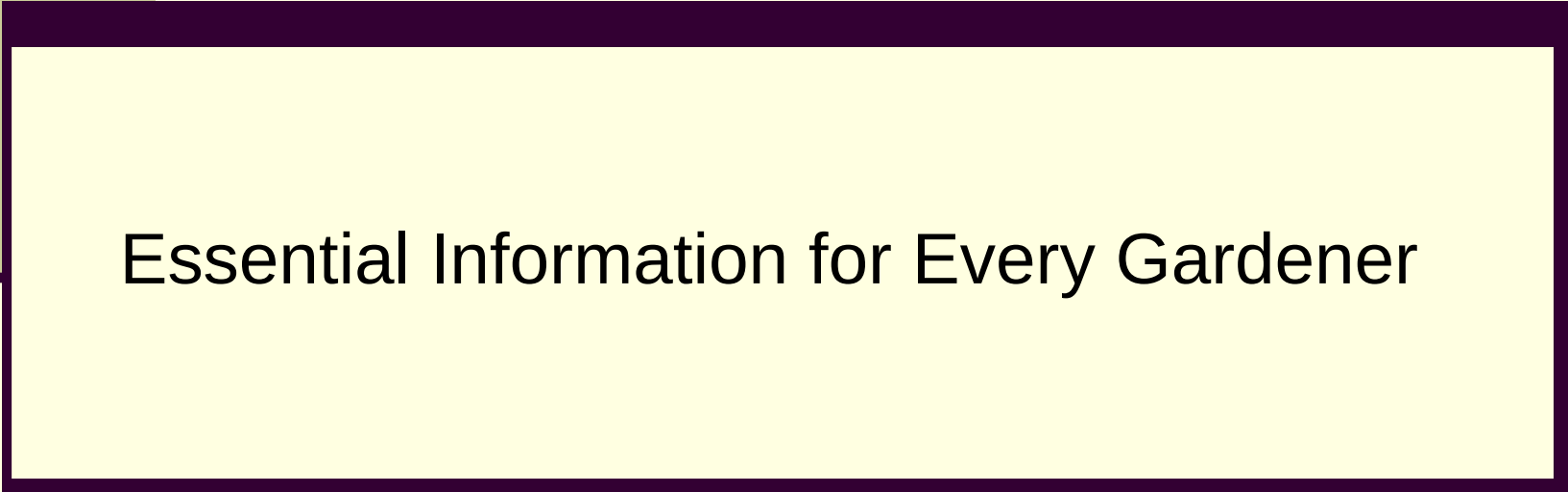




# Gardening Basics



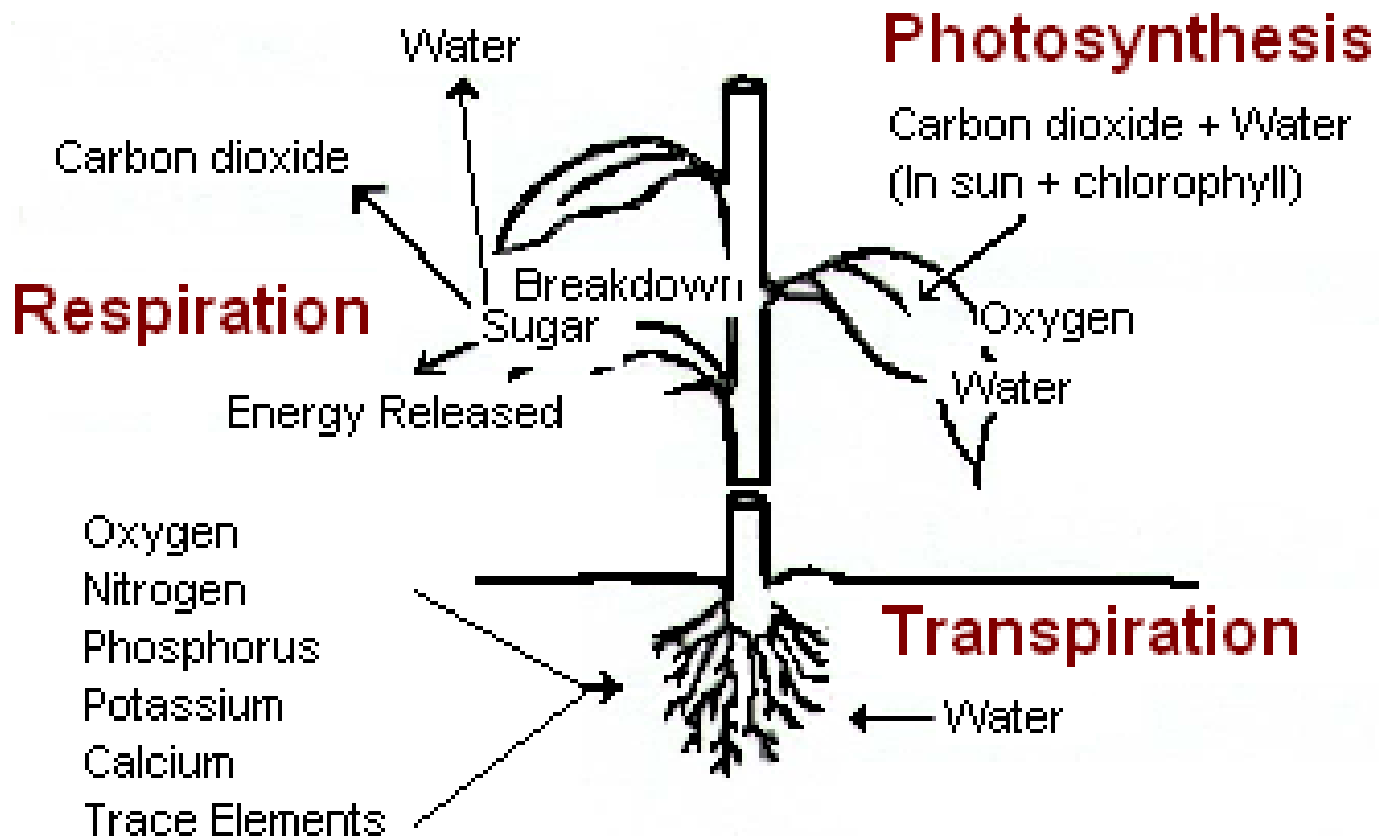
Essential Information for Every Gardener

# Topics

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- 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



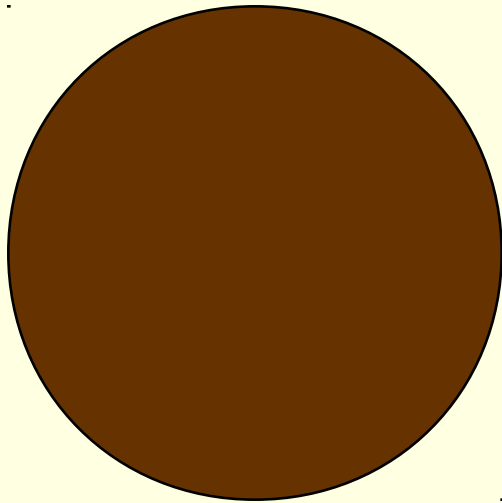
# Soil

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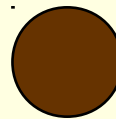
- Type
- pH
- Nutrients
- Soil Tests
- Soil Improvement Methods
- Organic Material
- Macro and Micro Organisms

# Soil Particles

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Sand



Silt



Clay

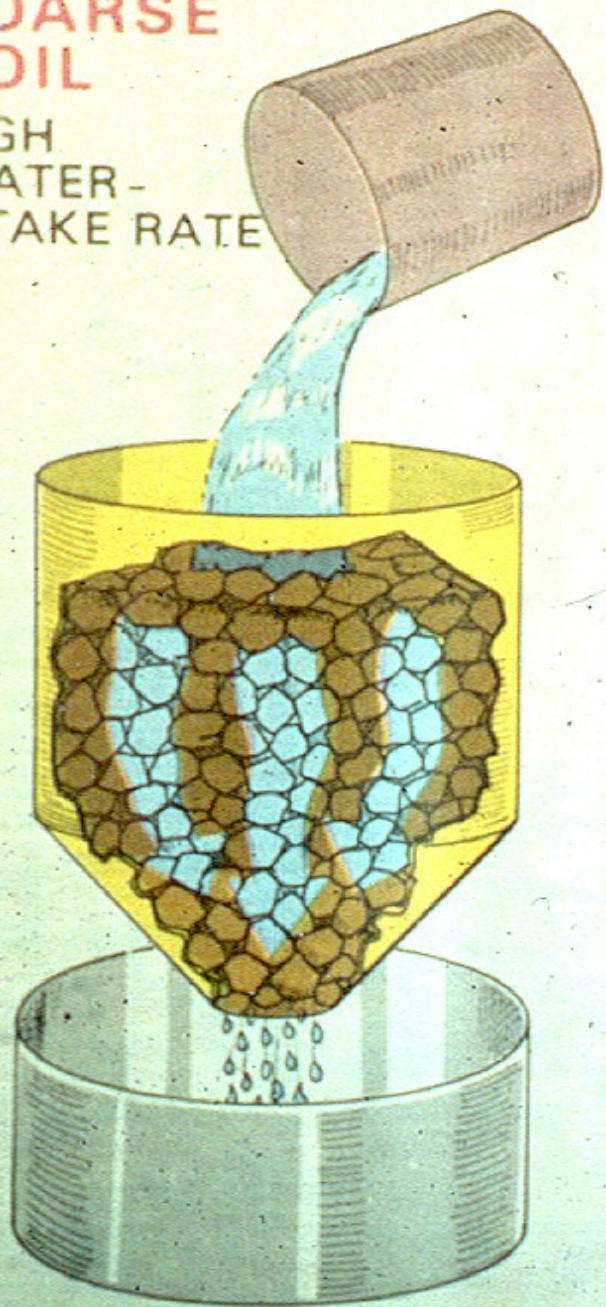
# Soil Type

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- 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)

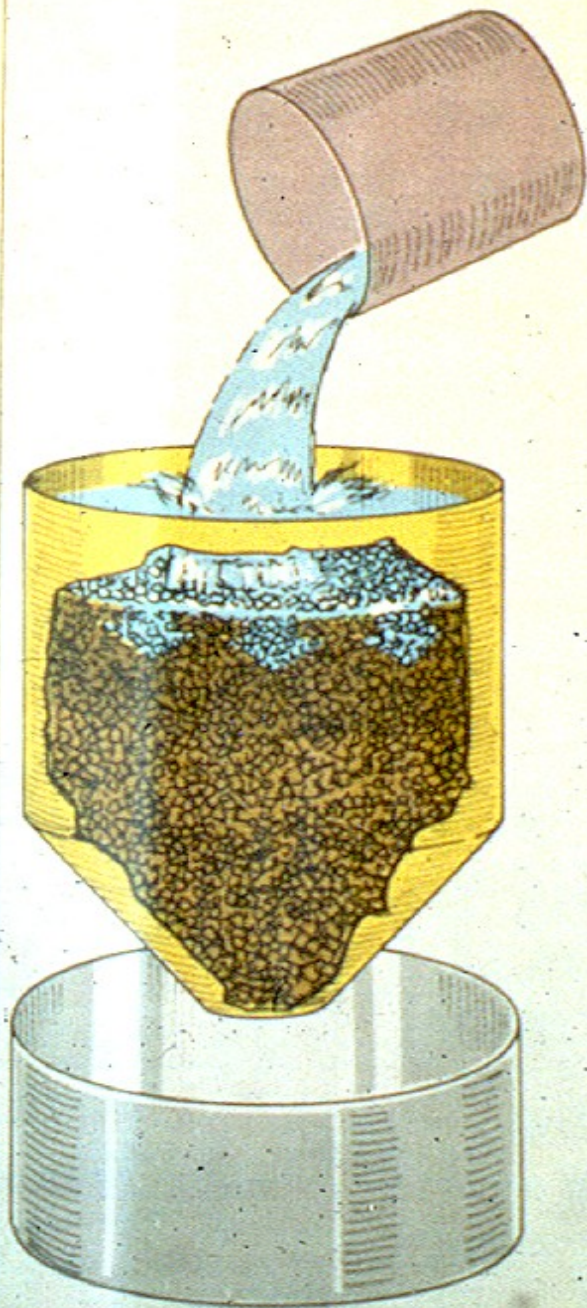
**COARSE  
SOIL**

HIGH  
WATER-  
INTAKE RATE



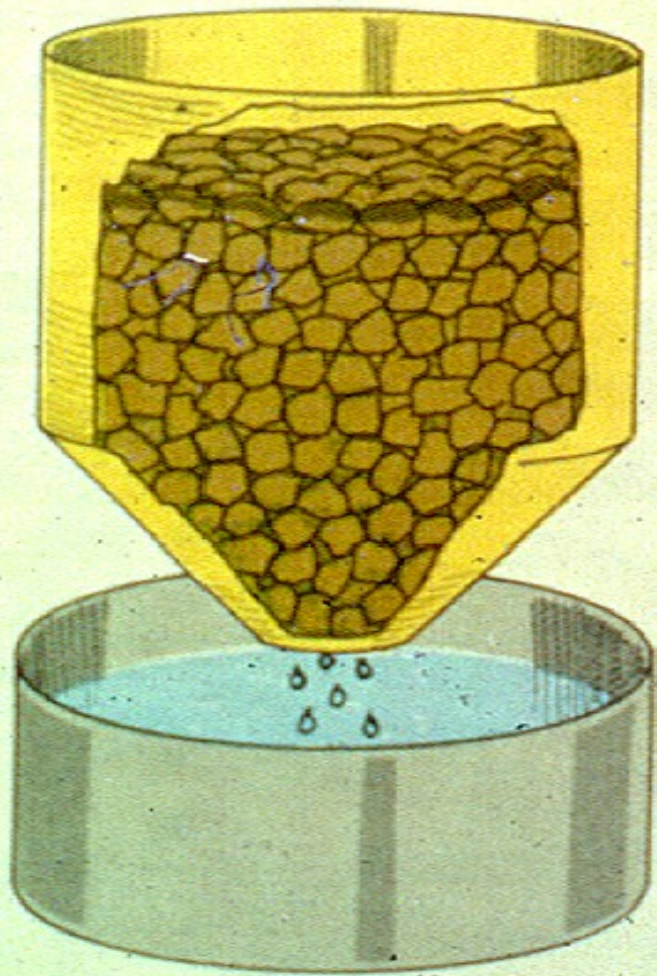
**FINE  
SOIL**

LOW  
WATER-  
INTAKE  
RATE



# COARSE - TEXTURED SOIL

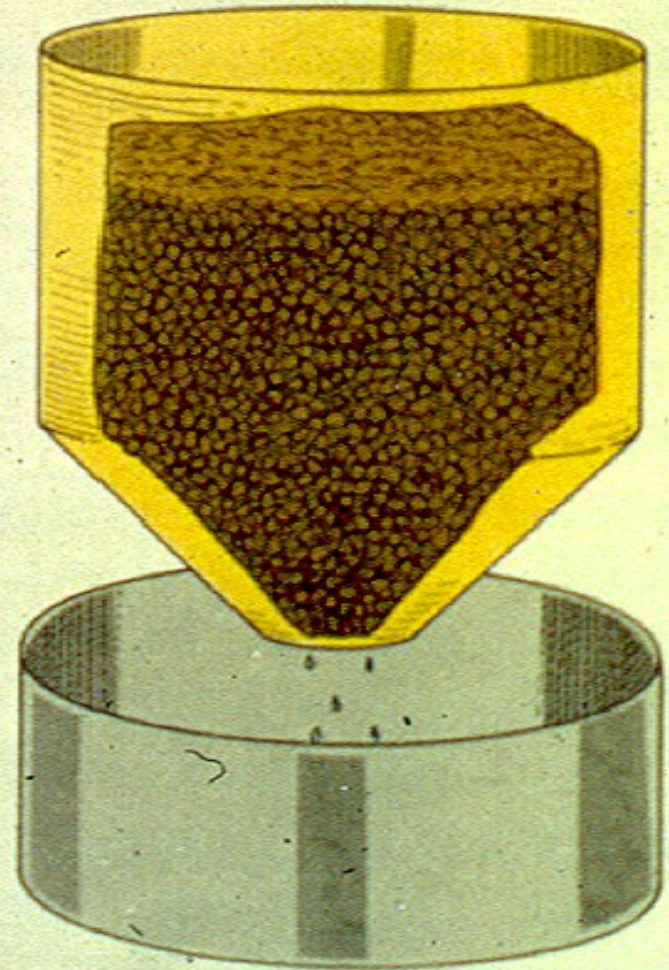
LOW WATER -  
HOLDING CAPACITY



(a)

# FINE - TEXTURED SOIL

HIGH WATER -  
HOLDING CAPACITY

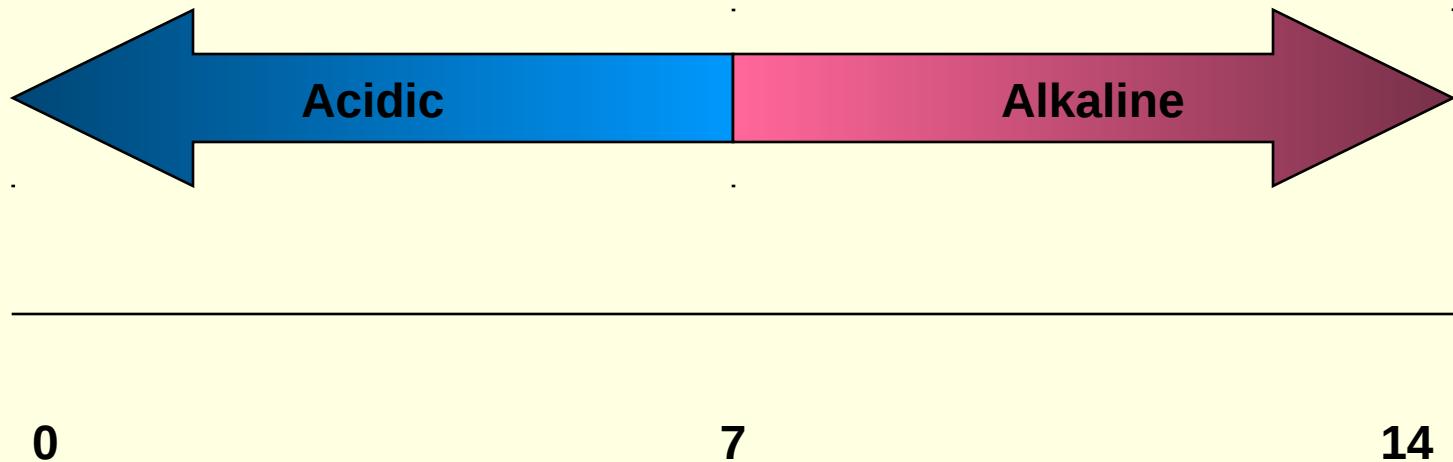


(b)



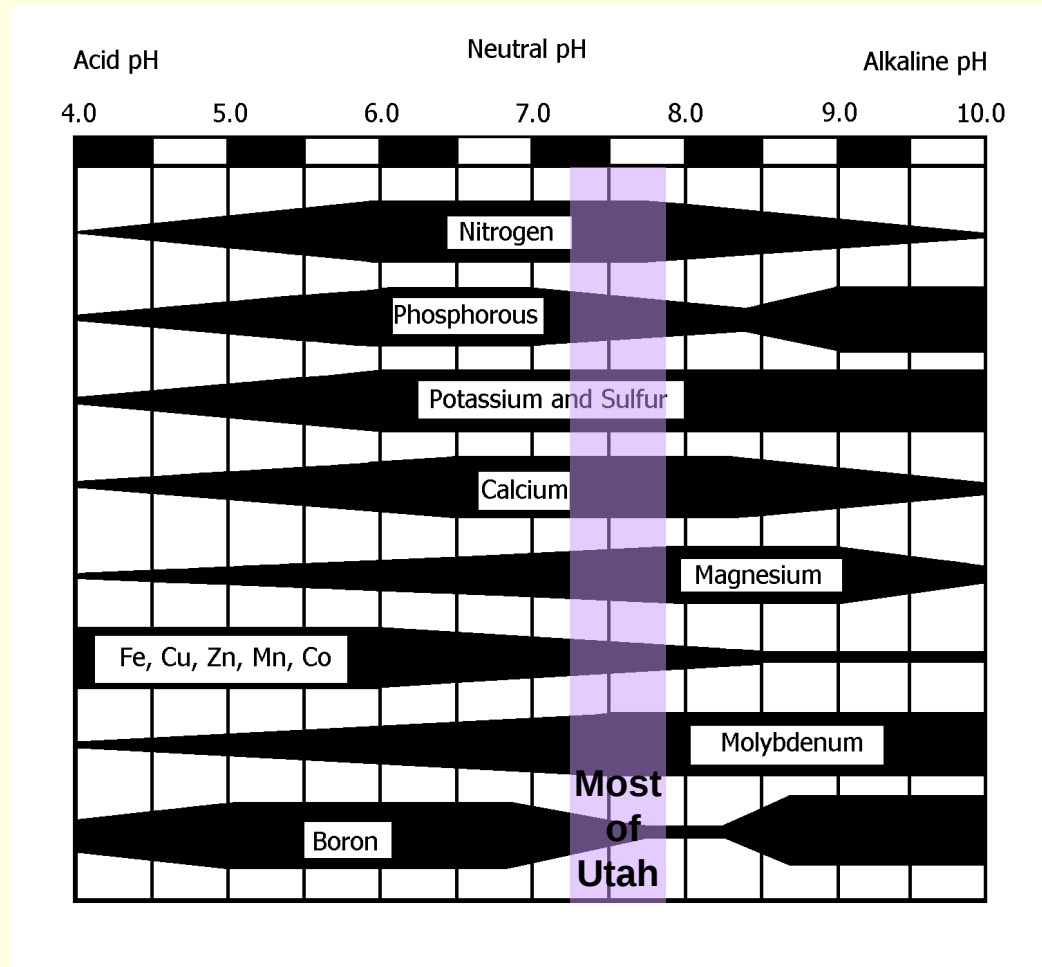
# Soil pH

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

# Effect of Soil pH



# Nutrients

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## ■ Macronutrients

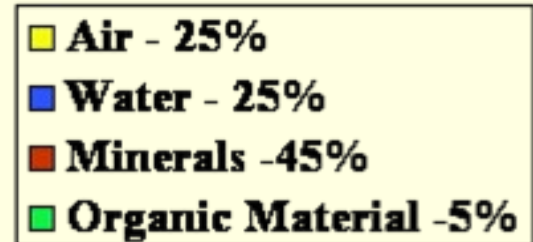
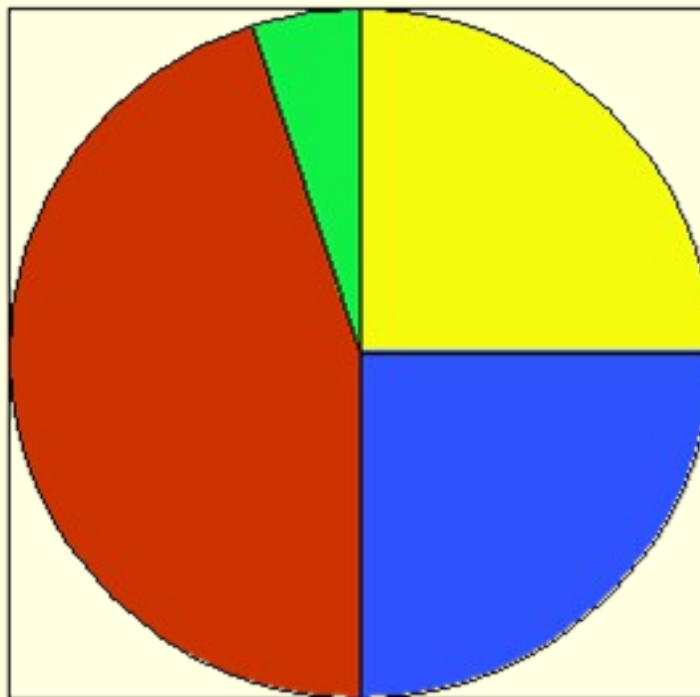
- Nitrogen
- Phosphorus
- Potassium
- Sulfur
- Calcium
- Magnesium
- Hydrogen, Oxygen and Carbon

## ■ Micronutrients

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

# Four Components of Soil

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Utah topsoil contains less than 1% organic material.

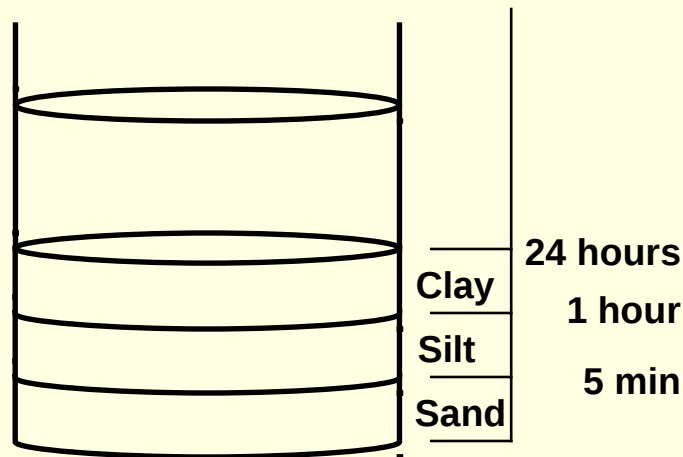
# Soil Tests

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- 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.



# Percentages

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- Percentage of clay =  $24 \text{ hr} - 1 \text{ hr} / 24 \text{ hr}$
- Percentage of silt =  $1 \text{ hr} - 5 \text{ min} / 24 \text{ hr}$
- Percentage of sand =  $5 \text{ min} / 24 \text{ hr}$
- Loam = 40% sand, 40% silt, 20% clay

# Ribbon Test

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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

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- 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

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- 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

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- 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

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- Organic Material
- Green Manures
- Double Digging

# Organic Material

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- 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

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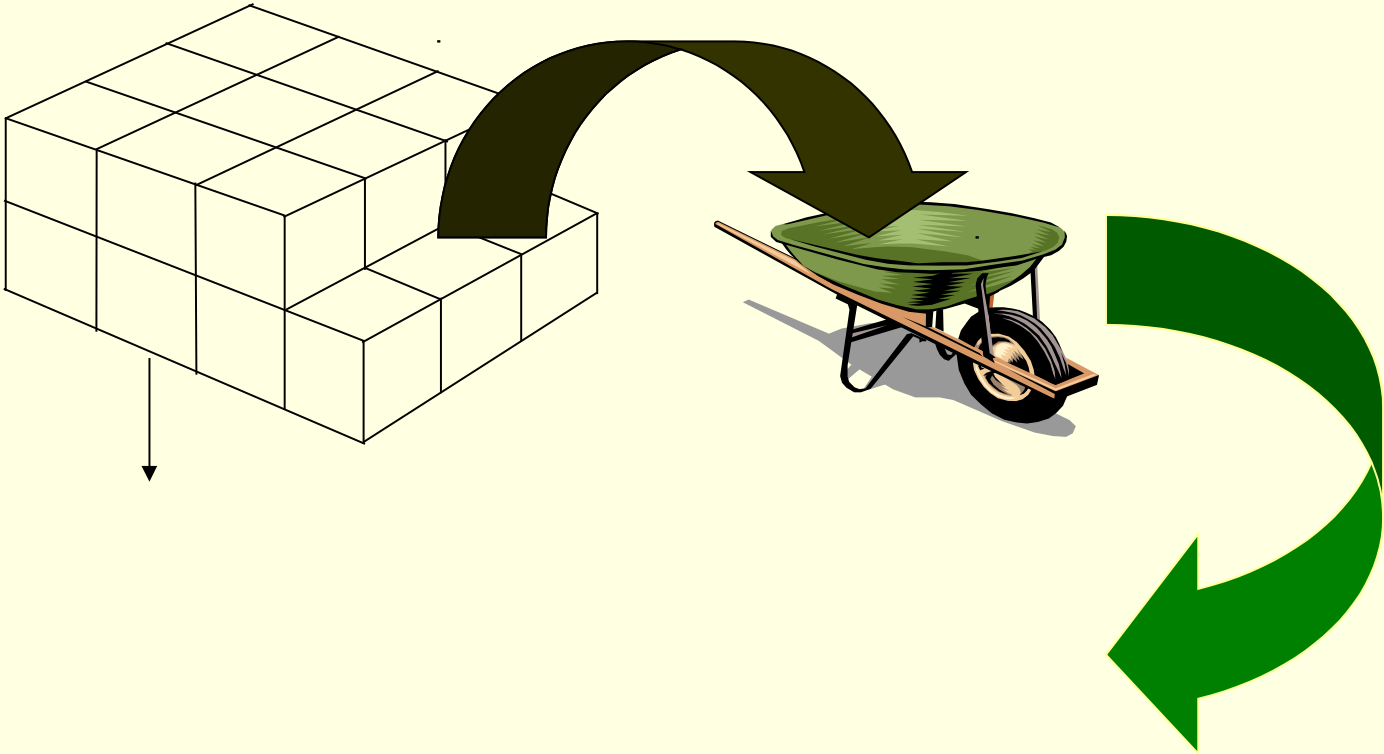
- Compost
- Tree leaves
- Pine needles (acidic)
- Grass clippings
- Manure – horse, cow, chicken, rabbit ...
  - Fresh manure can burn plants.
- Recycled paper and cardboard

# Green Manures

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- 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

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- 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

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- Drainage
- Guidelines
- Hydrozoning

# Drainage

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- 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

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- Water early in the day.
- Avoid frequent, light watering.
- Base the frequency of watering on soil type.
- Know how much water you are applying.
  - See USU online publications for sprinkler system water-check instructions:  
<http://extension.usu.edu/files/publications/publication/HG-2003-02.pdf>
- Avoid runoff.

# Hydrozoning vs. Xeriscaping

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- 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

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

# N-P-K

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- % 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

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Lbs in bag	% N	Lbs N required	Lbs to apply
20 (21-0-0)	21	4	19
10 (34-0-0)	34	4	11
20 (6-2-0)	5	4	67



# Fertilizer Application

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- 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

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

# Chemical Weed Control

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- 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

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- 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.

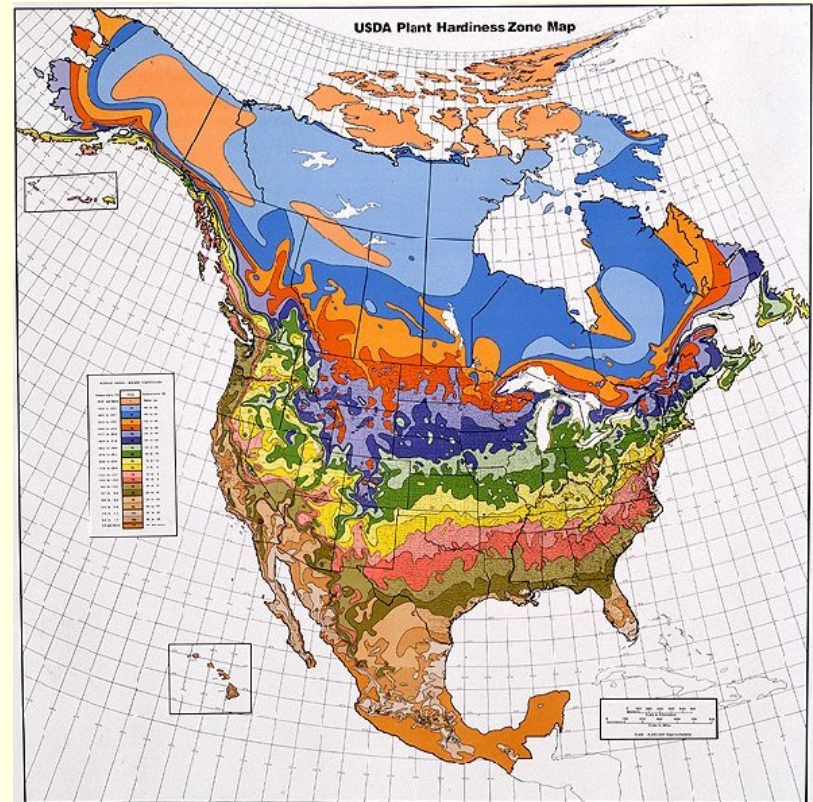
# Insect Control

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- 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

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- 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

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- 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

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- 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

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- The specific epithet may describe:
  - Characteristics
  - Origin
  - Developer
- Plants in a given family have similar problems
  - Rosaceae – fire blight
  - Solanaceae – verticillium wilt

# Quick Guide to Lawn Care

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- 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

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- 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

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- Online publications:  
<http://extension.usu.edu/htm/publications/>
- Preparing garden soil:  
<http://extension.usu.edu/files/gardpubs/hfs01.pdf>
- Water check:  
<http://extension.usu.edu/files/publications/publication/HG-2003-02.pdf>
- Water-wise landscaping:  
<http://extension.usu.edu/files/publications/publication/HG-518.pdf>
- Water-wise plants:  
<http://extension.usu.edu/files/publications/cernyrev.pdf>
- Inorganic fertilizer  
<http://extension.usu.edu/files/gardpubs/hg509.pdf>
- Organic fertilizer  
<http://extension.usu.edu/files/gardpubs/organic.htm>

# Summary

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- 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.