ENGINEERS IMPACT ON URBAN FARMING

Development of Urban Infrastructure

Reducing:

- The usage of physical spacing
- Building up on environmental energy consumption
- Transportation cost
- Impacts on a green society

dpi.nsw.gov.au

" Vertical Greenhouse"

- *resist climate changes*
  - *Climate made fit for all year round*
  - *Enclosure of sun's heat and the capability of maintaining moist environment*

FUTURE CITY COMPETITION

“Greenhouse”

Types of Greenhouse

- Lean-to – a half greenhouse attached to a building
  - A limitation of light exposures
- Even-span – a full size greenhouse with one gable end attached to a building
- Window-mounted – a glass enclosure greenhouse allowed to be attached to either the south or the east side of a building
- Freestanding Structures – a structure freely placed on any end of the building best suits

greenhousereviews.com

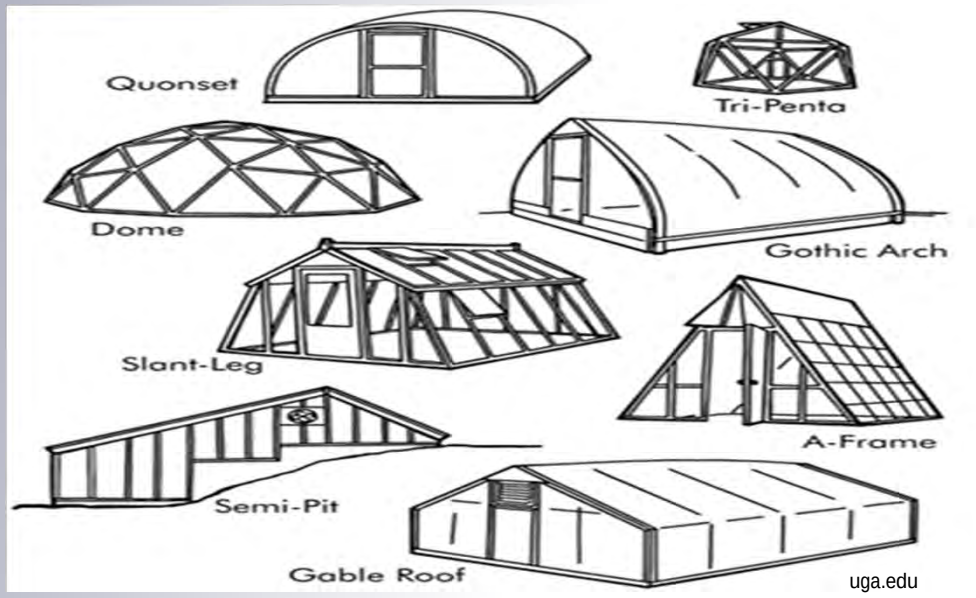
arcadiaglassnouse.com

gothicarchgreenhouses.com

eurotransla.com

Materials

- Frames
  - Quonset
  - Gothic Arc
  - A-frame
  - Post and Rafter
  - Tri-Penta
  - Dome
  - Slant Leg
  - Gable Roof



uga.edu

- Coverings (Fiberglass, Double-wall Plastic, Glass)


turnergreenhouses.com


alibaba.com


littlegreenhouse.com

Heating System

- Measured in British thermal units (Btu per hour) : energy used to heat one pound of water by one degree Fahrenheit

  (1 btu per hour = 0.29307107 watts)

- Sunlight storage – solar panels
  - Photovoltaic effect
  - Crystalline silicon (thickness of 2cm)

Solarpanelsperthquote.com

- LED (Lighting Emitting Diodes) - artificial lighting
  - Low in power usage (6 watt for about 2-3 plants)
  - Emission of wavelengths and light efficiency

Absorption of Sunlight

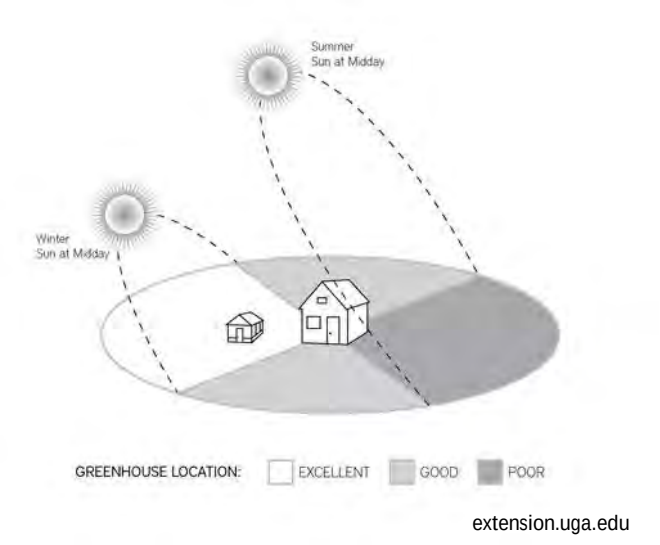
Maximum - Minimum sunlight locations

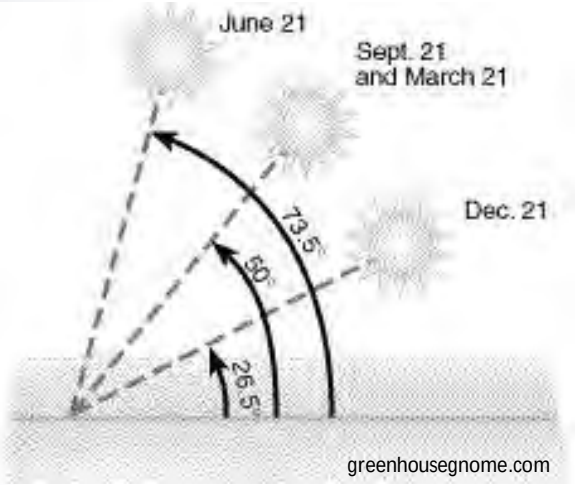
- South / Southeast
- East
- West
- North

Importance of Solar Panel's Angle

- Summer – Decrease around 10 degrees
- Winter – Increase around 10 degrees

Sunray should be perpendicular to the collecting area



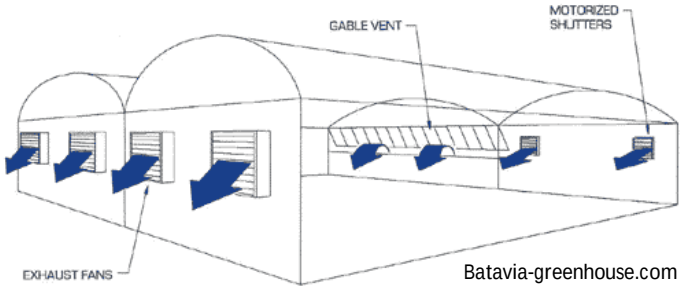


Ventilation System

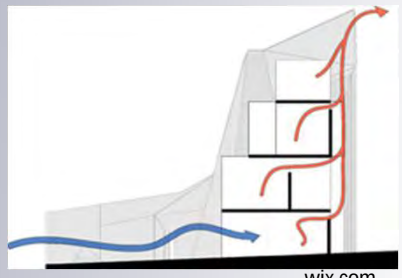
- Natural – roof vents with louvers
- Mechanical – usage of exhaust fan

munters.com

- Humidity Control
  - Prevent high temperature (decreasing fungus' growth)
- Temperature Control
  - Prevent the trapping of solar radiation (Greenhouse effect)
  - Controlling the conditions of plant's growth
- Carbon dioxide/Oxygen
  - Draws in oxygen -> increase rate of photosynthesis to produce carbon dioxide
- Air circulation
  - Warm air rises
  - Cool air settles



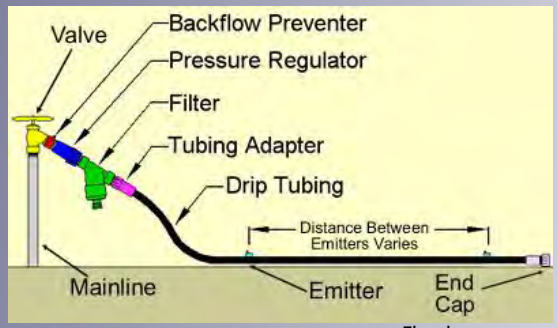
Batavia-greenhouse.com



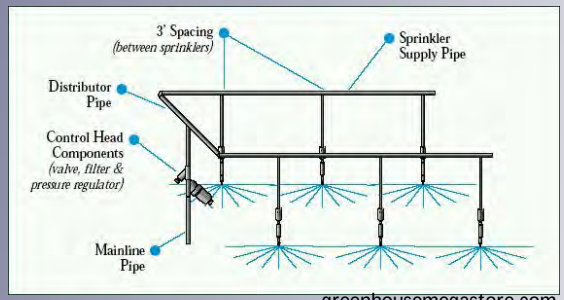
wix.com

Water Supplies

- Irrigation System
  - Drip Tubing – reduce evaporation and runoff
  - Overhead Misters
  - Mat Irrigation
  - Perimeter Irrigation

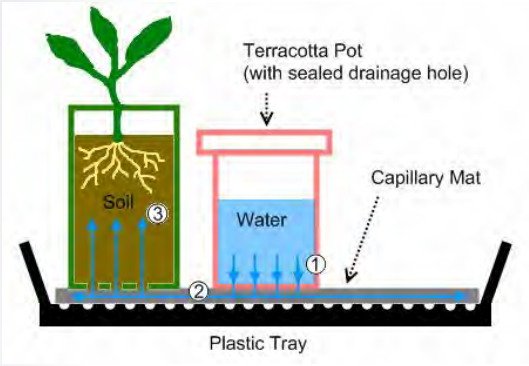


Floralawn.com



greenhousemegastore.com

- *Water are mainly stored in barrels*
- *Acquire constant checks on water temperature*

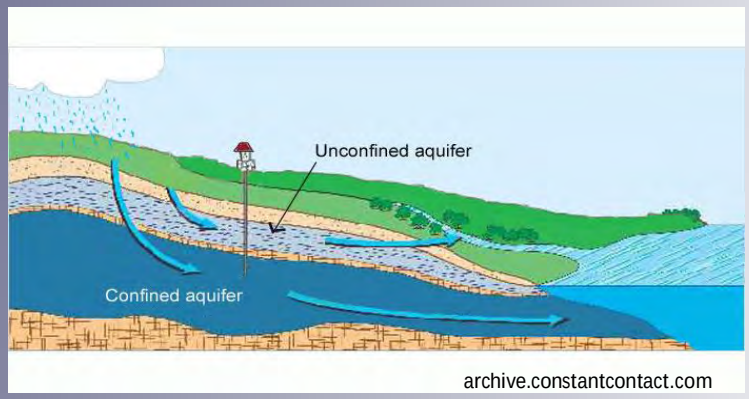


deepgreenpermaculture.com


progressivegardens.com

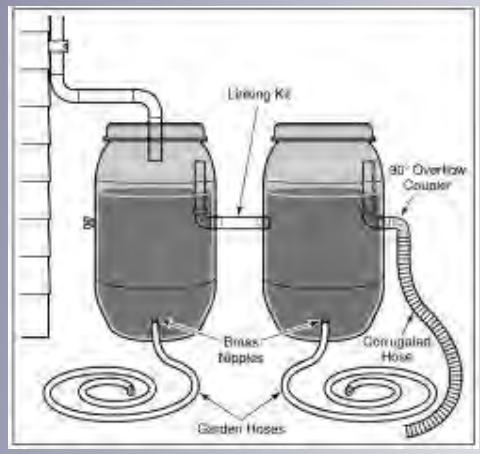
- Waterways
  - River and Ponds – mostly runoff waters
  - Municipal water system – high cost
  - Groundwater – aquifer zone (clean evaporated water)
  - Rain collection – little in amount received

Distribution Uniformity (DU) – measuring the distribution of irrigation system



archive.constantcontact.com


ci.windsor.ca.us



prepare-and-protect.net

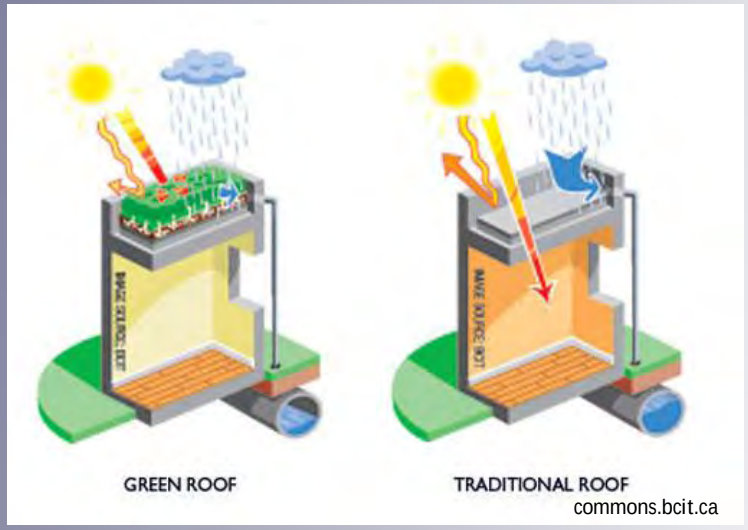
(The approximated amount of the usage of water for one acre is around 22,000 gallons of water per day)

FUTURE CITY COMPETITION

Green Roofing

Benefits

- Remove heat on the surface of the roof (energy reducing)
- Prevent further air pollution
  - Decrease gas emission level
- Lower heat wave
- Reduce runoff rain water (flooding)
- Landscape view



commons.bcit.ca


greenroofs.com

Extensive Green Roof

- Used for ecological protection layer
- No permanent irrigation system
- Plant's height growth are approximately 6 inches or shorter (Ex. Moss, herbs and grasses)
- Low in maintenance
- Mostly used by single family or residential buildings

greenroofs.com

Semi-Intensive Green Roof

- Occasionally irrigation system
- Plant's height growth are approximately 6 to 12 inches (Ex. Grass, herbs and shrubs)
- Moderate in maintenance

greenrooftechnology.com

Intensive Green Roof / Roof Garden

- Used as park/garden
- Permanent Irrigation System
- Plant's height growth are approximately 6 inches or more (Ex. Lawn, Shrubs and trees)
- High in maintenance
- Full scaled public park

cfpub.epa.gov

“Green”

- Building the structure of greenhouses
  - Production of organic plantation all year round
  - Reducing the cost used for transporting, heating, and watering
  - Uses of solar panels other than electricity
  - Effective ventilation systems

- Designing the usage of the Green Roofing
  - Increase the amount of unpolluted air
  - Advancing the view of the environment on the roof
  - Decreasing the chances of floods

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