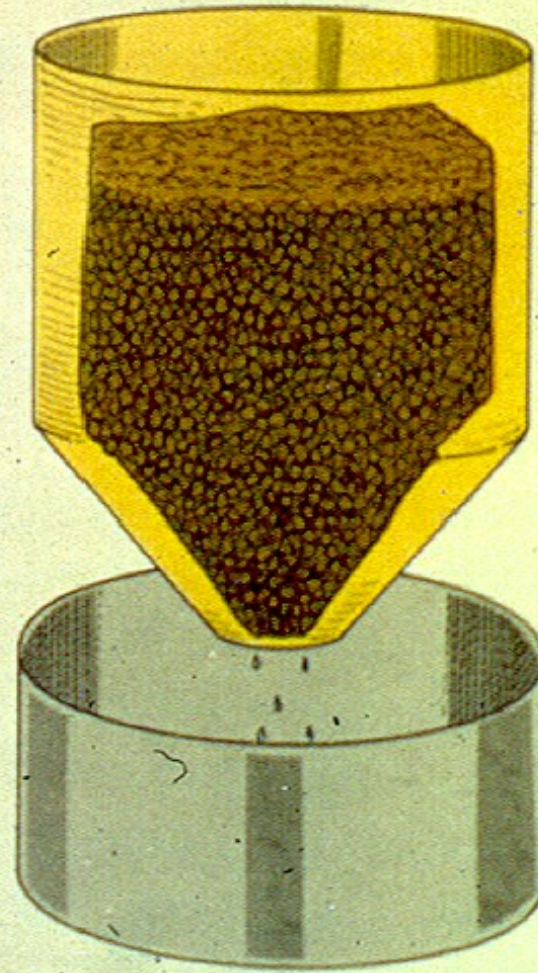
LOW WATER -
HOLDING CAPACITY



(a)

FINE - TEXTURED SOIL

HIGH WATER -
HOLDING CAPACITY

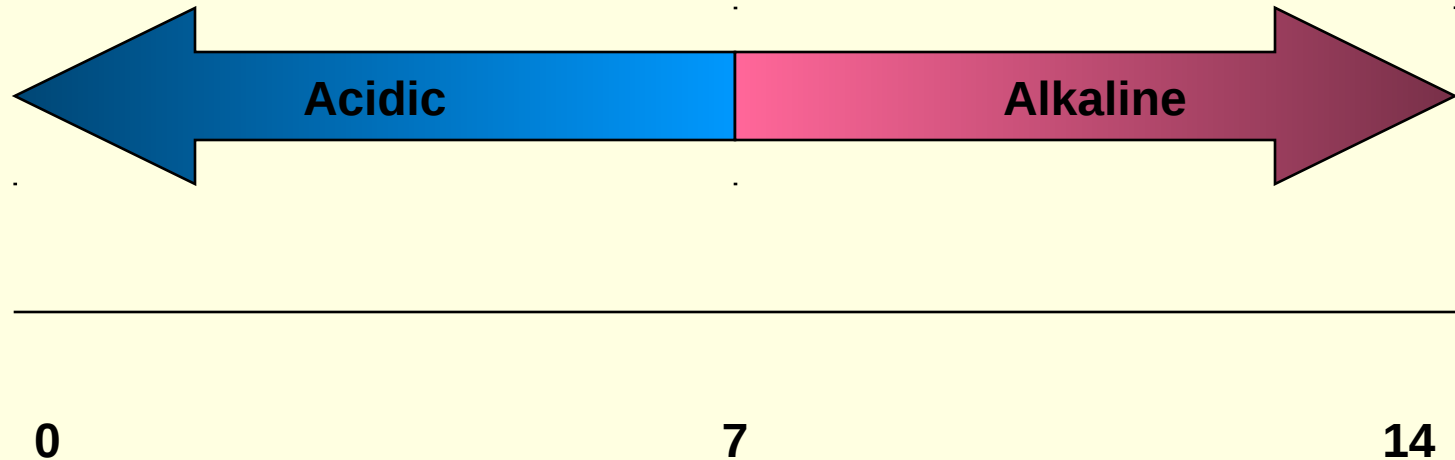


(b)

Watering Guidelines

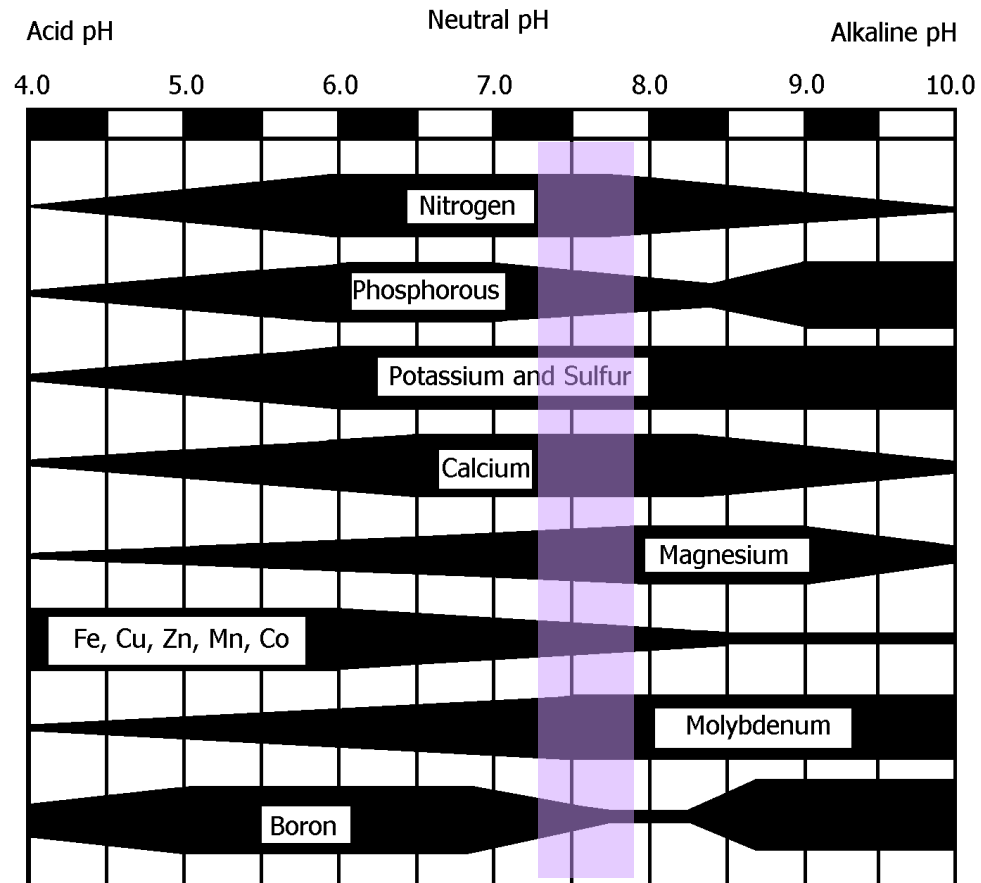
- Water early in the day.
- Water only the root zone.
- Avoid frequent, light waterings.
- Adjust, based on soil type, the frequency of watering, not the amount.
- Know how much water you are applying.
- Prevent runoff.

pH



**Alkalinity may make soil nutrients unavailable to plants.
Changing pH is very difficult in Utah.**

Effect of Soil pH



Soil Tests

- Ribbon test
- Over-the-counter tests
- USU soil testing

Ribbon Test

1. Take a handful of soil. Add a little moisture if soil is very dry.
2. Attempt to squeeze the soil into a ribbon with your thumb.
3. Determine the length of the ribbon.
4. Next add water to make a soupy mud.
5. With a dry hand, determine if the mud feels mostly gritty, mostly smooth, or both.
6. Determine the type of soil you have from the table below.

Length	Gritty Feel	Smooth Feel	Gritty & Smooth Feel
1" or less	Sandy Loam	Silty Loam	Loam
1" to 2"	Sandy Clay Loam	Silty Clay Loam	Clay Loam
2" or more	Sandy Clay	Silty Clay	Clay

Over-the-Counter Test

- Garden centers carry home soil tests.
- Tests kits for a single test start about \$1.
- Kits test multiple factors.
- The results are only approximate.
- Using distilled water increases accuracy.

USU Soil Testing

- Obtain the kit from the USU county extension office.
- Follow the instructions in the kit to take a soil sample from your yard.
- Select tests you want USU to make.
- Send the sample with a check for the appropriate amount to the address in the kit.

Soil Compaction

Soil may become compacted from:

- Heavy equipment in new construction areas.
- Excessive tilling.
- Traffic (play, animals).
- Soil chemistry.

Drainage

- Most plants will drown if water collects around roots.
- Sandy soils do not retain water easily and must be watered more frequently.
- Heavy soils prevent water draining away from roots.
- Raised beds improve drainage in clay soils.

Soil Improvement Methods

- Organic material
- Green manures
- Double digging

Organic Material

- Retains water in sand.
- Increases drainage and aeration.
- Breaks up compacted soils.
- Adds nutrients to the soil.
- Moves the pH towards neutral.

Sources of Organic Matter

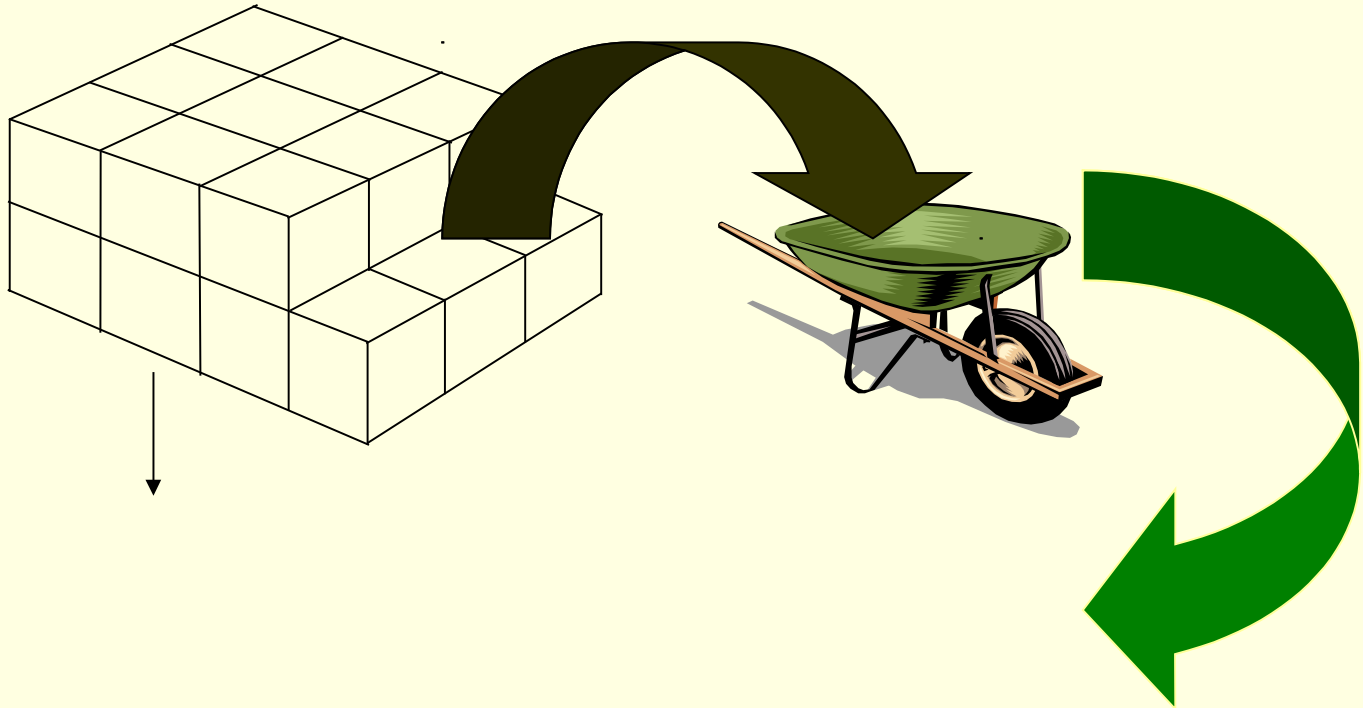
- Compost
- Tree leaves
- Pine needles (acidic)
- Grass clippings
- Manure—horse, cow, chicken, rabbit, ...
- Recycled paper and cardboard

Green Manures

Cover crops that are tilled into a planting bed just before they go to seed

- Alfalfa
- Clover
- Vetch
- Barley
- Buckwheat
- Winter rye

Double Digging



Macro Nutrients

- Nitrogen
- Phosphorous
- Potassium
- Sulfur
- Calcium
- Magnesium
- Hydrogen, Oxygen and Carbon

Micro Nutrients

- Iron
- Boron
- Copper
- Manganese
- Molybdenum
- Zinc

Macro and Micro Organisms

- Soil is teeming with life essential to healthy soil.
- Fungi, bacteria and other microscopic organisms convert organic material to nutrients.
- Earthworms and small animals aerate and mix soils and leave droppings.
- Other organisms act as predators.

Summary

- Soil is the foundation of the garden.
- Know your soil and select plants that do well in your soil.
- Improve soil with organic material.
- Insure adequate nutrient levels in your soil.
- Encourage soil organisms.
- Get dirty and enjoy it.