LESSON 18

Weed Success: A Bag of Tricks

Grade level: 5-8
Subject Areas: Biology, writing, role-play
Duration: 2 class sessions
Setting: Classroom
Season: Any
Conceptual Framework Topics: Plant ecology, invasive plant management

OBJECTIVES

Students will be able to identify life-history strategies that make some plants successful invaders.

METHOD

Students brainstorm what characteristics of plants might make them successful invaders. They research noxious weed species of Montana and demonstrate traits their species uses to help it successfully invade new areas.

MATERIALS

- ✎ 20-foot-long piece of fine rope or twine, as well as a few shorter pieces with Velcro® to hold them together at the ends
- ✎ spray bottle
- ✎ Velcro® tabs
- ✎ Downy fluff (such as cotton batting, cotton balls, dandelion seeds, etc.)
- ✎ A jar of approximately 10,000 poppy seeds. There are 3,000 seeds per gram.
- ✎ A few slightly prickly or pointed implements such as wooden chopsticks with pointed ends
- ✎ "Armor" or shield (this could be a child's costume from a thrift store or something as simple as a piece of cardboard cut into the shape of a shield and covered with tinfoil)
- ✎ Telescoping pointer from a teaching supply store or tool supply
- ✎ Uninflated balloons
- ✎ A bag to fit all the above items into

BACKGROUND

Moving plants?

Plants don't have the ability to walk, fly, swim or crawl to new places like animals do, to escape danger, find food, or spread their offspring. However, they have evolved many rather amazing traits to protect themselves, grow, and reproduce.

Successfully invading species tend to have one or more of the following characteristics:

1. They reproduce quickly by producing many seeds.
2. Their seeds disperse far and quickly, by being airborne or adhering to fur or clothing (burrs).
3. Their seeds may remain viable for several years.

Dalmatian Toadflax
Linaria dalmatica

4. Seeds have high germination rates.
5. They grow quickly.
6. They are able to spread vegetatively (that is, through their roots or pieces of the plant).
7. They have deep roots (leafy spurge roots can reach 20 feet in length!).
8. They are not palatable to livestock and wildlife.
9. They are not susceptible to local diseases, parasites, herbivores, etc.
10. They are allelopathic – they give off chemicals that inhibit the germination or growth of other plants.

These are all admirable traits that make for successful plants, but they can cause problems for the other inhabitants of the new environment they invade, including humans. In this lesson, students can use a number of common items to demonstrate the traits that a weed they researched uses to help it survive and thrive in a new environment.

PROCEDURE

Students should be familiar with what weeds are and basic problems associated with them.

1. Begin the lesson by asking your students to imagine that:

You are seeds that have somehow been moved to a completely new area, where none of your kind live. Perhaps you've come from across the ocean on a ship or plane as a burr stuck on someone's clothing. Maybe you were in some hay or other animal feed. Or you were stuck in some mud in the tire of a vehicle that drove for thousands of miles before the mud was washed off by the rain.

You have left behind most or all of your natural enemies – animals, including insects, that like to eat you or the plants you grow into; a fungus that grows on you, making it hard for you to thrive; and any bacteria that infect you with disease. What's more, now you're in a spot where the plants that have grown here for thousands of years have been disturbed – some have been removed or harmed, leaving some bare ground. This could be a good chance to grow and have offspring – just what every plant wants! But there are still a lot of other plants in this new place. They want to live in the same soil as you do, take up the same space, use the same sunlight, and suck up the same water from the ground. What can you do to make sure you grow and flourish, and that your seeds are successful in creating new plants and increasing your population?

2. Have students brainstorm traits that might help plants invade a new area where the land has been disturbed, and make a list on the board.

3. Now have each small group of students pick a noxious weed in Montana and research its characteristics. They should make a list of the traits that help it succeed. You may want to continue the lesson another day at this point.

4. When students are finished with their plant research, explain that they are going to share their information about their plant with the rest of the class. However, instead of just telling about it, they are going to demonstrate what makes their plant successful. Explain that while plants can't move around like animals can, they have evolved other ways to help them escape danger and get the resources they need to survive and reproduce. Each species may have a "bag of tricks" to help them. Show them the bag of items from the Materials list and ask them to figure out ways to use those items, or any others they can find in the classroom, to demonstrate some traits that make their plant successful.

5. Give each group time to look through the items and brainstorm their demonstration. You might want to prompt or demonstrate some ideas for them. Possibilities include:

- 20' rope: root length in some species, such as thistle or spurge
- Spray bottle filled with water: allelopathic chemicals released to harm other plants
- Velcro® tabs: burrs
- Downy fluff: airborne seeds
- Jar of seeds: large number of seeds that can be produced by one plant of some species
- Prickly items: thorns to discourage herbivory
- Armor: tough plants, difficult to eat or kill
- Telescoping pointer/balloons: rapid growth

Student groups can take turns demonstrating a couple of their plants' traits to the rest of the class. At the end of these demonstrations, make a list on the board or discuss as a group the most common traits they found. Do many invasive species seem to have similar characteristics? Do some native plants have some of these same characteristics? Why aren't they considered noxious weeds? What keeps them from spreading and taking over like plants from other areas do? Can they think of other traits that might help plants outcompete other species?

Extensions

Have students research plants that are invasive in areas outside of Montana. Do these plants have some of the same traits? Are any of our native plants considered invasive elsewhere?