

Module 1 ~ Silent Invaders - National Version

Teaching Points



Recommended as additional background information to supplement the Silent Invaders video presentation and/or to foster class discussion and activities.

For more information about native, non-native and invasive plants, please visit: <http://plants.ifas.ufl.edu/manage/>

BEFORE THE PRESENTATION

Vocabulary and Keywords

This is a good time to introduce/discuss the keywords described in the Keywords Chart and Keywords Definitions for Module 1 located at: <http://plants.ifas.ufl.edu/education>.

Consider introducing some of these new science words by explaining their Latin/Greek roots, and how they are incorporated or translated into English words. This can be especially effective for upper elementary students because it enhances language and this is the prime age for language acquisition. It's also beneficial for middle and high school students. It is particularly useful as they continue on in future science classes, e.g. "terr" means "pertaining to or living on the land or ground surface"....so terrestrial plants are found on land.

Ask students to think of other words that begin with "terr"...such as terrarium, which is a simulated, contained ecosystem of plants found on earth/land.

A website for learning more about the origin of words: <http://www.wordinfo.info/>

Discuss things we can do to learn more about plants. Discuss some of the ways we can tell one plant from another, including the interesting patterns and structures found on leaves, flowers, etc.

DURING (OR COMPLEMENTING) THE PRESENTATION

Terrestrial Plants

Discuss what kinds of "dry land" habitats are available for terrestrial plants, e.g. Forests, pastures, deserts, tundra, rainforests, prairies, etc.

Introduce adaptations to explain how and why these plants live in terrestrial habitats. EXAMPLES: trees in the rainforest have very shallow roots because there is plenty of water; some trees on land have very big leaves to capture sunlight; pine trees (or trees with needles) keep some of their leaves all year to continue making food year round; some vines maximize the sunlight they get by climbing up and over other plants, trees, telephone poles, etc. Also, the shape of a leaf often tells us whether or not the plant is designed to live in shade or sun (e.g. ferns have lots of surface area because they tend to live under forest canopies; they use their many leaflets for gathering as much light as possible for photosynthesis).

For older students, an entire lesson can be integrated about adaptations of terrestrial plants and how they compete with other plants in the same habitat for space, light, water, nutrients, etc.

Aquatic Plants

When introducing aquatic plants be sure to mention that: "aqua" means "water"; so this gives a clue that aquatic plants are found in the water. Ask students to think of other words that begin with "aqua" (an aquarium is an artificial home for animals and plants that live in the water).

Ask students to think of places where they have seen aquatic plants: Drainage ditches, rivers, streams, ponds, lakes, marshes, estuaries, etc.



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This would be a good time to discuss different types of aquatic habitats. Aquatic is usually used to describe freshwater systems while marine is used for salt water systems, but this may vary depending on curriculum and teacher preference.

Introduce adaptations to explain how and why plants live in aquatic habitats. e.g., plants that live rooted in the water vs. those living on the shoreline; inflated stems on some plants that allow them to float; etc.

For more information: <http://plants.ifas.ufl.edu/manage/why-manage-plants/aquatic-and-wetland-plants-in-florida>

For older students, an entire lesson can be integrated about adaptations of aquatic plants and how they compete with others in the same habitat for space, light, water, nutrients, etc.

Discuss the big picture: what makes each of these types of plants critical to these environments? What wildlife might use them? For example: Do all of them provide oxygen to the water through photosynthesis?

Emerald – plant roots provide shelter for juvenile fish and habitat for insects; those growing near the shoreline can reduce erosion and take up excess nutrients from stormwater.

Floating-leaved – leaves provide good hiding places for fish and other animals, provide areas where birds can land and forage for food.

Submersed – plants provide good hiding places for fish and small animals, and food for some creatures; provide oxygen to the water; prevent shoreline erosion, etc.

Dead plant material (detritus) provides food for aquatic organisms (bacteria, zooplankton, benthic worms)

MS and HS students: This is a good place to integrate a lesson on photosynthesis and respiration, and then discuss how each of these types of plants produces oxygen to various places within the water column, their utilization of sunlight (depending on where they live in the waterbody), nutrient uptake, what limits their distribution (depth, etc.)

General Ecology

Discuss how plants are producers and animals are consumers.

Introduce food chains and food webs here using plants and animals that are familiar to students. Illustrate the importance that plants have in keeping higher order consumers alive – even those that may not live in the water.

Discuss some of the more common wildlife species (deer, bear, snakes, birds, frogs, and fish) and how they have adapted to climate, plant life, soils, water, etc.

Use examples of keystone species to show what happens when one part of the food chain is removed (e.g. a classic example is the sea urchins, kelp, and sea otters in the Pacific; when sea otters were hunted for their skins, the sea urchin populations grew out of control with no predators around to eat them...as a consequence, the sea urchins overgrazed the kelp and the kelp forests of the Pacific became endangered).

Provide examples of ways that populations are controlled:

Natural – Discuss biological controls such as predators, various reproductive strategies (i.e., the concept whereby animals have a small number of offspring and provide lots of parental care OR they have many offspring and offer little to no parental care). Other controls such as disease, fire, storms, periodic flooding, etc.

Human induced (anthropogenic) – urbanization and development, introduction of disease and parasites by exotic species, chemicals (fertilizers, pesticides, etc.), agriculture, deforestation, etc.



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EXAMPLES: The discussion might include weeds introduced to ditches that are created for stormwater run-off and flood control; or cat-tails filling in their favorite lake/pond or blocking their view;, etc. (Note: cat-tails are native plants but they can become problematic in disturbed areas or when excess nutrients are introduced to a waterbody.)

Ask how these changes may influence other plant communities. Discuss how we use plants for food, medicine, shade, landscaping, decoration, wildlife habitat, prevent erosion/stabilize land, textiles, etc.

Invasive Species – What are their effects?

Many plants are introduced accidentally because people don't realize what can happen as a result. Point out to students: even though two species might look the same or similar, they have different needs in terms of nutrients, water, and sunlight and end up competing for these same resources – including habitat. When native plants are replaced by invasive species, wildlife that depend on these plants for food may die out or move to another area. This can cause negative effects all the way up the food chain. In addition, many non-native plants have no natural predators and so are difficult to control unless humans actively manage them with chemicals (herbicides) and/or removal by hand or machinery (harvesting). These methods are expensive and someone (taxpayers) must pay for them.

Why are invasive species a problem?

Environmental – When an invasive aquatic plant completely covers the surface of the water, it can also prevent other animals, such as birds, from being able to access the water for food. It can also prevent sunlight from penetrating through the water column, thus preventing photosynthesis and oxygen production by plants below the surface. Fish need dissolved oxygen in the water to breathe, so this can result in a massive die-off of fish (known as a fish kill). When many plants die off at once, the massive quantity of decaying / decomposing plants further depletes dissolved oxygen in the water (because bacteria and other animals consume oxygen during the decomposition process).

Note: Ask students to think about how much oxygen they consume while walking vs. exercising, etc.).

For MIDDLE and HIGH school students: Discuss photosynthesis vs. respiration and oxygen consumption (day vs. night), etc. **RECOMMENDED:** See *A Fish Tale Presentation*, Module 2 on our website at: <http://plants.ifas.ufl.edu/education>.

Some invasive plants can grow so thick that it's difficult for people or animals to move through them. There are some examples of animals becoming tangled and unable to escape. Recently, one researchers / field technician found part of a deer carcass wrapped in an invasive climbing fern (*Lygodium*). It's not conclusive, but the vine appeared to have wrapped around the animal's leg before it died.

When only one food source is available, think about effects on the consumers. What if humans only had one food source to eat? What would happen? How difficult or easy would it be to provide food to your offspring? What about needing a variety of foods for nutritional needs?

ECONOMIC: Introduce a discussion of the economic damage that can be caused by invasive plants. Discuss ways in which invasive plants hurt economic activities such as agriculture, recreation, flood control, pest management, and natural resource management. Make the connection between these two words: Invasive = Invade.

Discuss ways that flood control structures might be prevented from operating properly by invasive aquatic plants. Have they seen ditches in their neighborhood full of plants? Were they native or non-native? Have they seen these ditches fill up after a heavy rain? Do rain gutters operate properly when they are filled with leaves?

WHAT CAN YOU DO TO HELP?

NEVER empty aquariums in a lake, pond, ditch, or canal.

INSPECT: Discuss ways in which the class or individuals can inspect the local schoolyard or neighborhood for



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invasive plants or how they can make a difference in their own backyard or local park. Discuss the importance of knowing for sure whether a plant is native, non-native or invasive. Remember to offer the CAIP website as a resource: <http://plants.ifas.ufl.edu>

DISPOSE: Discuss the difference between household garbage and composting. Discuss the ways that composting is a good practice for household biodegradable waste (vegetable scraps, eggshells, etc.) but NOT for invasive plants and explain why (some seeds can survive composting.)

LANDSCAPE SMART: Consider having students map out sections of the schoolyard and document native, non-native plants and invasive plants that may be there. Break the schoolyard into quadrants and have students work on different sections. Then the maps can be pieced together to get a picture of the whole area.

VOLUNTEER activity: Ask how many students help work in their own yard or in an area park. See if any would be interested in helping out at a local park or schoolyard.

OUTREACH: Contact your local native plant organization or area parks to see if there are opportunities for students to help remove invasive plants.

CONSIDER: Having students make a map of their yard or area park and developing a management plan for removing invasive plants and replanting natives.

ADDITIONAL SUGGESTED ACTIVITIES

- Give students a non-native plant and ask them to research it - find its home range, uses or value in its native ecosystem, what eats it or what depends on it in other ways, how it affects other plants (e.g. does it put out inhibitors in the soil or water, does it compete with them for resources?)
- Have students write and present a “biography” of a native, non-native or invasive plant. Depending on student age, a variety of presentations can be given about the plant’s life: a newspaper scrapbook with pictures; an obituary with a tombstone (for older kids: highlight what made this plant “famous” and why); a public service announcement for television or radio; a movie trailer. This is particularly valuable for students as they learn the plant’s origin, ecological significance (or impact), its associated wildlife, life history (where it grows, how it reproduces, ancient uses, etc.), current uses or economic importance, methods of control (natural and human mechanisms), etc. For images and information on plants, see <http://plants.ifas.ufl.edu>
- Have students take a survey of their family members, friends, school community (other teachers and students) and see what they know about native, non-native and invasive plants. Students are often enthusiastic about doing this, and when results are compiled, it gives them a visual image of just how many people don’t know about problems associated with non-native species. This provides a great opportunity for students to be the “teachers” and educate their peers and family members.

For more ideas and lesson plans on invasive species, please see our website at: <http://plants.ifas.ufl.edu/education>.