SCIENCE NORTH SCIENCE NORD
SUDBURY, ONTARIO, CANADA

A Cup of Tea **Grade 7 - Interactions in the Environment**

Post Activity

Assessment: Discussion
Cross-curricular: History

Big Ideas
50 minutes

Ecosystems are made up of biotic (living) and abiotic (non-living) elements, which depend on each other to survive.

Specific Expectations
Demonstrate an understanding of an ecosystem as a system of interactions between living organism and the environment (3.1)

Identify biotic and abiotic elements in an ecosystem, and describe the interactions between them (3.2)

Describe the roles and interactions of producers, consumers, and decomposers within an ecosystem (3.3)

Describe how matter is cycled within the environment and explain how it promotes sustainability (3.5)

Use appropriate science and technology vocabulary, including sustainability, biotic, ecosystem, community, population, and producer, in oral and written communication (2.4).

Description
In this activity, students will make tea and learn about tannins. Students will make a poster outlining the important function of tannins.

Materials
Black tea or local plants for tea (like pineapple weed)
Cups, water, kettle or hot plate and pot
Optional: sugar, honey or maple syrup, dark chocolate and milk chocolate

Safety Notes
Ask your students and their parents about possible allergic reactions. If you are collecting wild plants to make tea, make sure that you have properly identified the plant. If you are uncertain, use black tea.

Introduction

1. Review food webs and discuss producers, consumers and decomposers in terms of food webs.
2. Ask students how they think different organisms in the food web protect themselves. Do plants protect themselves?
3. Have students brainstorm ways that plants might protect themselves from being eaten and discuss the ideas.
    - There are two types of plant defense: mechanical (like spines on a cactus) or chemical (like toxins). The type of chemical defense we are going to talk about is the ability of plants to produce chemicals that have a bitter or foul taste to dissuade animals from eating them, which ensures their survival.
4. Tannins are a type of compound that make plants taste bitter. Ask the students if they can think of some foods that are bitter.
    - Some foods might be coffee, dark chocolate and tea. All of these foods contain tannins.
    - Unripe fruit is also bitter because of tannins - this ensures the fruit is not eaten until the seeds are mature.
    - Animals do not like eating things that are bitter but humans do, often with the help of some sugar!
    - The students might notice that many of these foods are brown in colour. Naturally occurring tannins produce the colour brown – resulting in the plant being that colour. Some lakes and rivers look brown and this from tannins that have leeched into the water from trees and stained the water.
5. Tannins also play a role in nutrient cycling in soil. Instead of nitrogen cycling between the air (abiotic) and the soil and plants (biotic), tannins keep nitrogen in the soil and in a form that plants can use.
6. Have students guess how tannins have been used in industry. They should be able to make the connection between tannin and tanning.
    - Tannins attach to proteins in a prepared hide to make the skin more waterproof, resistant to decomposition from bacteria and fungi, and more flexible.

Action

Brew the tea while discussing tannins with students.

Pineapple Weed or Raspberry Leaf Tea

Note: When harvesting the pineapple weed, be sure to collect it from an area that is far from human disturbance (where there hasn't been a lot of foot traffic). Collect the entire plant, but not the roots.

Note: When collecting raspberry leaves, ensure you only collect the leaves and not the stalk. The stalk of a raspberry plant is covered in thorns, so ensure you are wearing gloves when collecting. Choose young leaves from the top of the stalk and try to find plants that you know have been untreated i.e. not growing along a hydro corridor where herbicides may have been sprayed.

Boil water in a kettle or pot.

Place a handful of raspberry leaves or pineapple weeds into the pot or teapot. Let steep for 4-5 minutes.

Discard this first brewing because it will contain a lot of tannins and other compounds. Save the leaves and just discard the water.
Add more water and steep again for another 3-4 minutes.
Serve with some maple syrup or other sweetener.

Labrador Tea or Cedar Tea
Follow the same instructions as above to make Labrador Tea or Cedar Tea. Be especially cautious when preparing cedar tea. Put the cedar through 2-3 washes before serving to students to ensure that the tannins and terpenes have been removed.

Black Tea (from tea bags)
Boil water in kettle or pot.
Take water off the heat. Add tea bags, about 1 tea bag per cup of water.
Steep tea for 3 minutes.
Serve with honey.

Consolidation/Extension

Along with containing tannins and terpenes, these naturally occurring teas are high in vitamin C. When Europeans first came to North America, many of them suffered from scurvy. The Indigenous people showed them how to make these teas, which resulted in the cure for scurvy. Scurvy is caused by vitamin C deficiency and results in muscle weakness and soreness, bleeding, poor wound healing, personality changes and sometimes death.

If there is cedar or Labrador tea (or raspberry and pineapple weed) growing near the school, take the students out to collect their own leaves. Make sure they are collecting the right plant and not taking too many leaves from a single plant. Students could experiment with the taste of teas made from new or old leaves and find a way to tell which is which on the plant. If the students do this extension, make sure that they do not drink too much tea. Give the students a small cup of tea or spread the experiment over several days.

If using black tea, leave some tea at the bottom of the pot to oversteep and release more tannin. Get students to take a small taste and discuss how the flavour is different.