



AQUAPONICS

activities

These lessons are structured to work with very little time, so even in a few weeks your students can learn about the benefits of using an aquaponics system!

Activity 1: "Time to Go and Grow"

DESCRIPTION:

Students learn how to transplant seedlings from seed start trays. Students will plant seedlings in both the aquaponics system and traditional outdoor garden bed.

OBJECTIVE:

To learn how to transplant seedlings in both soil and the substrate clay media. Students will learn how to properly handle these delicate seedlings while examining roots of plants and comparing different types of agricultural methods.

BUILDING BACKGROUND:

It is very important that students learn and understand the proper way of handling a delicate plant when transplanting. The roots are very fragile and plants need to be handled carefully, by the stem. Students will learn about spacing in a garden setting and how to plant in net pots found in the aquaponics system.

Note: *It is important that dirt has been removed from the roots of the seedlings before placed into the grow pots to prevent contamination of the water and fish tank.*

MATERIALS:

Trowels, seedlings ready for transplanting, paper, pencils.

CLASS DISCUSSION:

Have the students observe and look at the seedlings in the seed start tray. Observe how the plants begin growing closely together. It is imperative that the plants are

handled carefully and given space in the garden so they have plenty of room when fully grown. Discuss why plants in the aquaponics system can be grown closer together because of access to unlimited water and nutrients.

ACTION:

1. In groups of two, have students work together to carefully remove the seedlings from the start tray. Students can use a hand trowel or gently squeeze the bottom of the tray and lift the plant out by the stem.
2. Have students dig a hole at least twice the size of the root ball in the soil for the traditional garden bed and wet the hole with water. For the aquaponics system, instruct students to carefully wash off all dirt from the seedling so the dirt does not cloud the water in the system.
3. In the traditional garden, have the students plant the seedlings, press the soil firmly around the plant, and water. In the aquaponics system, place the plant in first and then make sure the clay media covers it's roots in the net pots.
4. All students should record the transplants size and start date for growth.
5. Have students study the rate of growth between both transplants over the next few weeks. This is a great way for the students to see which way the plants grow faster. The students can also measure how much water was used over a period of time to grow the transplants into fully mature plants in the traditional garden versus the aquaponics system.

FURTHER DISCUSSION:

Ask the students why it was necessary to transplant the seedlings?

Since we have net pots for the aquaponics system ask the students about the difference in spacing between the net pots and a traditional garden.

Ask the students to explain why it is important to have the proper spacing in order for the plants to grow.

Ask students to predict which plants will grow faster and explain why.

Activity 2: "What Do Plants Need to Live?"

OBJECTIVE:

To learn about different elements (substrates) that plants can grow in. Students will understand that in the aquaponics system plants are grown in a different substrate such as gravel, clay pellets, peat or coconut based plugs. Students already know and understand that plants typically grow in healthy soil in a garden.

MATERIALS:

5 bean seeds/plants, paper towels, zip lock bags, plastic cups (clear), potting soil, sand, two cups of water, scissors.

ACTION:

1. Start seeds on a wet paper towel cut into a narrow strip about 4 inches wide and place inside a ziplock bag. Students can watch the whole sprouting process. Have students germinate seeds in the aquaponics system.
2. Once the seeds have sprouted, transplant the sprouts into clear plastic cups, positioning them against the sides so you can see the root formation as they grow. Grow 4 in cups with potting soil and 1 in an aquaponics system net pot.
3. Label the five identical plants:
 - Light, Soil, and Water (A regular potted plant with a watering schedule)
 - Light and No Water (A potted plant without a watering schedule)
 - Water and No Light (A potted plant with a watering schedule, covered to prevent photosynthesis)
 - No Light and No Water (A potted plant with no watering schedule, covered to prevent photosynthesis)
 - Light, Water, and no soil (This will be your aquaponics system plant)
4. Deprive each plant of one thing it needs to grow (with the exception of the control plant and the aquaponics system plant).
 - One gets light, water, and soil (Control Plant)
 - One gets light and soil, but no water
 - One gets water and soil, but no light
 - One gets soil, but no light and no water
 - One gets light and water, but no soil (aquaponics system Plant)

FURTHER DISCUSSION: The following worksheet is for your students to record their data and analysis.

Predict: Write a Hypothesis. (What do you think will happen to each plant during this experiment?)

Observe: How do the plants look? Record your observations in the chart:

DAY 1: At this point, what do you think plants need to live?

Collect Data: Look at the plants every few days. Record your observations in your chart.

Analyze Data: Which plant grew the most after two weeks? Which plant looks the healthiest?

What makes the aquaponics system Plant different from the other plants?

Conclusion: (DAY 10) What do plants actually need to live?

Data Collection Worksheet

Name: _____

PLANTS	Day 1	Day 2	Day 4	Day 6	Day 8	Day 10
Light, Water, and soil						
Light, soil, no water						
Soil, water, no light						
Soil, no water, no light						
ECO- Garden Plant (No Soil)						

Activity 3: "What's Your Role; The Ecosystem Play"

OBJECTIVE:

To understand the role of all organisms, biotic (living) and abiotic (non-living), in various ecosystems.

MATERIALS:

Any appropriate materials determined by teacher and students to complete the activity. Props are recommended but not necessary.

BUILDING BACKGROUND:

Our world is made up of a variety of different ecosystems. An ecosystem is a biological community of interacting organisms and their physical environment. Some specific types include: Traditional Garden, Desert, Jungle/ Tropical, Grassland, Forest and Ocean/Freshwater systems. The aquaponics system is a small-scale version of a freshwater ecosystem. In this activity, students will be assigned an ecosystem to research and will write a 5 - 10 minute "play" where all students in a group will have at least one speaking part. The "roles" will be all of the elements and organisms that make up an ecosystem.

For example: The roles in the "play" called *Aquaponics Ecosystem* would include the following:

Fish, Water, Oxygen, Plants, Fish Waste, Fish food, Light
Gravel (or any bottom material), Decorations or Statues, Aquarium

ACTION:

1. Write the name of each of the ecosystem types on a small piece of paper. Each slip of paper should be folded once and placed in a hat or basket. Divide the class into groups and ask a representative from each group to come forward and pick an ecosystem out of the basket.

2. Explain to students that they are to make a list of all the "roles" in their ecosystem, both abiotic and biotic. After they complete their list, students should determine who will take each of the roles in their ecosystem play. If there are more roles than students, students should take on a second and perhaps even a third role in the play.

3. Once students know what role they will be playing, they should think about their own role and determine 3 statements that they should make about their role in the ecosystem. At least one statement should include identifying their part of the ecosystem as abiotic (non-living) or biotic (living) in their lines for the play.
4. Teachers should be sure to check that all ecosystems are represented, by the elements/organisms found there to how each works together. (See adjustable worksheet at the end of this activity.)
5. Allow time (5-10 mins) for each ecosystem play.
6. Ask the student audience to discuss each play or run the presentations as if they were acts in a play and conduct a class discussion at the conclusion of all the ecosystems.

The next page provides the handout to give to each Ecosystem Group:

NAME: _____

PLAY TITLE: _____

My groups play is about the _____ ecosystem.

ABIOTIC roles in this play _____

BIOTIC roles in this play_____

I will play _____ in our _____ ecosystem play.

Facts about my role:

My lines for our ecosystem play :
