LESSON 7: AQUAPONICS

TEACHER GUIDE

BACKGROUND INFORMATION

There are quite a few benefits to using an aquaponics system. This section is designed to help the students understand why anyone would take on the project of aquaponics, and especially in their own classroom. Here are a few of the benefits:

- **Necessarily organic produce** – If you use pesticides or herbicides you will harm your fish and bacteria. If you use hormones or fish medicines you could harm your plants. An aquaponic system necessarily produces food that is free of chemicals.
- **Grow using 1/10 the water of dirt gardening –** Because the water in an aquaponics system is recirculating rather than seeping into the groundwater, aquaponics uses far less water than traditional soil-based gardening.
- **Turning a waste disposal problem into a valuable input** –Aquaculture treats the waste the fish produce as a harmful bi-product to be disposed of. Aquaponics turns that around and treats the waste as a valuable input into the plant growing part of the system.
- **Growing your own food** – The average distance most produce in the U.S. travels is 1800 miles. When your food comes out of your backyard no fossil fuel is used to transport it.

- **Waist-high - free from deer, dogs and bunnies** - A nice benefit of the grow beds being elevated is the inability of pesky herbivores to get the pick of your garden before you do.
- **Weed Free –** You will not need to pull weeds from your aquaponic grow beds.
- **No dirt** – Aquaponics is a much cleaner way to grow.
- **No watering** – Most plants die from either under or over watering. Because of the automatic nature of a recirculating aquaponics system, this risk is now removed.
- **No fertilizing** - Under and over fertilizing is another leading cause of plant death and poor performance. Again, because of the nature of the system, fertilization happens automatically.
- **The Fish are Safe** - In addition to being convenient and fresh, an aquaponically grown fish is safer to eat than any other fish you can buy or catch. You know what this fish has eaten. You know what its growing and harvesting conditions have been. You know when it was harvested and how it was stored (if at all). You now have complete control over every factor important in the freshness and safety of the fish you eat.
- **The Fish Are Ecological** – With all these benefits you are not asked to compromise any environmental principles. You are lessening the demand for fish from our oceans. You are not using energy to ship frozen fish from faraway lands.

One listed point is that "A mature aquaponics system supplies us with fresh fish as well as fresh vegetables". "A mature..." is specified because it takes a while for the fish in the system to grow to the size at which they can be eaten.

LESSON OBJECTIVES

- To get the students to a point where they understand why their class is undertaking this project.
- To introduce the class to the societal topics of pesticides, water use and potentially carbon emissions.
- To explore the various benefits of aquaponics, and consider why they are actually beneficial.
- To practice presentation skills.

LESSON MATERIALS

- Materials for the brainstorming activity. This may just be a piece of paper and a pencil.
- Copies of the assessment

ASSESSMENT ANSWER KEY

1) "There is no need to add anything such as water or fish food" is not a benefit of aquaponics.
2) Using less water addresses water shortage issues, as well as the monetary cost of water.
3) Aquaponics systems do not require added fertilizer because the fish waste acts as a fertilizer.
4) The last question does not have a right or wrong answer, it is an opinion question.

STUDENT GUIDE – WHY USE AQUAPONICS TO GROW FOOD?

VOCABULARY

Pesticide – a chemical that is used on plants in order to stop pests, such as bugs, from eating the plants.

Herbicide – A chemical used to kill weeds

Nutrients – Food for plants. This often comes in the form of fertilizer in gardening.

Organic – grown without manufactured fertilizer or pesticides.

LECTURE AND DISCUSSION

- Begin the discussion by asking the class: why do you think people might decide to do aquaponics?
- We can grow fish and plants at the same time! (power point)
- A mature aquaponics system supplies us with fresh fish as well as fresh plants. You can be sure the food is not old. (power point)
- Having an aquaponics system allows for complete control of our fish and plant products. Everything is completely organic. (power point)
- Growing your own food eliminates the shipping that has likely taken place with grocery store bought goods. (power point)

- There is no need to water (except to replace evaporated water) or fertilize – the system does it all for you. (power point)
- Aquaponics uses only a tenth of the water of soil-based gardening. (power point)
- The system can be located indoors so you can grow all year-round. (power point)
- Aquaponics opens up an abundance of learning opportunities. It is easy to see an ecosystem, the bacteria, plant growth, fish and worms in action! (power point)
- Aquaponics is fun! You can grow your own fruits, veggies, flowers and fish for fun or for food! (power point)
- Ask the class: can you think of any other benefits of our aquaponics system now that we have talked about a few?

ACTIVITY

- Divide the class into five groups.
- Assign each group one of the following aquaponics benefits concepts:
    - A mature aquaponics system supplies us with fresh fish as well as fresh plants.
    - Having an aquaponics system allows for complete control of our fish and plant products.
    - Growing your own food eliminates the shipping that has likely taken place with grocery store bought goods.
    - No need to water (except to replace evaporated water) or fertilize
    - Aquaponics uses only a tenth of the water of soil-based gardening.
- Have each group discuss their topics – especially what not having that benefit means. For instance, having to water and fertilize the system would open opportunity for error. Over or under watering and fertilizing issues can

negatively affect plants. This discussion should take about 10 minutes. If you would like to go more in depth with this activity, consider computer or library research in addition to brainstorming discussion.

- After each group has discussed their topics, bring everyone back together. Have each group present their findings to the class. You might consider elaborating the presentations by having the students create a visual to go along with their information.

CONCLUSION

- Go over the key points of each group's presentation with the entire class to ensure that the ideas were conveyed to all of the students, and that they did not end up with any misconceptions from their class mates' presentations.
- Touch on the "why aquaponics?" points once more time so every student understands why the class is taking on this project.

EXTENSION

- *Social Studies* – this lesson opens up several opportunities to explore in greater depth current societal topics including pesticides, water use and climate change.

Name_____ Date_____

ASSESSMENT 7 - AQUAPONICS

1) Which of the following is NOT a benefit of aquaponics? (Circle one)

   A. There is no mess from dirt

   B. There is no need to add fertilizer

   C. There is no need to add anything such as water or fish food.

   D. We can learn from aquaponics

2) Why is it a benefit that aquaponics uses much less water than soil-based gardening? (In your own words)

3) Why does the aquaponics system not need fertilizer? (In your own words)

4) What do you think will be/what is your favorite thing to do with the aquaponics system?