

Garden Food Chain Game

*A lesson from the New Jersey Agricultural Society
Learning Through Gardening program*

OVERVIEW: Your students should understand that their school garden is an ecosystem that contains many food chains. Instead of talking about those food chains, you can illustrate them easily with this fun food chain game. Students act as herbivores, carnivores, and omnivores as they try to survive by finding food over a large area. The game lends itself to many subsequent conversations about balanced and unbalanced ecosystems.

GRADES: 2-5

MATERIALS:

Popcorn, 3 large bags
6" x 6" squares of red, orange, and yellow felt
(for 24 students, you will need 16 red, 6 orange, and 2 yellow squares)

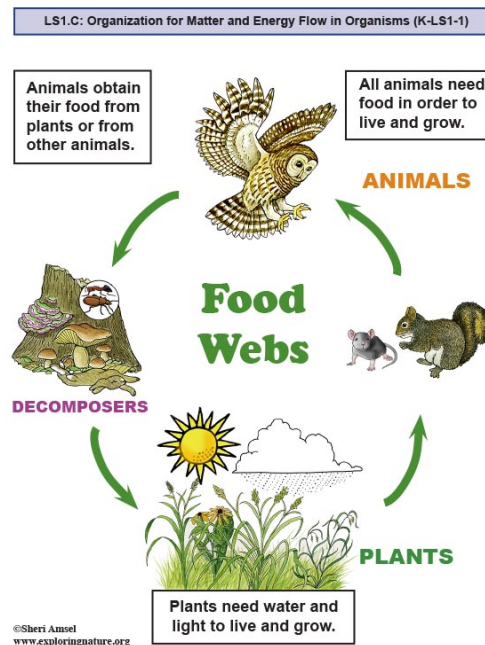
Safety pins (one per student)
Sandwich bags (one per student)
Permanent markers
Optional: 3 hula hoops

INTRODUCTION:

Ask students what all living things need to survive - food, water, air, and sunlight. Living things that live together in a certain area form an ecosystem. Your school garden is an ecosystem. Ask students for examples of things that live in or near their school garden. Explain that today you are going to look at how creatures in and around our garden get their food. Ask for examples. Ask how do plants get their food?

Every ecosystem has at least one food chain, which is the order in which living things depend on each other for food. Some ecosystems have more than one food chain, which form a food web. Almost all food chains start with plants, which are the only living things that can make their own food.

Producers: In a food chain, plants are called the *producers*, because they can produce their own food. Plants capture the light energy from the sun and with it they use water and carbon dioxide to make their food, which is a type of sugar. Plants are found at the bottom of every food chain, because all living things depend on plants for their food.



Primary Consumers: Some animals eat only plants. These animals are called *herbivores*. and they are at the next level of the food chain. Herbivores include animals such as rabbits, snails, grasshoppers, cows, and giraffes. On the food chain, they are called *primary consumers*. They depend on plants for their food.

Secondary Consumers: On the food chain, *secondary consumers* are animals that eat the *primary consumers*. They can be *carnivores* - animals that eat only meat, or *omnivores*, animals that eat both plants and meat. Examples of secondary consumers which are carnivores are spiders, snakes, and seals. Examples of secondary consumers which are omnivores are robins, racoons, skunks, and bears. Even animals that only eat other animals depend on plants for their food, because many of the animals they eat are herbivores, which feed only on plants.

Decomposers: Decomposers are also part of every food web. They are the organisms that eat dead animals and plants and recycle nutrients back into the soil. Decomposers such as worms, roly polies, milipedes and mushrooms are also food for other living things in the food web.

Ask students for examples of food chains in and around their school garden and make a chart of their suggestions. Some garden food chains could include:

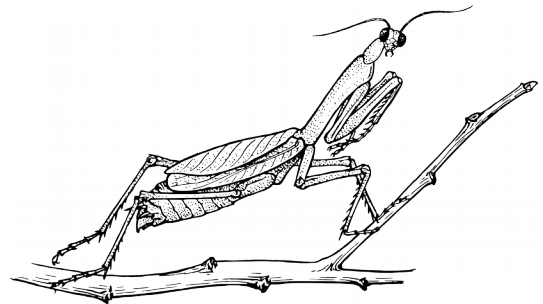
aphid - lady bug - dragon fly

stink bug - spider - robin

grasshopper - praying mantis - bat

beetle - mouse - blue jay

caterpillar - braconid wasp - wren



Tell students that they are going to play a game that will help them see how food chains work. Ask students to vote on the first food chain they will use for the game.

OPTIONAL: Read the book *Food Chains and the Food Web in Our Backyard, Secrets of the Garden*, by Kathleen Weidner Zoehfeld.

PROCEDURE:

PLAYING THE GARDEN FOOD CHAIN GAME

The game requires a large play area, so it must be played outside or in a large room such as a gym. For the sample game, we will use the chain of aphids - lady bugs - dragon flies.

The popcorn is spread over the entire area. Each piece of popcorn represents a plant. The students will be the primary consumers or one of two different types of secondary consumers. Most of the students will be primary consumers. For a class of 24 students, you will need 16 aphids (primary consumers), 6 ladybugs (the first secondary consumer), and 2 dragon flies (the second secondary consumer).

Briefly discuss why there are so many more primary consumers in an ecosystem than some types of secondary consumers. For example, aphids lay 2,500 eggs and green frogs lay 3,000 eggs, while a red-tailed hawk will only lay five eggs. An ecosystem needs more primary consumers and small secondary consumers because they are food for so many more animals.

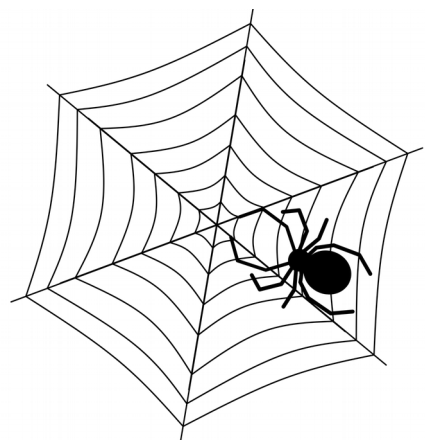
Put all of the felt squares with safety pins in a large bag or bowl and have students select one without looking. Students should pin their felt squares onto their shoulders.

Pass out the sandwich bags and ask students to mark the halfway point with a permanent marker. Tell students that the sandwich bag represents their animal's stomach and that they must fill their stomachs halfway to survive.

When the game starts, aphids must try to fill their "stomachs" halfway by picking up popcorn while they watch out for the ladybugs. If a ladybug tags an aphid, the aphid must empty the popcorn in its "stomach" into the ladybug's "stomach." Then the aphid must sit on the sidelines because it has been eaten. Ladybugs, in turn, must be on the lookout for the dragonflies who will try to tag them. If a ladybug is tagged, it must empty the contents of its "stomach" into the dragon fly's "stomach" and then sit on the sidelines.

Dragon flies can only eat lady bugs, which can only eat aphids, which can only eat popcorn (plants.) Any animal that is not eaten during the game but does not have its "stomach" halfway full at the end of the game, will also die - of starvation.

The teacher should time the game, perhaps starting out with five minutes. Allow students to change roles in each subsequent game and/or switch to a food chain of different animals.



OPTIONAL GAME MODIFICATION: If you would like to make the game fairer for your less athletic students, you can place three hula hoops at various points on the playing field. These hoops will represent hiding spaces in which animals can seek protection if they are about to be eaten. If a student jumps into a hula hoop, then the predator can no longer see its prey and must look for prey elsewhere. Tell students that the hiding spaces are only a temporary refuge. They must count to 10 and then leave the hoop. Since predators cannot see the hiding places, they cannot stand at the edge of the hula hoops waiting for prey to emerge. Only one student can hide in a hoop at a time.

EVALUATION:

Students write a paragraph or a few paragraphs about what they learned about food chains and food webs from playing the game.

EXTENSIONS:

Discuss why unlike in the game, animal species usually do not eat only one food and why animals that do eat only one food, such as pandas or koalas, are at a higher risk of extinction.

Ask students to research other insects that are either detrimental or beneficial for their garden and design some other garden food chains that they can use in their game.

Ask students to consider what happens when the food chain becomes unbalanced. Do you have to protect your garden from deer? In New Jersey, deer are part of a food chain that is now unbalanced, so that is a good place to start that conversation.

New Jersey Agricultural Society

Science: 2: LS4.D 3:LS4.B, C, D 4:LS1.A, D 5:LS1.C, LS2.A,B

English Language Arts: 2:W.2.2,4,8 3:W.3.2.A-D, W.3.4,8
4:W.4.2.A-E, W.4.4,8 5: W.5.2.A-E; W.5.4,8

