

Grades: Intermediate

## **The Farm at Fairplex Hydroponics and Aquaponics**

### **Before your visit:**

- Brainstorm what is hydroponics?
  1. Hydroponics is gardening without the use of soil.
  2. There are essentially 6 types of hydroponic systems: wick, water culture, ebb and flow, drip, nutrient film technique (NFT), and aeroponic. (Visit <http://www.simplyhydro.com/system.htm> for an explanation of the various types and further information about hydroponics)
- Show examples of hydroponic systems by accessing the above website.
- Brainstorm what is aquaponics?
  1. Aquaponics is hydroponics with the use of farmed fish. The fish waste in the water is used to supply nutrients to plants, and the plants help to purify the water.
  2. It is the merging of raising fish and hydroponics in one integrated system.
  3. Bacteria and composting red worms are needed to convert the ammonia in the fish waste material into nitrites for food for the plants.
  4. Visit <http://www.theaquaponicsource.com/what-is-aquaponics/> for additional information about aquaponics systems.
- Discuss the disadvantages of regular gardening in dirt.
  1. Weeds
  2. Large amounts of water are needed
  3. Insects
  4. Heavy labor with digging, weeding, lifting, and bending
  5. Animals such as rabbits, squirrels, deer, and dogs have easier access
- Discuss the advantages of hydroponic gardening:
  1. You can give the plant exactly what it needs at the time without losing the nutrients to the soil itself
  2. No need for weeding
  3. Results in faster and healthier growth for the plant since proper pH can be maintained easier
  4. Garden can be above ground making it harder for insects and animals to destroy or consume
- Discuss the advantages of gardening with aquaponics vs hydroponics:
  1. Hydroponic systems require the application of expensive man-made chemicals and solutions where incorporating aquaponics the fish naturally supply the needed nutrients
  2. Water pH needs to be carefully monitored with a hydroponic system, but after a month of monitoring the pH needs to only be checked weekly or when plants or fish show signs of stress.
  3. The water on hydroponic systems can become too salty or chemicals build up and the water needs to be drained and replaced.
  4. Root rot can occur in hydroponic systems, but does not occur in aquaponics systems

### **During your visit:**

- Walk through *The Farm at Fairplex* exhibit and specifically look at the hydroponics displays.
- Discuss what soil mediums are being used in the hydroponics systems. How do the plants look? Do they appear to be growing better than a normal garden grown in regular soil?
- Can you identify which of the 6 types of hydroponic systems are being used?
- Walk through *The Farm at Fairplex* exhibit and specifically look at the aquaponics displays.
- What types of fish are being used in the display?
- Does the water appear to be clear and healthy for both the fish and the plants?
- What types of systems are being utilized in the exhibit?

### **After your visit:**

- Discuss the hydroponic and aquaponics systems in *The Farm at Fairplex* exhibit.
- Do these types of gardening appear to be better than traditional soil based gardening? Make a list of the advantages and disadvantages.
- Make a Venn diagram comparing and contrasting the hydroponic gardens in the display with the aquaponics gardens in the display. Which appears to be the best for your needs?
- Using the Venn diagram, write an opinion essay to support which is the best type of gardening. Make sure you use evidence from your discussions and your observations from *The Farm at Fairplex* exhibit.
- Design and set up a hydroponic or aquaponics garden for your school. See the books below and the above websites for lesson plans and design plans for these types of gardens.

### **Books About Hydroponics and Aquaponics:**

Aquaponic Gardening: A Step-by-Step Guide to Raising Vegetables and Fish Together by Sylvia Bernstein

Aquaponics: How to do Everything from Backyard Set-up to Profitable Business by David H. Dudley

Aquaponics in a Changing World: Introducing the Aqua-Pod by Jim Gibson

Aquaponics: The Essential Aquaponics Guide: A Step-by-Step Aquaponics Gardening Guide to Growing Vegetables, Fruit, Herbs and Raising Fish by Andy Jacobson

Aquaponics System: A Complete Walkthrough of Building Your Own System with Step-by-Step Directions and Pictures by Russell Hopper

Aquaponics: The Ultimate 2 in 1 Box Set Guide to Mastering Aquaponics and Aquaponics for Beginners by Breanna Lawrence

The Complete Idiot's Guide to Aquaponic Gardening (Idiot's Guides) by Meg Stout

DIY Hydroponics Gardening: How to Make Your First Hydroponics Systems without Spending too Much Money or Time by James Coble

Hydroponics: The Definitive Beginner's Guide to Quickly Start Growing Vegetables, Fruits, & Herbs for Self-Sufficiency by Michael Martinez

Hydroponics: The Gardening without Soil. Easy-to-Follow Instructions for the Flatdweller, Hobbyist, and Commercial Grower by Dudley A. Harris

STEM Labs for Middle Grades, Grades 5-8 by Schyrlet Cameron and Carolyn Craig

Tabletop Aquaponics – For Homes, Schools, Churches, Clubs, and Science Fairs: Enjoy Learning to Grow Your Own by John Choisser

Understanding Hydroponics: Growing Plants without Soil by George Sullivan