

Hydrilla/Godzilla

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Grade/Subject: Sophomore Biology

Lesson Overview

This is a kind of “Devil’s Advocate” activity of inquiry-based instruction designed to begin (due to it’s two-week run) before teaching, and run concurrently with, Biomes, Ecosystems and Populations. The instructor will lead students into discovery of the dangers when species cross biomes and adapt, often thriving under non-native conditions. This activity requires focus, team-work, record keeping, and extrapolation of gathered information into long range vision and comprehension.

Websites: Please list host of each website (complete reference)

<http://plants.ifas.ufl.edu>,
<http://nas.er.usgs.gov>,
<http://invasivespecies.gov>
<http://anstaskforce.gov>,
<http://plants.usda.gov/java/noxiousDriver>

Learning Objectives

~~When finished~~, Students will be able to:

1. identify three types of plant reproduction,
2. two forms of adaptation to new niches, ~~and~~
- 4.3. four characteristics of invasive aquatic species to biomes. not clear?

Michigan High School Science Benchmarks:

B3.2C Draw the flow of energy through an ecosystem. Predict changes in the food web when one or more organisms are removed.

B3.4A Describe ecosystem stability. Understand that if a disaster such as flood or fire occurs, the damaged ecosystem is likely to recover in stages of succession that eventually result in a system similar to the original one.

B3.4C Examine the negative impact of human activities.

B3.5B Explain the influences that affect population growth.

B3.5C Predict the consequences of an invading organism on the survival of other organisms

B3.5d Describe different reproduction strategies employed by various organisms and explain their advantages and disadvantages

B3.5e Recognize and describe how the physical or chemical environment may influence the rate, extent, and nature of population dynamics within ecosystems.

B3.5f Graph an example of exponential growth. Then show the population leveling off at the carrying capacity of the environment.

Materials:

Hydrilla (or other invasive plant, ie. Eurasian Milfoil
four 3-5 gallon aquariums with aerators

pond water with sediment
pH test strips
thermometers
log sheets

Vocabulary:

Leaf Axils - point of origin of a leaf on a plant stem,

Fragmentation - the ability of plants to regenerate from small pieces of original plant

Rhizomes - underground root structure that allows new growth above ground

Subterranean Turions (Tubers) - underground fibroids that develop new above-ground plants.

Procedure

1. Ask students to define the word, "Invader". Expect many references to movies. Pursue, dig deeper to identify what makes something an "invader".
2. Break students into four ~~big~~ groups, give ten minutes to develop a definition. Circulate among groups and ask questions about invader control and reproduction. Have students appoint a spokesperson to present ideas, record ideas on board.
3. Show students photos of Hydrilla (Milfoil) along with background information of plant (please provide the background). Students take notes.
4. Remind students of plant reproduction, most will only know seed production. Teach rhizomes, tubers and turions at leaf axils.
5. Set up demo: Four aquariums with pond water and sediment. Four equal weight measurements of plant in four different forms:
Form #1 - full plant and root (control)
Form #2 - chopped fragments
Form #3 - rooted plants cut to axils
Form #4 - tubers
6. Set aquariums in equal light conditions, well-lit countertops are usually fine. Appoint each group one aquarium and within each group, have each student sign up to test and record pH and temperature. Record numbers each day for two weeks. At end of demo, remove plants and roots, rinse and weigh. Compare numbers.
- 6.7. Brainstorm with students what makes a species invasive: tolerance, rapid reproduction, rapid growth, resistance to management. Not clear?

Assessment:

Have each student write a ~~one page~~ p5 paragraphs paper explaining how they participated, what they observed, and what their deductive reasoning tells them. Grade with included rubric

One Page Rubric

10 - Neat, five paragraphs with topic sentences. Sentences are complete and include information on participation, observations and thoughts about the outcome.

9 - Neat, four paragraphs with topic sentences. Sentences are complete and include information on participation, observations and thoughts about the outcome.

8 - Neat, four paragraphs, topic sentences not clear. Sentences within paragraphs are complete and include information on participation, observations and thoughts about the outcome.

7 - Neat, four paragraphs, topic sentences not clear, paragraphs limited in information, deductive reasoning not apparent.

6 - Neat, two or three paragraphs, topic sentences not clear, information limited, deductive reasoning not apparent.

0 - Anything else.