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

FINE - TEXTURED SOIL
HIGH WATER - HOLDING CAPACITY

(a)

(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.
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.

<table>
<thead>
<tr>
<th>Length</th>
<th>Gritty Feel</th>
<th>Smooth Feel</th>
<th>Gritty &amp; Smooth Feel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot; or less</td>
<td>Sandy Loam</td>
<td>Silty Loam</td>
<td>Loam</td>
</tr>
<tr>
<td>1&quot; to 2&quot;</td>
<td>Sandy Clay Loam</td>
<td>Silty Clay Loam</td>
<td>Clay Loam</td>
</tr>
<tr>
<td>2&quot; or more</td>
<td>Sandy Clay</td>
<td>Silty Clay</td>
<td>Clay</td>
</tr>
</tbody>
</table>
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.