Invasive Species Activity
2003 COSEE Summer Institute

Objectives:

- Define exotic and endemic species.
- Identify adaptations that allow exotic species to succeed in a new area.
- Assess the damage that can be done to a local habitat when an exotic species becomes established.

Materials:
(Per group of 4) a plastic shoebox or other water-holding device, water hyacinth plant, scalpel, hand lens, scissors, forceps.

Introduction:
Humans are not the only immigrants to the United States. Thousands of animal, plant, and microbial species are also newcomers to this country. Because they were brought to our area from another place, where they evolved and adapted, they are called exotic species. Some exotics have been introduced on purpose. Others have entered accidentally. Species that have evolved and adapted to an area are called native or endemic species.

Exotic species that make their way into natural wild ecosystems can threaten native habitats and the organisms in them. They may have adaptations that allow them to out compete the native species for food, shelter, or space. They may even displace natives that occupy the same or similar niches. When no natural predators of an exotic species exist in its adopted environment, its population grows unchecked, causing further pressure on the established ecosystem. Populations of exotic species sometimes increase uncontrollably, interfering with human activities such as industry, agriculture, and recreation.

One of the most troublesome of the Gulf coast's exotic plants is the water hyacinth. This beautiful, free-floating aquatic herb can inhibit most fresh waterways in our area, being active from early spring through the first hard freeze of winter. It is easily recognized by its flowers, which are lavender and blue, with a conspicuous yellow spot on the top petal. The flowers are arranged in a spike that is held erect above a floating cluster of leaves.

Water hyacinths are native to Central and South America but were brought into the U.S. for an exposition held in New Orleans in 1884. Because of their beauty, they ere admired by many exposition attendees, who enthusiastically divided the plants and took them home to add to backyard ponds. By 1900 they had escaped cultivation and had become serious pests, clogging waterways throughout the coastal states. The water hyacinth's success in its new habitat can be traced to a number of adaptations.

Prediction:
How do you think the water hyacinth could impact a local aquatic environment?

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Procedure:

A. Examine the water hyacinth plant floating in the container at your station.

1. Sketch and label this plant as it appears in the container: leaves, flower (if present), roots, stem/bladder. Color your sketch appropriately.

B. Blow across the surface of the water.

2. Describe what happens to the plant when you blow across it.

3. What might be the benefit of such a reaction?

4. What adaptations does the plant have that allow it to respond to and benefit from windy weather?

C. Cut off a small piece of the root and examine it with your hand lens.

5. Sketch that portion of the root and label your drawing.

6. What is the benefit of such a dense, feathery network of roots in an aquatic environment?

7. When the waterway dries up, water hyacinths have been seen to continue to thrive. How might their root structure be beneficial when the environment becomes dry?

D. Gently cut one of the stems off from the rest of the plant. Using your scalpel, carefully cut through the inflated portion of the stem called the bladder.

8. Examine the inflated bladder-part of the stem and sketch what you see. Label your sketch. Color.

9. Explain how this hollow stem lined with spongy tissue is a benefit to the plant.

E. If a flower head is present, use your forceps to gently remove one of the flowers. If not, examine the available photo/picture and respond accordingly. Each flower raceme only lasts for one day.

10. Examine the flower carefully. Sketch the flower and color it appropriately. Label your sketch.

11. What adaptations make this flower attractive to pollinating insects?

12. This single flower, although attractive, is merely one of a number of blooms on the flower head. How is having a number of flowers in a single place beneficial to the plant?

F. Now look at the plant as a whole. Notice how new sections of the plant seem to grow out from the original? If the plant is broken into pieces, each piece can root and grow into a new plant.

13. How is this type of vegetative reproduction called **fragmentation** an adaptation that is beneficial for survival?

Analysis:

14. Predict the effects of a number of water hyacinth plants on different organisms in the ecosystem.

(A) other aquatic plants

(B) aquatic animals

15. Predict the effects of a number of water hyacinth plants on human activities:

(A) boat navigation

(B) recreational activities, such as fishing, water skiing, and swimming

16. Explain why efforts to rid our waterways of this pesky plant have been largely ineffective or might have undesirable side-effects:

(A) using mechanical croppers

(B) using herbicides

(C) importing natural predators from the water hyacinth's original habitat.

17. Differentiate between those species that are endemic and those that are exotic.