

Lesson	Aquaponics - Water Garden Lesson 2
Topic (title of lesson)	Species of an Aquaponics Ecosystem
SCO/Learning goals/Essential question/ECG(s)	SCO: LS1 - Explain how different parts of an ecosystem interact and affect each other. Learning Goal: Students will learn about how the addition of a new species (plant or animal) will affect the existing ecosystem and if it will be harmful or helpful. Essential Question: What species can be added to the existing aquaponics tank? ECG: Creativity & Innovation, Critical Thinking
Prior knowledge and/or misconceptions	This second lesson is meant to follow Aquaponics - Lesson 1 . Misconceptions may involve assuming any small aquarium fish and plants can live and grow together.
Accommodations	The use of technology or assistive devices can be used for the writing portion and the option to print or use google docs is available. Research can be done in pairs to help students handle certain tasks.
Materials/Grouping	This lesson requires a Back to the Roots Water Garden Kit , as well as purchasing a fish and fish tank accessories pH strips are required for testing Optional: nitrate, nitrite, ammonia testing strips
Safety	When adding new things to the aquarium, ensure everything is rinsed with tap water before.

Engagement: As a class, discuss other species that could be added to the aquaponics tank. Write down a list of student suggestions. Ask students what they need to research to determine if they should include one of the new species into the tank. Some students may have fish at home and already know about this.

Exploration: Have students work either individually in pairs to research one potential species that could be added to the aquarium. They will justify why or why not their chosen species would be a good addition to the aquaponics tank, based on factors such as, existing species, size, pH and temperature needs, food sources, adverse effects, etc.

The following are common species that can pair well with bettas:

- Moss balls
- Snails (mystery, nerite, turret, pond, etc)
- Freshwater shrimp
- Live plants (java ferns, anubias, duckweed, etc.)
- Corries, guppies

Other species that aren't recommended to pair with bettas (but can be added with a different

fish):

- Freshwater clam
- Crabs (such as hermit crabs)
- Most other fish
- African dwarf frogs

Have about half of the class research species from the list that pair well, and the other half research species that likely don't pair well. Avoid telling them which category their species is in, as they will determine themselves, based on their research.

Give students about 25 minutes to complete their research sheet

Explanation: Have students, or student pairs, each share their argument that either supports if the organism is to be safe to be added to the tank, or not. For those who argue their species should be added, give them one or two sentences to use to convince the class that their species would be the most beneficial to add. Allow the rest of the class to ask questions they may have to ensure the species is a good choice.

Elaboration:

Conduct a vote on the top species that were found to be safe and beneficial for which one the students would like to see added.

Optional: purchase the species that was the winner of the class vote and add it to the aquaponics tank.

Evaluation (Assessment):

See below

Name: _____

Date: _____

Chosen Species: _____

1. Based on your research, fill out the following characteristics about your species:

-Plant or animal:

-Size/height:

-Diet:

-Preferred temperature range:

-Preferred pH level range:

2. List any concerns about the species being added to the existing tank. (i.e. reproduces on its own, too big/needs more space in current tank, doesn't work well with other species)

3. Would you recommend this species be added to the aquaponics tank? If so, justify why the species would be beneficial to the ecosystem. If not, explain why the species should not be added.

4. If the species were to be added to the tank, are there any additional measures that need to be taken place? (i.e. extra feeding, more frequent cleaning, additional water testing etc.)