

**WORLD SCOUT ENVIRONMENT BADGE**  
PROGRAMME ACTIVITY RESOURCE



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## Food Chains and Chemicals

### Aim 3

The risk of harmful substances to people and the environment are minimised.

### Educational Objectives

Be aware of harmful substances in the local environment and identify their source. Demonstrate what personal action can be taken to reduce the risk of harmful substances to people and the broader environment.

### Age Range

11 to 14

### Summary

A run around game to show how agricultural chemicals build up within the food chain.

### Aim

To show how chemicals from agriculture are passed through ecological systems and why this is harmful to the environment.

### Equipment

Cards showing different items in a common food chain (for example, grass, rabbit, fox etc.). There should be many more cards for the items lower in the food chain and only one or two for the higher levels. Some type

of coloured tags (one per person at the bottom of the food chain).

### Preparation

Make up the food chain cards. Choose a food chain that would be affected by agricultural pesticides and if possible that is relevant to your local area. Some ideas are supplied in the resources section. The cards should be able to be worn by the Scout, for example, they could be pinned or stuck onto jumpers or worn around the neck on string.

### Duration

Thirty minutes

## Setting

Scout meeting place

## Background

Life on earth depends on the sun. The sun provides energy that plants use to grow and then also provide food for other organisms. One important way in which organisms depend on each other is for their food. Many animals feed only on plants (herbivores), lots of animals eat only other animals (carnivores) and some animals eat both plants and animals (omnivores). Despite these differences in diet, actually all animals depend on plants for their food through a relationship between plants and animals called a food chain.

Foxes eat rabbits, rabbits feed on grass. A hawk eats a lizard, the lizard eats a grasshopper and a grasshopper eats grass. In the ocean, fish eat small crustaceans (e.g., shrimps), who eat microscopic organisms called plankton. Plankton are very small organisms that live in the ocean and are classified as either 'phytoplankton' or 'zooplankton'. Phytoplankton use the energy from sunlight to create food via a process called 'photosynthesis'.

Example food chains:

Grass > Grasshopper > Lizard > Hawk

Phytoplankton > Zooplankton > Shrimp > Fish > Shark

Cactus > Insects > Lizard > Snake > Hawk

Trees > Insects > Monkey > Leopard

The organisms at the beginning of a food chain are usually very numerous while the animals at the end of the chain are often large and few in number. It is rare for high end predators to eat other high end predators. Food chains are normally more complicated than a simple chain as most animals eat more than one type of food. For example, a fox will eat rabbits, mice and beetles. In reality the food chain becomes a food web.

A food chain can be upset by human actions. This activity focuses on the impact of agricultural chemicals on food chains. Agricultural crops are commonly sprayed with chemicals called pesticides. These destroy insects, fungi and plants that might damage or compete with the crop.

Pesticides disrupt the food chain in two main ways. Firstly, by removing organisms from it. The majority of these pesticides kill the harmless or beneficial organisms as well as the harmful ones. If a plant or animal is removed from a food chain then the animals higher up the food chain will be affected.

Secondly, by introducing persistent, poisonous chemicals into the food chain. Some of these chemicals take a long time to break down. Once eaten, the chemical remains in the body of the animal and when that animal is eaten the chemical moves into the body of the next animal. The concentration of the chemical within each animal increases as it moves up the food chain. The chemical may be harmless to larger animals in low concentrations but as a result of being passed through the food chain its concentration might have increased sufficiently to cause disease or death.

## Step by step guide to activity

1. Introduce the subject of food chains. Ask the Scouts some questions to find out what they know about food chains. What food chains exist in the local natural environment? What food chains do they know about from other natural environments? Choose a variety of examples, such as, the ocean, a tropical rain forest, the desert.

2. Give each Scout several long pieces of string and a food chain card. They must wear the card so it is visible to the other Scouts. Explain the activity. They are going to create a food chain. The cards show all the different organisms within a food chain. They must look at the different plants and animals on the cards and think about what their creature would eat and what would eat them. When they find something that they eat they must connect themselves to that creature with a piece of string. They should lie the string on the floor. They will end up with a food chain which shows a clear progression from several plants at the base of the food chain to one top predator at the top but with some animals that are connected to more than one other creature. Ask the Scouts to explain their chain. Is it a food chain or a food web? This activity will actually produce a food web which is a more realistic picture of what really happens in nature.

3. The next activity is food chain tag. The aim of the game is to catch your prey. Start by letting the plants run around the room and get warmed up. Set the herbivores (plant eaters) off to catch the plants. When they catch a plant the herbivore receives one point and the plant must sit on the ground. After a few minutes let the carnivores (animal eaters) start to play. When they catch a herbivore they automatically take their points. The winner at the end of the game is the carnivore with the most points. This might seem unfair on the plants and the herbivores but the situation will be changed in the next game when chemicals are introduced into the food chain.

4. Repeat the game but this time hand out a coloured tag to all the players who represent the lowest rung in the food chain (the green plants). They have been sprayed with a pesticide and the coloured tag represents the chemical. When they are caught they have to hand over their tag and lie down. At the end of the game, ask each carnivore to count up the number of coloured tags they have collected.

### Evaluation

1. The coloured tags represent pesticides that have been sprayed onto the plants to ensure that the farmer's crops are successful. The farmer does not want diseases, insects or other plants to affect his crops. Discuss how the farmer's actions have affected the natural environment. Use the following questions to help your discussion.

Which animals have ended up with the most coloured tags?

If the tags are harmful chemicals then is having lots of them good or bad?

What might the chemicals do to the different animals?

How has the food chain system helped to increase the concentration of chemicals?

What properties of the chemicals have enabled this to happen?

2. Encourage the Scouts to think about why the pesticides were used and what alternatives to pesticides are available. Use the following questions to help your discussion.

Do you think the farmer would stop using pesticides if he knew about the damage they cause further up the food chain?

How could the farmer protect his crops from pests, disease and other plants without using harmful pesticides?

3. How aware are the Scouts of pesticides in their local environment? Use the following questions to help discuss this.

What crops are grown in your local environment, region, country?

Do you know if pesticides are used locally, regionally, nationally?

Has anyone heard of any local problems from pesticide use?

Do you think problems from pesticides are well publicised?

How could human beings be affected by pesticides?

What can individuals do to reduce the risk of pesticides to the environment?

### Further activities

1. Explore how food is grown locally. Can you find examples of organically grown foods? Are there places growing food with chemicals? Which ones are used and why? Find out about alternatives to pesticides.

2. Find out which animals in your local area are top end predators. Do you think they may be affected by chemicals in the landscape?

3. Grow some of your own food using organic methods.

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