Exploring Hydroponics!

Hydroponics in ANY classroom!

Mother Daughter Duo!

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Hydroponics! What are they?

Hydroponics - Method of growing plants without soil, in water or in a other growing medium

Andre Lepine Speaking on Hydroponics in 1985

Why Hydroponics

- Water conservation - recycling water
- Environmental Control
- Pest control
- Lower nutrient costs
- Portable

Hydroponics in the Classroom

- Soda bottle projects - K-12
- Full size systems K-12
- Research and Hydroponic Build Project 5-12

Types of Hydroponics Systems

Common Terms

Nutrient mix - Plant food in a hydroponic system, which is created by mixing the proper amounts of nutrients with water.

Reservoir- Tank for holding nutrient mix

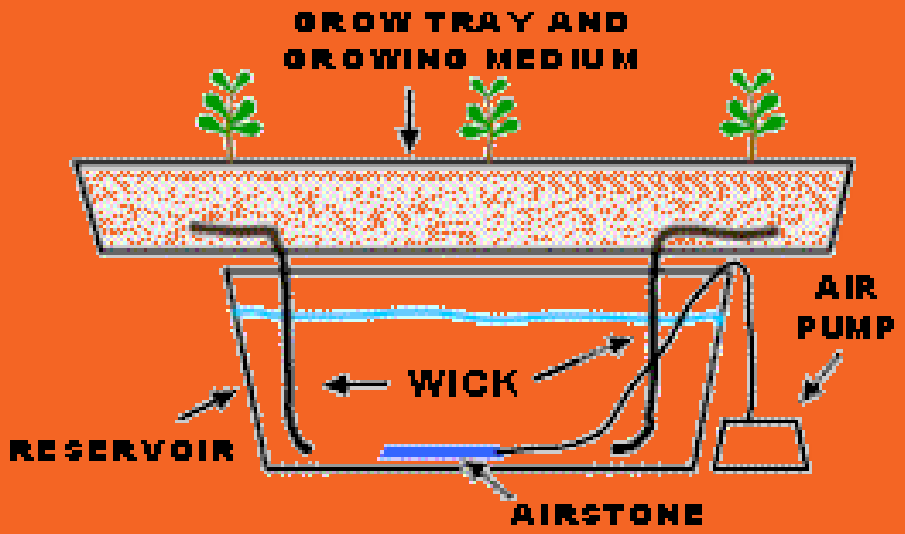
Air Pump -Device that supplies air to the air stone, creating bubbles in the nutrient solution and providing oxygen to the plant roots

Air Stone - Uses air from the air pump to create bubbles in the nutrient solution and provide oxygen to the plant roots

Hydroton/Clay Pebbles - Grow medium

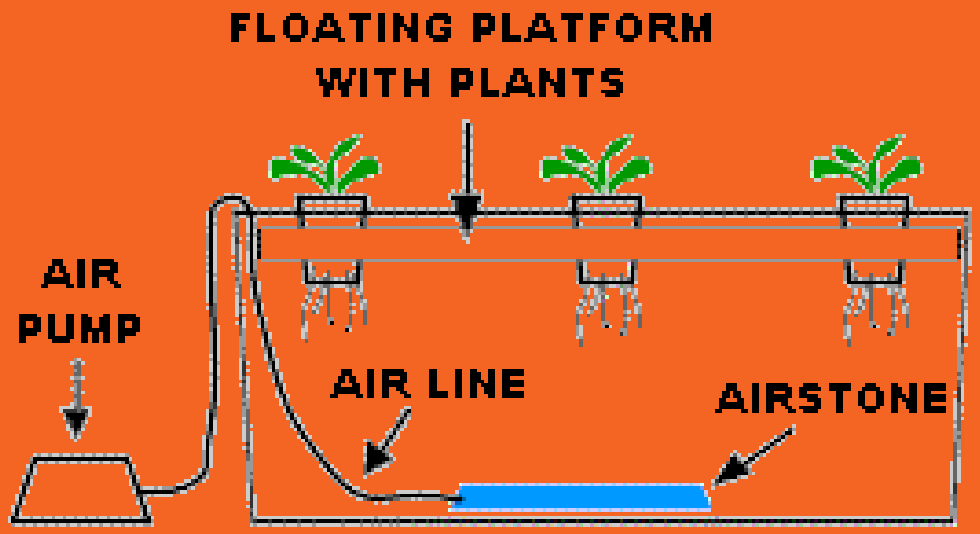
Rock Wool- Grow Medium that holds water

Wick System



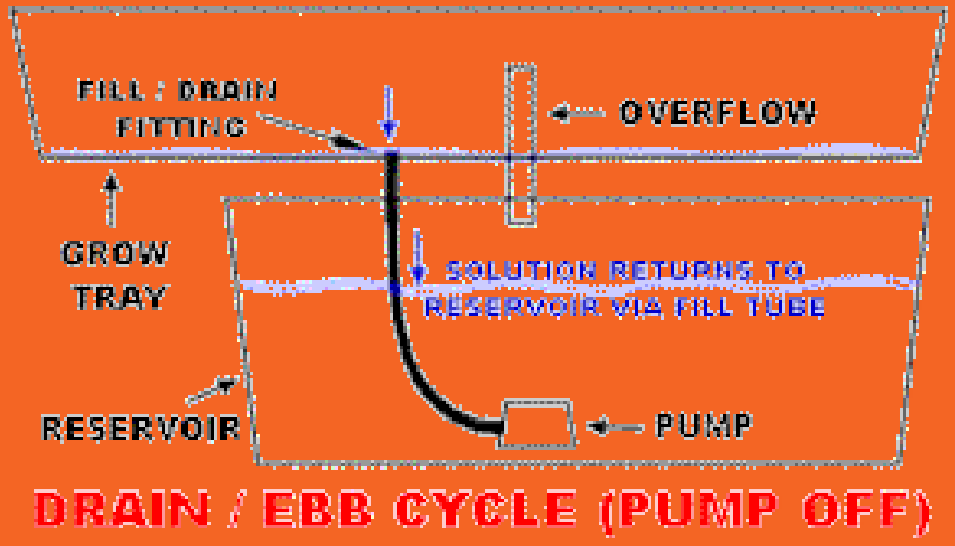
This is a passive system, which means there are no moving parts. The nutrient solution is drawn into the growing medium from the reservoir with a wick

Water Culture



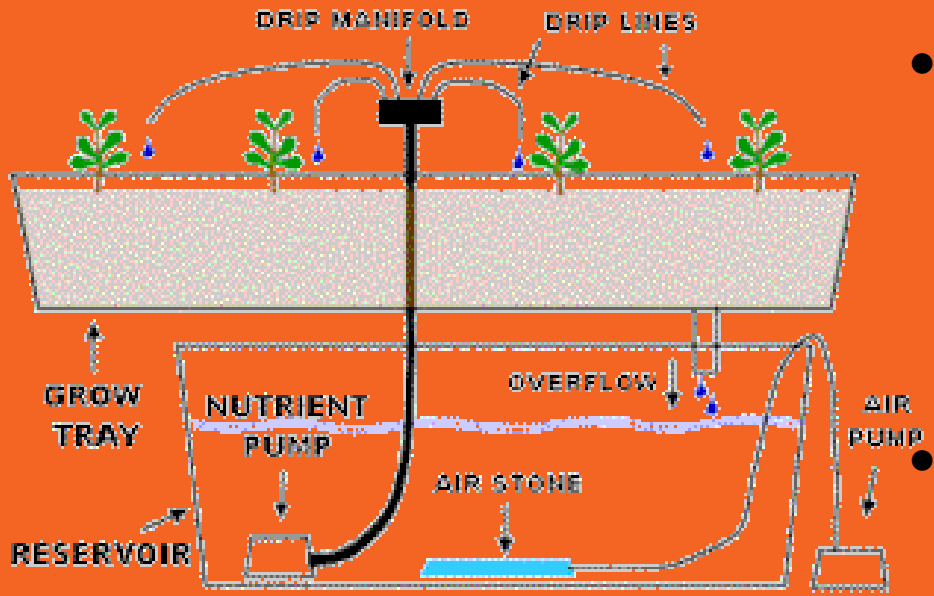
The water culture system is the simplest of all active hydroponic systems. The platform that holds the plants is usually made of Styrofoam and floats directly on the nutrient solution. An air pump supplies air to the airstone that bubbles the nutrient solution and supplies oxygen to the roots of the plants.

Ebb and Flow



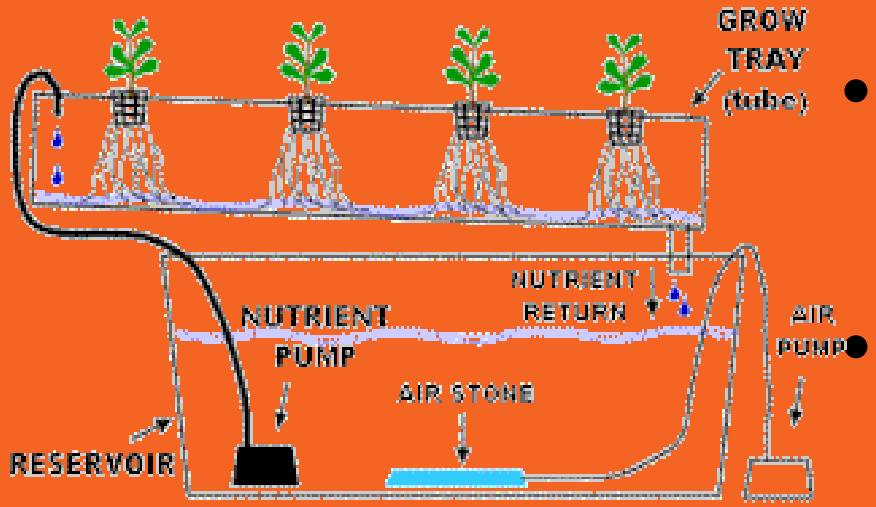
The Ebb and Flow system works by temporarily flooding the grow tray with nutrient solution and then draining the solution back into the reservoir. This action is normally done with a submerged pump that is connected to a timer. When the timer turns the pump on nutrient solution is pumped into the growth tray. When the timer shuts the pump off the nutrient solution flows back into the reservoir. The Timeris set to come on several times a day, depending on the size and type of plants, temperature and humidity and the type of growing medium used.

Drip System



- Drip systems are popular with large scale production (strawberries/tomatoes)
- Operation is simple, a timer controls a submerged pump. The timer turns the pump on and nutrient solution is dripped onto the base of each plant by a small drip line.
- In a Recovery Drip System the excess nutrient solution that runs off is collected back in the reservoir for re-use.

Nutrient Film Technique (NFT)



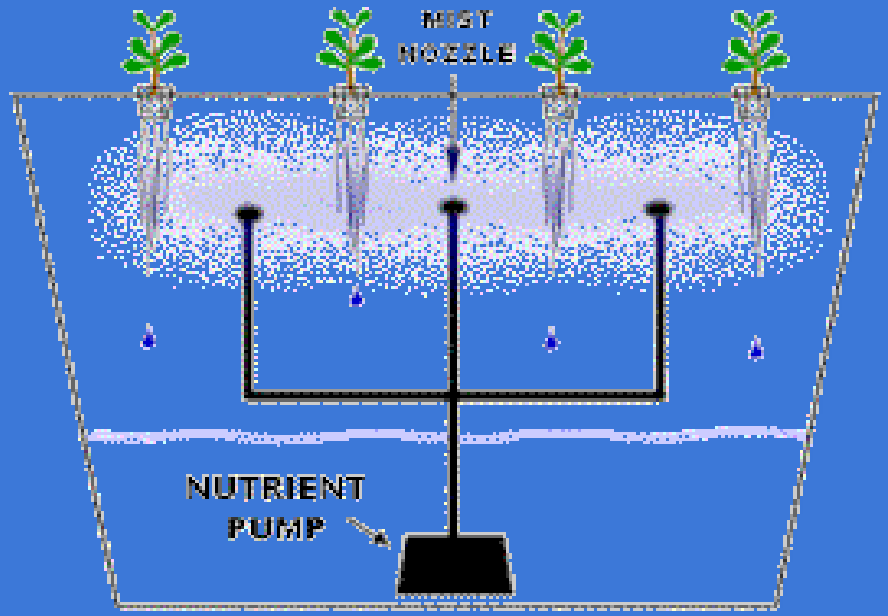
- This is the kind of hydroponic system most people think of when they think about hydroponics.
- N.F.T. systems have a constant flow of nutrient solution so no timer required for the submersible pump.
- The nutrient solution is pumped into the growing tray (usually a tube/PVC) and flows over the roots of the plants, and then drains back into the reservoir.


CHARLOTTE PIPE


MAIN
PP-P2
NIKE


CNS17
CNS17

Aeroponic

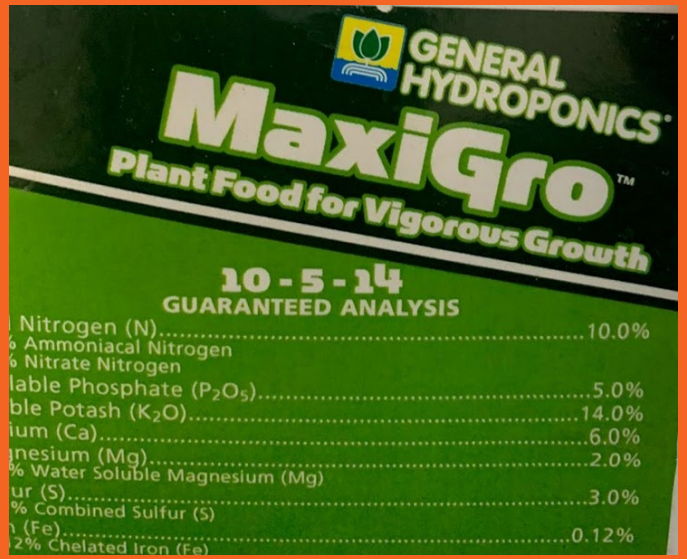


- The aeroponic system is probably the most high-tech type of hydroponic gardening.
- Like the N.F.T. system above the growing medium is primarily air. The roots hang in the air and are misted with nutrient solution.
- The mistings are usually done every few minutes, because the roots are exposed to the air like the N.F.T. system, the roots will dry out rapidly if the misting cycles are interrupted.

Soda Bottle Hydroponic Activity

Hydroponic Keys to SUCCESS!

- Use a good nutrient mix/plant food (Maxigro is my preferred mix)
- Use a pelleted version of seeds (they are easy for kids to use and see)
- Stick to hydroponic friendly plants (lettuce - butterhead/buttercrunch, basil, strawberries, jalapenos, tomatoes)
- Regular maintenance, cleaning and changing of water/food for reservoir


GENERAL HYDROPONICS
MaxiGro™
Plant Food for Vigorous Growth
10 - 5 - 14
GUARANTEED ANALYSIS
Nitrogen (N) 10.0%
% Ammoniacal Nitrogen
% Nitrate Nitrogen
lable Phosphate (P_2O_5) 5.0%
ble Potash (K_2O) 14.0%
ium (Ca) 6.0%
nesium (Mg) 2.0%
% Water Soluble Magnesium (Mg)
ur (S) 3.0%
% Combined Sulfur (S)
n (Fe) 0.12%
2% Chelated Iron (Fe)

Connecting Curriculums

Science

- Measurement of nutrients
- Testing for water quality, pH etc
- Growth rates with different nutrient mixtures, lighting sources, environments

ELA

- Journal daily growth observations

General -

- Troubleshooting
- Collaboration
- Research/Development

Technology

- Engineered systems
- Tools and machine applications

Other Resources

- **Youtube -** Epcot behind the scenes tour of the Land Pavilion
- **AITC-** State workshops/lesson plans
- Link to lesson plan

Thank You!
Any Questions?

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