

Green Space Invaders

(How Non-Native Plants Change our Landscape)

Objective:

In this activity, students will compare competition in their own lives with that of plants. They will discover the advantages that non-native plants species have when competing with native species for space.

California State Standards:

3rd Grade

Life Science 3c – Know living things cause changes in the environment in which they live; some of these changes are detrimental to the organism or other organisms

4th Grade

Life Science 2b – Know producers and consumers....may compete with each other for resources in an ecosystem

5th Grade

Investigation and Experimentation 6a – Classify objects (rocks, plants, leaves) in accordance with appropriate criteria.

Time:

Introductory Activity #1: 10 minutes

Introductory Activity #2: 10 minutes

Main Activity: 20 minutes

Discussion: 5 minutes

Vocabulary:

Native, Invasive, Competition, Advantage, Herbivore

Materials:

- Samples or Pictures of Native & Non-Native Plants
- Plant Community Envelope: (*Contains 16 red slips of paper, 4 white, 4 yellow, and 4 blue*)
- Space Invasion Envelope: (*Contains 7 red, 1 white, 1 yellow, and 1 blue*)
- Herbivore Envelope: (*Contains 5 yellow, 5 white, and 5 blue*)

Preparation:

- Prepare the 3 sets of envelopes. Cut a total of 28 red slips of paper, 10 white, 10 yellow, and 10 blue. (Colors may vary)
- Gather samples or pictures of native and non-native plants
- Pictures can be found in the “Image Gallery” of the USDA Plants Database: plants.usda.gov
- For information on invasive plants: www.blm.gov/education/LearningLandscapes/explorers/lifetime/invasive.html

Introductory Activity #1:

Put five equations or five spelling words on the board. Instruct the class that they have one minute to solve the given problems. Those that solve the most will be granted a privilege (*example: 1st in line for recess, exempt from classroom clean-up*). Secretly supply a small number of students with the answers.

After one minute, explain to the class they were all involved in a competition. “Humans compete with each other all the time. What are some other ways that you are involved in competition?” (sports, school, etc.) “Do you think that plants compete? What are some things that plants might compete for?” (nutrients, sunlight, water) “All plants need to have a space to grow where they can get the nutrients, sunlight, and water that they need. Plants, therefore, have to compete for a space to grow.”

“Raise your hand if you correctly answered all five questions in the one minute’s time.” Identify the students of that group that were secretly given the answers. Explain that by giving them the answers they had an obvious advantage over the rest of the class. This made it very difficult for those without the advantage (answers) to compete.

“Now we are going to learn about an ongoing competition in the plant world between native and non-native species and some of the advantages that non-native species have when it comes to competing for a space to grow (where they can get sunlight, water, and nutrients).”

Introductory Activity #2:

“What is the difference between a native and a non-native plant?” Native plants have grown in a particular area historically where a non-native plant was introduced from another location.

“How does a not native plant become a green space invader?” Non-native plants that have no predators, enjoy the climate, and can reproduce quickly, take over the growing space where native plants once grew.

Show pictures or samples of native and non-native plants that may compete for growing space in your local region and discuss possible advantages of the non-native species for invading space.

The biggest advantage that non-native plants have is an exemption from herbivores and parasites. Non-native species have no natural predators to keep their populations in check. Native animals will eat the leaves and seeds of native plants, but leave the non-native species alone.

When non-native plants invade space they can also use the following methods to help give them a further advantage over their native counterparts. *Note: Native plants can exhibit all these features listed below, but are held in check by other factors (herbivory & parasitism).*

Space Invading Advantages:

- Plants with massive seed production (*example: dandelions & pampas grass*)
- Plants that reproduce without the use of seeds (vegetative reproduction – rhizomes, stolons, adventitious roots, bulbs or bulblets (*example: European beach grass &, sour grass*))
- Plants with different methods of seed dispersal (burs carried by animals, wind/water dispersed seeds (*example: duck weed*))
- Plants that are nitrogen fixers (increase nutrients in the soil making it easier for other plants to grow instead of the native plants that are adapted to low nutrient soils (*example: yellow bush lupine*))
- Plants with more efficient ways to capture and store water (such as taproots) even during the dry season (*example – yellow star thistle*)
- Plants with protection from grazing herbivores and parasites (sharp spines, thorns, or toxins (*example: gorse*))

“We know that many non-native species invade the growing space of native plants. Why is non-native plant invasion harmful to the environment?”

Discuss the following harmful effects of exotic plant invasion:

Loss of Diversity: What is your favorite food? Would you like to eat that same food for the rest of your life? Would you enjoy it if the weather were exactly the same every day? Diversity is important in our lives, and it is also important for the health of a natural environment. A single exotic plant species can take over the growing space where 20 native plant species once grew.

Food and Habitat Loss: Native wildlife is accustomed to feeding on and finding homes among native vegetation. When non-native plants invade, some wildlife species can lose their home and their dinner. Some non-native plants are also toxic to animals.

Reduced Use: Non-native plant invasion can also reduce opportunities for grazing, timber, and recreation.

Main Activity:

Explain to students that they will now get a chance to experience how non-native plants can invade space. Pass around the plant community envelope. Once all students have drawn a card, outline a location on the floor, relatively small, where they can choose to grow. Once they have found their place, they should plant their feet / roots into the ground and may no longer move from that spot. Once students are situated, explain that all plants holding a red card are non-native species, and all students holding the blue, yellow, and white cards are native species.

Draw a card from the space invasion envelope. All students with the color drawn may invade the space of another plant. For example, if you draw a yellow, all the yellow plants can invade space by touching the shoulder of a nearby student / plant. They should only replace plants of a different color than themselves (e.g. the blue species should not

replace another blue species but rather conquer more territory from other color species). The replaced plants exit the game.

Select 2-3 students from those that exited the game and tell them they have become herbivores. Have these students draw from the herbivore envelope. They may then go eat a plant of the color that they draw.

Repeat the process until all or nearly all native species have been eliminated from the plant community.

Discussion:

Engage students in a discussion about the activity. Discuss the unfair advantages of the game and compare with the unfair advantages of non-native plants.

“In our game there were no red cards in the herbivore envelope, which gave the non-native species an advantage. In the natural world, native herbivores are not adapted to eating non-native vegetation and therefore gain an advantage over their native competitors.”

“In our game, there were a greater number of red cards in the plant community envelope. In the natural world, non-native plants often multiply in numbers quickly.” (refer to space invading advantages)

“In our game, native plants that survived the activity were probably not standing in among the crowded main group of players. In the natural world, some native species can only survive in isolated areas that may not have the best growing conditions.” (shady, poor soil, etc.)

“How can we help prevent the green space invasion?” (plant only natives, volunteer at weed-pull events & educate your friends and family)