Gardening Basics

Essential Information for Every Gardener
Topics

- Plant Processes
- Soil
- Water
- Fertilizer
- Weed, Pest, and Disease Control
- Climate Zones
- Plant Material and Selection
- Plant Names
- A Quick Guide to Lawn Care
Plant Processes

Photosynthesis
Carbon dioxide + Water (In sun + chlorophyll)

Respiration
Carbon dioxide
Water
Breakdown
Sugar
Energy Released

Oxygen
Water

Transpiration
Oxygen
Nitrogen
Phosphorus
Potassium
Calcium
Trace Elements
Water
Soil

- Type
- pH
- Nutrients
- Soil Tests
- Soil Improvement Methods
- Organic Material
- Macro and Micro Organisms
Soil Particles

Sand

Silt

Clay
Soil Type

- Mostly sand
  - Does not retain water or nutrients.
- Mostly clay
  - Dries rock hard.
  - Compacts.
  - Does not absorb water.
  - Increases problems such as root rot.
- Loam (20% clay, 40% silt, 40% sand)
COARSE - TEXTURED SOIL
LOW WATER - HOLDING CAPACITY

FINE - TEXTURED SOIL
HIGH WATER - HOLDING CAPACITY
Soil pH

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

Most of Utah
Nutrients

- Macronutrients
  - Nitrogen
  - Phosphorus
  - Potassium
  - Sulfur
  - Calcium
  - Magnesium
  - Hydrogen, Oxygen and Carbon

- Micronutrients
  - Iron
  - Boron
  - Copper
  - Manganese
  - Molybdenum
  - Zinc
Four Components of Soil

Utah topsoil contains less than 1% organic material.
Soil Tests

- Canning Jar Test
- Ribbon Test
- Over-the-counter Tests
- Utah State University (USU) Soil Testing
Canning Jar Test

1. Put one cup of soil in a quart jar.
2. Add water until the jar is 2/3 full.
3. Mix thoroughly and record settling levels.

Diagram:

- Clay: 24 hours
- Silt: 1 hour
- Sand: 5 min
Percentages

- Percentage of clay = 24 hr – 1 hr / 24 hr
- Percentage of silt = 1 hr – 5min / 24 hr
- Percentage of sand = 5 min / 24 hr
- Loam = 40% sand, 40% silt, 20% clay
Ribbon Test

1. Take a handful of soil; moisten if dry.
2. Attempt to squeeze the soil into a ribbon using your thumb.
3. Determine the length of the ribbon.
4. Add water to make a soupy mud.
5. With a dry hand, determine if the soup feels mostly gritty or mostly smooth, or both.
6. Check the table below to determine the type of soil.
Over-the-Counter Tests

- Garden centers carry home soil test kits.
- Tests kits for a single test start about $1.
- Kits test multiple factors:
  - pH
  - Nitrogen, Phosphorous, Potassium (N-P-K)
  - Moisture
- Results are only approximate.
- Using distilled water increases accuracy.
- Soil test meters are also available.
USU Soil Testing

- Obtain the kit from the USU Davis 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 provided in the kit.
Soil Compaction

- Soil may become compacted from:
  - Heavy equipment in new construction areas.
  - Excessive tilling.
  - Traffic (play, animals).
  - Soil chemistry.

- Aeration, liquid conditioners, and digging can loosen compacted soil.
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 ...
  - Fresh manure can burn plants.
- Recycled paper and cardboard
Green Manures

Green manures are 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 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.
Water

- Drainage
- Guidelines
- Hydrozoning
Drainage

- Soil drainage test:
  - Dig a hole 18 inches deep.
  - Fill with water.
  - Measure the time required to drain completely.
    (Longer than 5 hours indicates poor drainage.)

- Most plants will drown if water collects around roots (no oxygen uptake).

- 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.
Watering Guidelines

- Water early in the day.
- Avoid frequent, light watering.
- Base the frequency of watering on soil type.
- Know how much water you are applying.
- Avoid runoff.
Hydrozoning vs. Xeriscaping

- Xeriscaping is an industry buzz word and has many different interpretations.
- Hydrozoning is a method of grouping plants by their water needs.
- Design your garden to create distinct garden areas with separate water sources.
- Plant species with common water needs in each area.
Fertilizer

- N-K-P
- Pounds of Nitrogen
- Application
N-P-K

- % Nitrogen (N) – vegetative growth
- % Phosphorus (P) – roots, flowers, fruit
- % Potassium (K) – plant health
- 4-10-8 = 4% N, 10% P, 8% K
- Quick release vs. slow release
## Pounds of Nitrogen

<table>
<thead>
<tr>
<th>Lbs in bag</th>
<th>% N</th>
<th>Lbs N required</th>
<th>Lbs to apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 (21-0-0)</td>
<td>21</td>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td>10 (34-0-0)</td>
<td>34</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>20 (6-2-0)</td>
<td>5</td>
<td>4</td>
<td>67</td>
</tr>
</tbody>
</table>
Fertilizer Application

- Application method varies:
  - Lawns – apply evenly over entire surface.
  - Perennial beds – broadcast.
  - Vegetable and rose beds – work into soil around plants, six inches away.
- Excess fertilizer causes plant problems.
- Water moves fertilizer to the roots.
Weed Control

- Do not allow weeds to go to seed.
  - Remove
  - Mulch
    - Prepared organic and cover crops
    - Plastic
    - Weed block
  - Solarize
  - Apply chemicals
Chemical Weed Control

- Pre-emergent – prevents germination of annual and perennial weeds.
- Broadleaf – selectively kills non-grass weeds; particularly useful in lawns.
- Roundup™ – kills all plants on contact; use to kill grass weeds; reseed lawns after use.
- Grass-Be-Gone™ – selectively kills grass weeds; useful in perennial beds.
Disease Control

- Do not crowd plants.
- Rotate annually (does not apply to perennials).
- Clean the plants.
- Remove debris.
- Water the soil, not the plants.
- Select disease-resistant varieties.
- Make sure that air can circulate to dry off the leaves.
Insect Control

- Keep plants healthy.
- Keep the garden clean.
- Monitor plants for insect damage.
- Manually remove insects when practical.
- Introduce predatory insects.
- Use pesticides sparingly; follow the instructions on the label.
  - Pesticides will kill beneficial insects as effectively as they kill pests.
Climate Zones

- Hardiness Zones
  - USDA
  - Sunset
  - Arnold Arboretum
- Micro Climates
- Wind Patterns
- Sun Exposure
Plant Material and Selection

- Choose the right plant for the right location.
- Consider
  - Aesthetics
  - Use
  - Environment – wind, soil type
  - Climate – macro and micro
  - Spacing
  - Size at maturity
  - Power lines
Plant Common Names

- A plant may have many different common names such as *Nymphaea alba* (a white water lily) which has 15 English, 44 French, 105 German and 81 Dutch common names.

- Several plants may have the same common name such as Dusty Miller among which are *Artemesia stellerna, Centaurea cineraria, Chrysanthemum ptramiciflorum, Lychnis coronaria*, and *Senecio cineraria*.

- The scientific name uniquely identifies a plant.
Plant Scientific Names

- Scientific names are binomial (two piece) names that uniquely identify a species.
- The two pieces are Genus and specific-epithet and constitute the species name.
- Genus name are capitalized; the binomial name is italicized.
- A name in single quotes appended to the species name identify a cultivar of the species.
- For example, a variety of the Sugar Maple is:
  - *Acer saccharum* ‘Legacy’
- Genetic crosses between two species are identified by an x. (*Caryopteris x clandonensis*)
Inferences from Names

- The specific epithet may describe:
  - Characteristics
  - Origin
  - Developer

- Plants in a given family have similar problems
  - Rosaceae – fire blight
  - Solanaceae – verticilium wilt
Quick Guide to Lawn Care

- Mow – high; 2½ to 3 inches
- Water – deeply and infrequently
- Fertilize – 4 to 6 lbs of nitrogen per 1000 square feet per year spread over the growing season; late fall most advantageous
- Aerate
- Control bugs and weeds
Resources

- Utah State University Extension Office
  Davis County Courthouse, Room 200
  28 East State Street, Farmington
  - Gardening Hotline: 451-3204
  - Diagnostic Clinics: May – September, Tuesdays, 1– 4pm
  - Speakers Bureau

- “Backyard Basics” – public gardening classes
  Utah House, Thursday evenings, 7–8pm

- Books – use the library or buy your own favorites.
USU Publications

- Online publications: http://extension.usu.edu/htm/publications/
- Preparing garden soil: http://extension.usu.edu/files/gardpubs/hfs01.pdf
- Inorganic fertilizer http://extension.usu.edu/files/gardpubs/hg509.pdf
Summary

- Know and improve your soil.
- Select plants to match your site and needs.
- Water deeply and infrequently.
- Fertilize according to the needs of the plants.
- Control weeds before they go to seed.
- Get dirty and enjoy it.