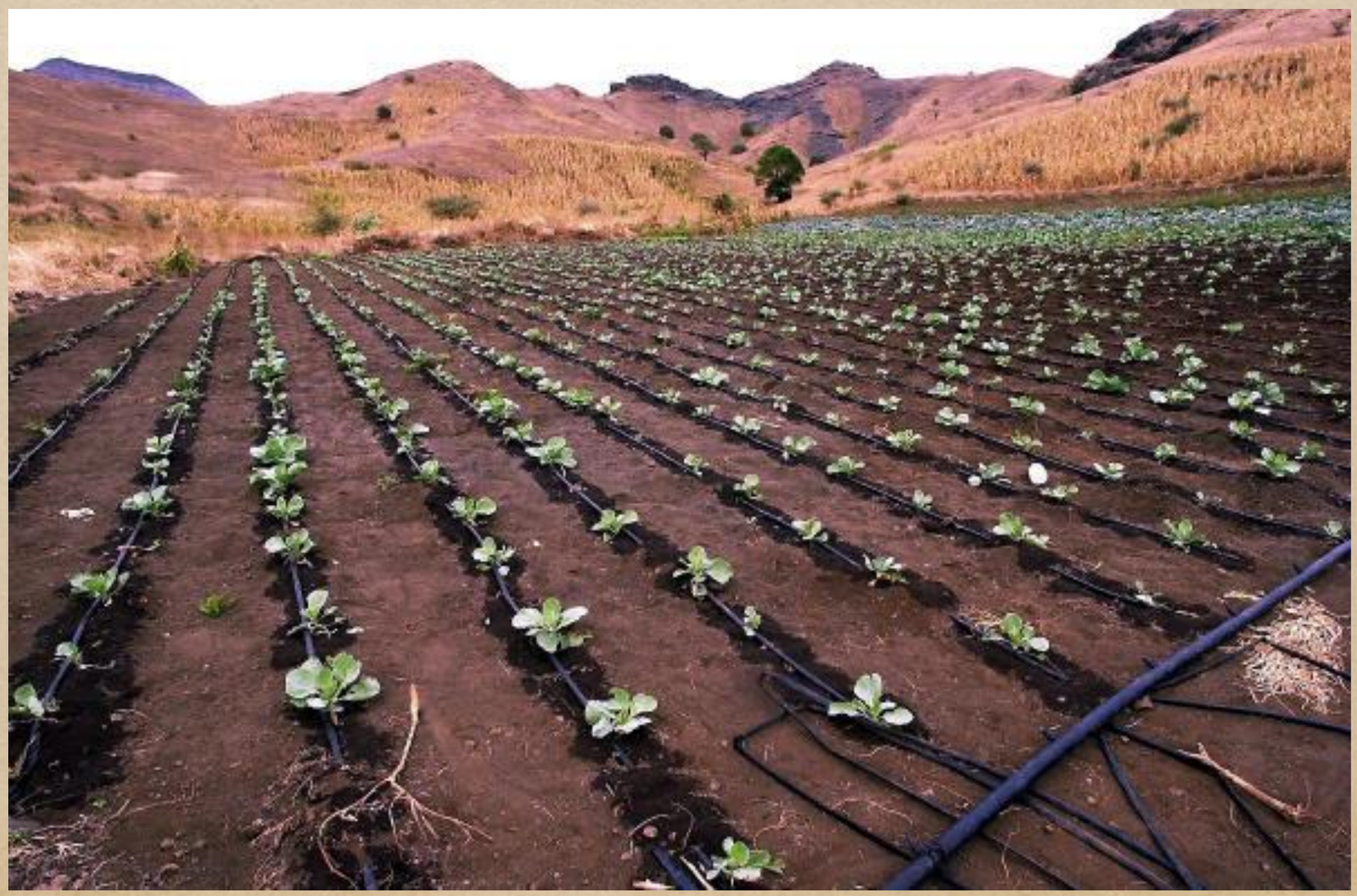
IRRIGATION

on the farm



OBJECTIVES

Student will learn...

- optimal times to irrigate during different stages of plant development
- types of small farm/permaculture irrigation systems
- different sources of water for farm irrigation
- methods of water retention for permaculture

DEFINITIONS

- irrigation...a system of supplying water
- drip tape...perforated plastic tubing used to supply water to plants in droplets
- pressurized water...water that is under force
- water retention...the ability of a soil to hold water

When to irrigate...germination

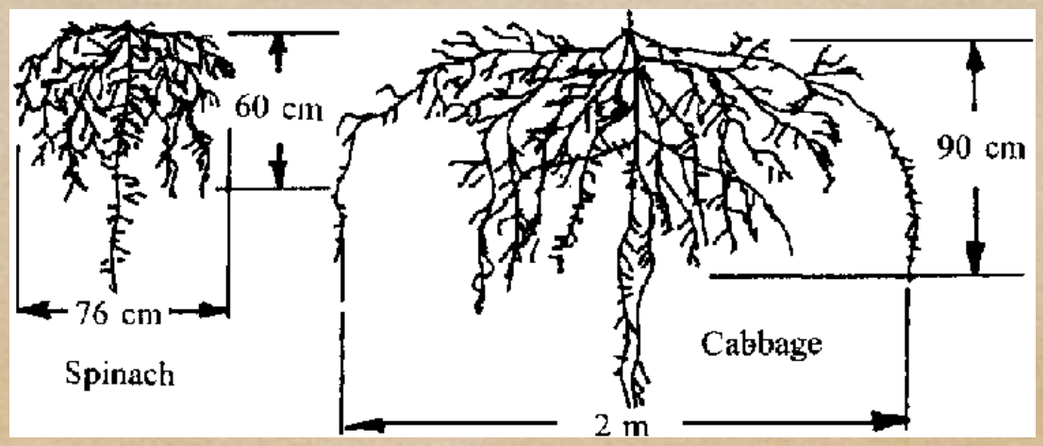
- Consistent watering is crucial at the time of germination in order to ensure there is water around newly planted seeds
- Water must be fine (mist) in order to not displace seeds

When to irrigate...young plants

- Crops take up more water as they grow bigger. For rapid growth, roots of young plants require consistent water.
- Too much water, however, will slow plant growth and lead to disease.

When to water...mature plants

- Mature plants require more water, but also have deeper roots for finding water
- Mature plants can store more water in stems and leaves, so watering does not need to be as consistent for survival.



When to irrigate...fruiting

- During fruiting, plants are using water to grow fruit.
- Many plants (tomatoes, watermelon) become less sweet if overwatered during fruiting.

Pressurized Irrigation

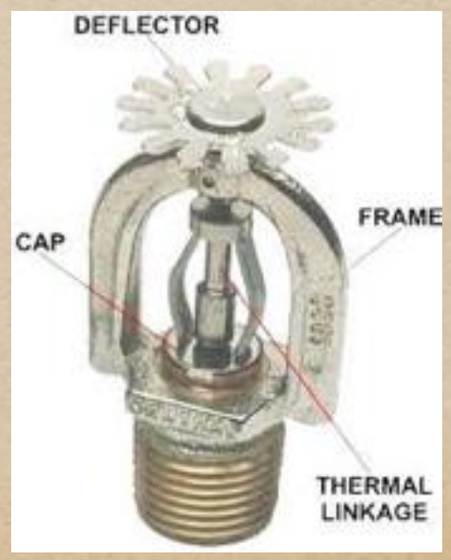
- Pressurized systems are either hooked up to local municipality water supplies that are pressurized or are attached to a well with a pump and pressurized tank.

Pressurized irrigation...overhead

- Overhead irrigation systems are designed to supply a large area with even coverage.

Pressurized irrigation...overhead

- Several manufacturers offer different types of heads for overhead watering



Pressurized irrigation...overhead

- Wobbler heads are simple construction heads. Interchangeable orifices allow for different sized droplets.
- Use small droplets for germination and large droplets for field growing

Low pressure irrigation...drip tape

- Drip tape is used at the base of plants

Low pressure irrigation...drip tape

- Drip tape advantages:
  - leaves of plants remain dry (especially important on tomatoes and other disease-prone plants
  - saves water and money

Low pressure irrigation...drip tape

Ways to lay drip tape:

- drip tape layer, under plastic mulch
- by hand

http://youtu.be/uMvi6fPDHbE ext

Low pressure irrigation...drip tape

Many drip tapes have emitters--tiny holes--every 6 or 12 inches to let water escape

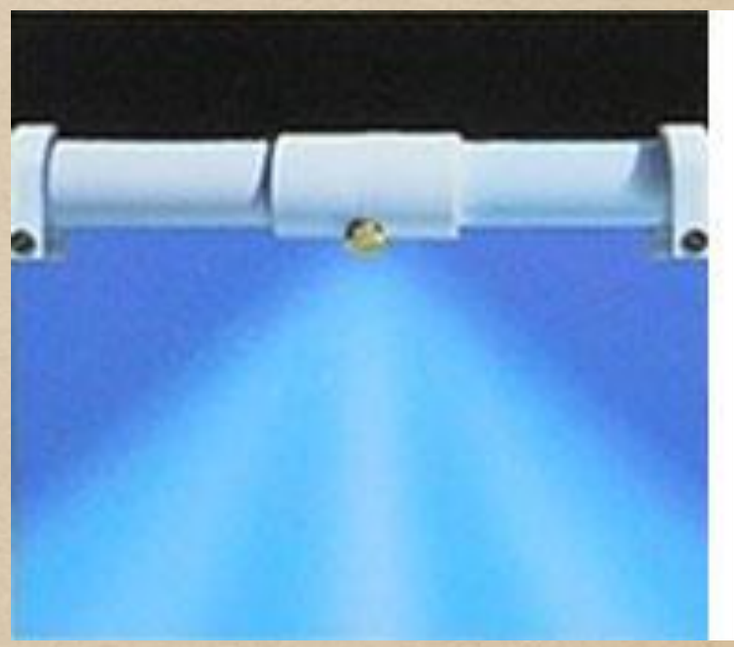
Low pressure irrigation...drip tape

Some drip tape systems use inserted emitters to water plants like bushes or fruit trees that are spaced far apart

http://youtu.be/4yLOWdMDELs

Greenhouse systems...misting

- Misting heads can be placed on "wands"
- Misting emitters can be suspended from overhead



Greenhouse systems...overhead

- To water in a greenhouse, use overhead emitters spaced every 24-36# for even coverage
- Greenhouses 20 ft and wider require two irrigation runs strung the full length of the greenhouse

Greenhouse systems...drip tape

Drip tape is also used in the greenhouse, with the same practices as in the field.

Greenhouse systems...

- Because light is diffused and there is no wind, water evaporates slowly from greenhouse soil.
- So less irrigation is required in the greenhouse.

Water sources...rainwater

- Rainwater can be collecting in barrels or large tanks.
- Raised tanks can feed drip tape systems using no electricity.

http://youtu.be/GUhox1ORlRk

Water sources...ponds and streams

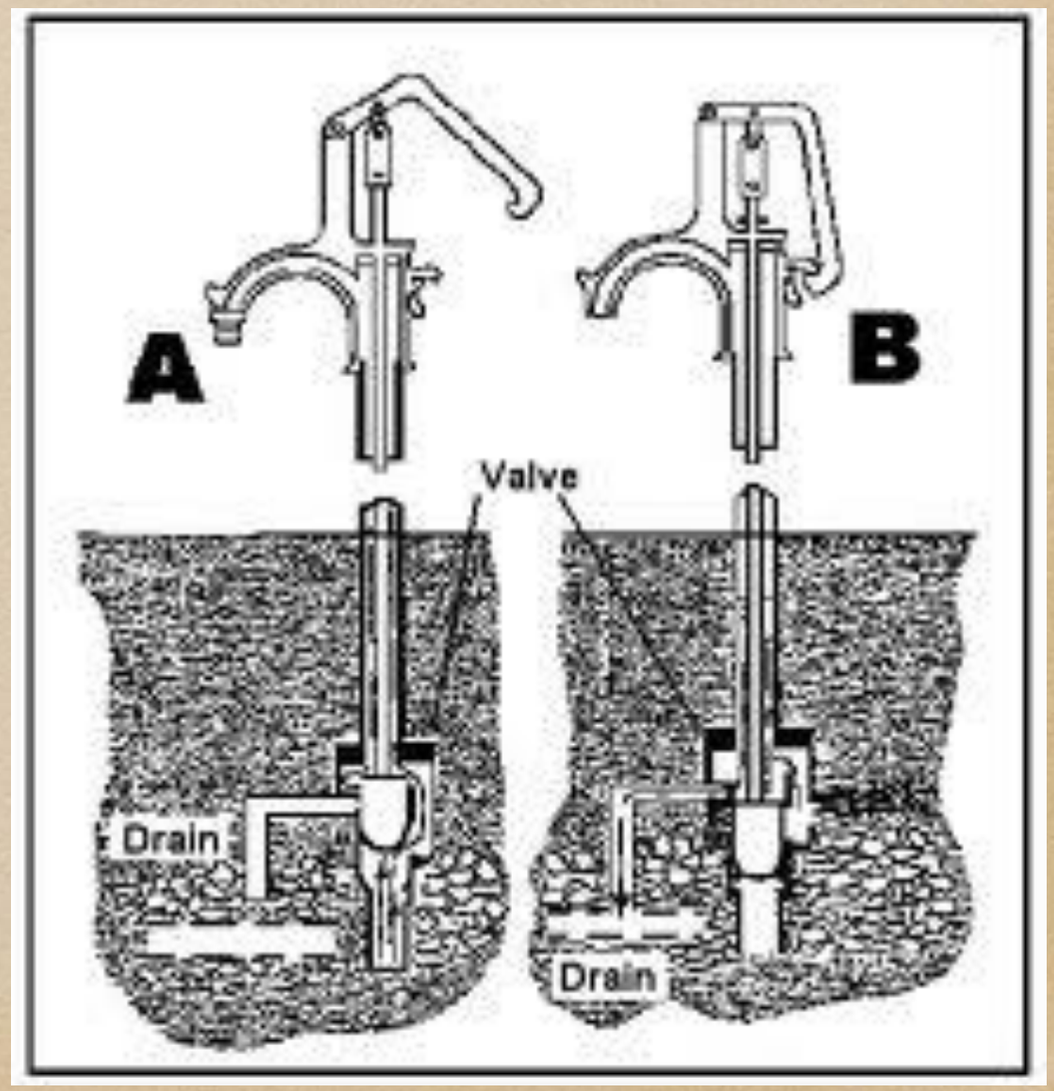
- Pumps can be used to irrigate with water from ponds and streams.
- In order to not plug up emitters, water must pass through a sand filter.

Water sources...groundwater

Groundwater can be stored in pressurized tanks. Underground water lines connect pressure tanks to water faucets.

Water sources...groundwater

Frost-free water hydrants prevent water from freezing in the hydrant.



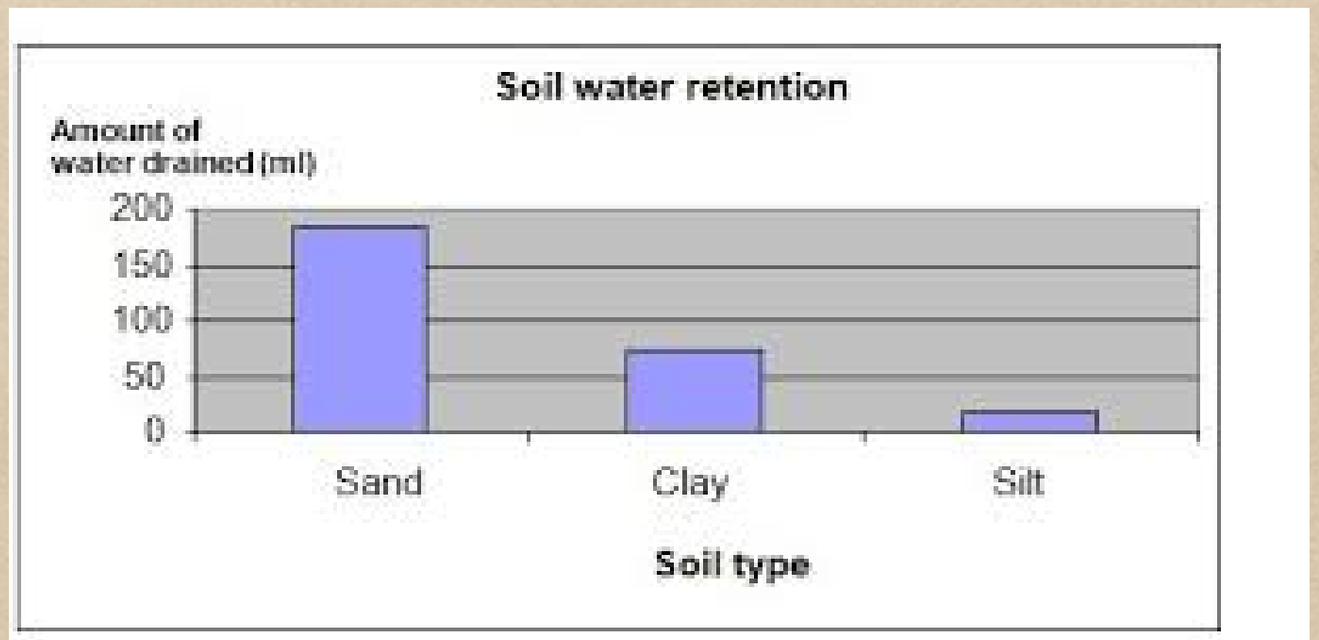
Testing water

- Testing water on an annual basis is recommended.
- Common problems include: high nitrate levels, chemical residue (creeks), poor PH balance

Retaining water

Irrigation systems for small-scale and permaculture farms need to include water retention strategies.

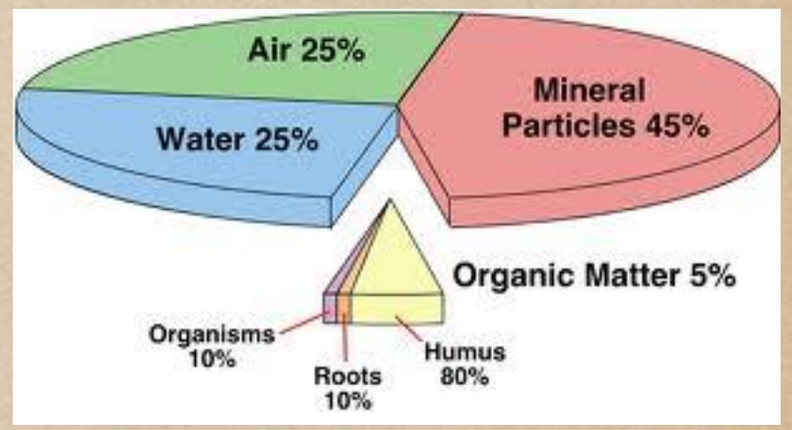
Retaining water...Soil water holding capacity



Check your soil survey to gather information about water movement and retention on your property. Note tables that describe how fast water moves through your soil

Retaining water...improving soil

- Soils with high organic matter will retain more water
- Adding compost and growing cover crops are great ways to build organic matter



Retaining water...mulching

- Organic mulches help hold water in the soil
- Apply mulch around young plants

Retaining water...mulching

Sources of mulch include:

- straw
- grass clippings
- leaves

Retaining water...shade

- Shading crops and soil is another way to minimize evaporative loss
- Permaculture designs place shade-tolerant plants under trees with leaf canopy
- Shade cloth can be suspended on greenhouses

Self-Check Review Questions

- What are the optimal times and ways to irrigate during different stages of plant development?
- What are the major sources of water for farm irrigation?
- What are some methods for water retention?

Resources

- dripworks.com
- www.irrigation.org
- ga.water.usgs.gov/edu/wuir.html
- wqic.nal.usda.gov/irrigation-1