

# CASE

*Curriculum for Agricultural  
Science Education*

**Principles of Agricultural Science – Plant**

# Principles of Agricultural Science – Plant

## Methods and Monitoring of Hydroponics

Unit 3 – Soilless Systems  
Lesson 3.2 Hydroponics

# Types of Hydroponic Systems



## **Media Based (Aggregate Culture)**

- Ebb and Flow
- Drip System
- Wick System

## **Water Culture**

- NFT (Nutrient Flow Technique)
- Aeroponics

# Ebb and Flow

- Flood and drain growing media manually or mechanically
- Relies on a media, such as peat moss, that will retain the moisture and nutrients after flooding



# Drip System

- Contains a drip line that slowly adds nutrient solution to media
- Nutrient solution drains back to a reservoir
- Nutrient solution recycled via pump



# Wick System

- Bottom feed system
- Media contains a wick that will absorb the nutrient solution through capillary action from a container below the plant
- The wick must be primed to maintain the absorption of the nutrient solution



# Nutrient Flow Technique

- Plants supported with rockwool cubes or cups allowing the roots to dangle in solution
- The tubes or cups sit in channels where the nutrient solution runs along the bottom
- The nutrient solution will be recycled via pump and reservoir

# Aeroponics

- Plant roots are misted with the nutrient solution
- Misting may be constant or may be cycled on a timer
- Conserves nutrients and water



# Management of a Hydroponic System



You must monitor:

- pH
- Salinity or Electrical Conductivity
- Dissolved Oxygen
- Nutrient Levels

# pH and Salinity



Remember from soils:

pH is measured from a range of 1 to 14

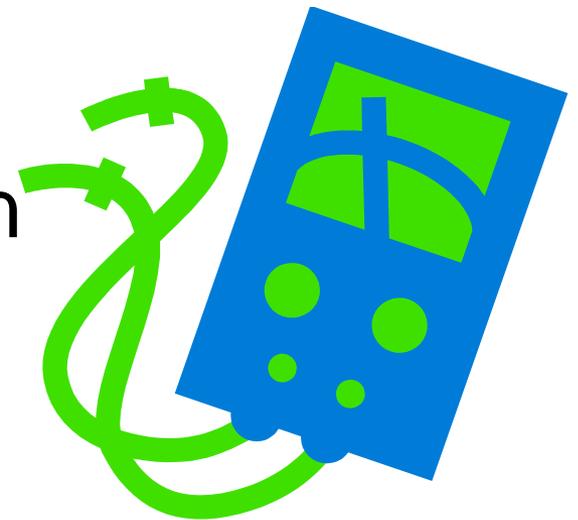
- 7.0 being neutral
- 1 - 6.9 acidic
- 7.1 - 14 being alkaline

Most nutrient ions are absorbed between pH levels of 5.5 to 8.0.

Salinity also causes absorption problems and should be monitored.

# Electrical Conductivity (EC)

- Measures electricity conducted by the nutrient solution
- A higher EC means more nutrients found in the solution
- A high EC can also lead to problems with salinity
  - make sure EC levels are optimal for the plant species being grown



# Dissolved Oxygen (DO)



Because some hydroponic systems submerge the roots underwater, oxygen must be present in the solution or roots die.

Ways to increase DO concentration:

- Aerate with bubblers
- Allow water to run over objects to create turbulence in the flow

# Nutrients



Plants will use nutrients from the water. A closed system will need to have these nutrients replenished to maintain growth.

The three macronutrients are:

- Nitrogen
- Phosphorus
- Potassium

# References



The Growing Edge. (2008). *The growing edge of hydroponic basics*. Retrieved from <http://www.growingedge.com/basics/start.html>