Lesson Plan: Compost, Grades 1 and 3 Science and Technology

Activity

Using compost to grow plants from seeds.

Introduction

Composting is a great way to divert organic waste (anything that is used to grow or was once alive that we no longer need or want) away from the garbage while providing an opportunity to improve local soil conditions. Soil is a natural resource that is incredibly valuable to our daily lives. Most of the food we depend on can be linked directly back to soil. Because of this, soil health is an important factor to our food chain. Healthy soil leads to healthy plants, and healthy plants lead to healthy people and animals. Compost is rich in nutrients, which plants need to germinate, grow, fight off disease and pests, and to reproduce. Compost also helps soil retain water and reduces the need for chemical fertilizers. Composting is a great circular approach to managing our organic waste while improving overall soil conditions. In this lesson, students will explore the benefits of composting by planting green beans and documenting their observations over a four-week period.

Curriculum Connections

Science and Technology, 2022 (revised)

Grade 1

- Strand A: STEM Skills and Connections
- Strand B: Life Systems, Needs and Characteristics of Living Things
- Strand D: Structures and Mechanisms

Grade 3

- Strand A: STEM Skills and Connections
- Strand B: Life Systems, Growth and Changes in Plants
- Strand E: Earth and Space Systems, Soils in the Environment

Learning Objectives

1. Make connections between soil, plants, and the food we eat
2. Describe organic waste, composting, and finished compost
3. Describe ways in which humans can improve the quality of soils and/or lessen or prevent harmful effects on soil
4. Identify personal actions that they can take to minimize organic waste and enhance soil conditions
5. Describe the basic needs of plants, including the need for air, water, light, heat, nutrients, and space, and identify environmental conditions that may threaten plant survival

The Regional Municipality of Durham - Waste Management Services
If this document is required in an accessible format, please contact schoolprograms@durham.ca

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Resources Provided

- Module: Compost

Materials Required

- One small container to plant beans for each student
- Tray(s)
- Two green beans for each student
- Reusable spoons
- Bag of topsoil
- Bag of compost
- Watering can
- Marker(s)

Activity Instructions

Students will plant green beans and document their observations over a four week period.

Prior to Activity

1. Have students bring in a small container from home with two or three small holes punched into the bottom to allow for water drainage. Encourage students to practice the third “R” in the waste hierarchy (Reuse) by reusing items from their blue box.

   Reuse means using an item as many times as possible, either for their original purpose or for something new. By using containers that would have been put into the blue box, we are extending the lifespan of these items and we are avoiding buying a brand-new container. Once we are finished growing our seeds, we can rinse the containers out and use them again, or they can be placed in the Blue Box program to be recycled into something new!

2. Have each student put their name or initials on their container.

Day of Activity

1. Divide the class into small groups. Each student should have their own container with them.
2. Introduce the term organic waste.

   Organic waste is anything that use to grow, or was once alive, that we no longer need or want.

   Can your students think of any examples of organic waste? Examples include banana peels, leaves, flowers, watermelon rides, apple cores, bones, and dirty paper items like tissues, greasy pizza boxes, and paper plates to name a few. Organic waste even includes items like fingernails, pet fur, and hair!

   Questions to consider with the class:

   - Can you think of ways that we can decrease our food waste?
   - When we do have food scraps left over (like banana peels and apple cores), where should we put these materials at home?

- What should we do with food scraps from our lunches at school?
- Why do you think it's important that we manage our organic waste?

3. Introduce composting to the class.

   Composting is the process of turning organic material, such as garden and food scraps, into a dirt-like material called **humus**. This process works with the help of bugs, insects, and microorganisms (a microscopic organism such as bacteria and fungi), combined with air and moisture.

   Composting happens naturally in nature such as forest floors and grasslands, but we also manage the processes as part of waste management to help it go faster and ensure a high-quality product is produced.

   Composting completes a full cycle putting waste back into use to grow fruits, vegetables as well as grains and grasses that feed livestock. Compost contains nutrients that help to improve soil conditions.

4. Introduce the Green Bin and Leaf and Yard Waste programs.

   With the Region's curbside **Green Bin and Yard Waste collection programs**, organic materials can be diverted from your household garbage. Items like food scrapes and dirty paper products can be placed in your green bin for collection at the curb. Yard waste like leaves, tree trimmings, and other plant materials can be placed in paper yard waste bags or clearly labelled, returnable open-top containers (with drainage holes in the bottom) for curbside collection.

5. Provide each group with a container of finished compost and a container of topsoil. Explore why soil is important and ask the students what they think happens to plants if they are grown in soil with poor quality.

   Soil is a home for living organisms and it provides nutrients and stability for plants to grow. People and animals depend on plants grown in the soil. Can you name some things that come from soil? (Examples include food, clothing, wood products like lumber, and bricks). Poor soil quality affects the ability for plants to take up the nutrients they need and the quality of the nutrients that are passed from plants to humans.

6. As a class, make observations about the compost material.

   a. What colour is the compost?
   b. Can you see any recognizable food or plant material in the compost?
   c. What does the compost smell like?
   d. What does the compost feel like?
   e. Do you notice any differences between the soil and the compost?

7. Provide each group with enough beans to ensure each student has two beans and several reusable spoons for scooping the compost/soil into their containers.

8. Each student will mix three parts of soil to one part of compost and soil together into their marked containers.

   We mix compost with soil because compost alone is too loose and soft to support plant roots and water will drain out of it too quickly.

9. Students will plant two green beans in their container. The beans should be planted about one-inch deep and one-inch apart. This is a good opportunity to introduce the idea that plants need space.

   Plants needs space to grow. Roots need space so they can spread out and absorb water and nutrients. The plant above ground needs space to access light. Plants that are too close together will compete for the same sunlight, water, and soil nutrients. This can result in weaker plants that produce less leaves, flowers, cones/fruits, and seeds compared to plants that have lots of light, air, and soil around them.

10. Once planted, students will add a small amount of water to their containers to dampen the soil. This is a good opportunity to introduce the idea that plants need water, but too much water can also be harmful.

    Plants need water to grow. Not enough water can cause plants to wilt or droop and too much water which can cause a plant's roots to rot.

11. Students will place their container on the tray(s) for observation. The potted seeds should all be kept in the same conditions (temperature, light, and watering). Students will document their observations over the next three weeks.

Next Three Weeks

1. Students will water their plants regularly to ensure even moisture for the first two weeks. After, the plants can be watered whenever the topsoil feels dry. The beans should sprout within five to eight days.

2. Each student will record their observations over the duration of the activity including:

   - Date
   - Number of beans sprouted
   - Height of growth
   - Other general observations

End of Activity

1. Encourage students to take their plants home to plant in their own gardens. This is a great opportunity to introduce the benefits of growing food locally. This includes avoiding additional transportation and food packaging requirements that create waste that needs to be managed.

2. Once they begin producing beans, students can enjoy harvesting and eating them at home!

Summary

Composting is a great way to divert organic waste away from the garbage. Using finished compost on lawns and in gardens returns important nutrients back to the soil and improves overall soil conditions.

Compost can be used to grow new plants and food - this is a great circular approach to managing our organic waste.

Expanded Curriculum Connections

Grade 1, Science and Technology, 2022 (revised)

A: STEM Skills and Connections

A1. STEM Investigation and Communication Skills

- A1.1 use a scientific research process and associated skills to conduct investigations
- A1.2 use a scientific experimentation process and associated skills to conduct investigations
- A1.3 use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems
- A1.4 follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials
- A1.5 communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes

B: Life Systems, Needs and Characteristics of Living Things

B1. Relating Science and Technology to Our Changing World

- B1.1 describe changes or problems that could result from the loss of living and non-living things that are part of everyday life, while taking different perspectives into consideration
- B1.2 identify actions that can be taken to contribute to a healthy environment

B2. Exploring and Understanding Concepts, Needs of Living Things

- B2.1 demonstrate an understanding of the natural environment as a place where living and non-living things are interconnected
- B2.2 identify the basic needs of living things, including the need for air, water, food, heat, shelter, and space
- B2.3 identify the physical characteristics of various plants and animals, including humans, and explain how these characteristics help the plants and animals meet their basic needs
- B2.5 describe the characteristics of a healthy environment, including clean air and water and nutritious food, and how a healthy environment enables living things to meet their needs
- B2.6 describe ways in which living things provide for the needs of other living things

D. Structures and Mechanisms

D1. Relating Science and Technology to Our Changing World, Everyday Materials, Objects, and Structures

- D1.1 identify the kinds of waste materials produced by humans, and plan and carry out a course of action for minimizing waste in the classroom or at home, explaining why each action is important
- D1.2 assess everyday objects, including structures, that have similar purposes, in terms of the materials they are made from, the source of these materials, and what happens to these objects when they are worn out or no longer needed

Grade 3, Science and Technology, 2022 (revised)

A: STEM Skills and Connections

A1. STEM Investigation and Communication Skills

- A1.1 use a scientific research process and associated skills to conduct investigations
- A1.2 use a scientific experimentation process and associated skills to conduct investigations
- A1.3 use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems
- A1.4 follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials
- A1.5 communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes

B: Life Systems, Growth and Changes in Plants

B1. Relating Science and Technology to Our Changing World

- B1.1 assess ways in which plants are important to humans and other living things, taking different perspectives into consideration, and identify ways in which humans can protect native plant species and their habitats
- B1.2 assess ways in which human activities have an impact on plants and plant habitats, and identify personal actions that they could take to minimize harmful effects and enhance positive ones
- B1.3 assess the benefits and limitations of locally grown food

B2. Exploring and Understanding Concepts, Growth and Changes in Plants

- B2.1 describe the basic needs of plants, including the need for air, water, light, heat, nutrients, and space, and identify environmental conditions that may threaten plant survival
- B2.2 identify different parts of plants, including the root, stem, flower, stamen, pistil, leaf, seed, cone, and fruit, and describe how each part contributes to plants' survival within their environment
- B2.3 describe changes that different plants undergo in their life cycles
- B2.4 describe ways in which a variety of plants adapt and/or react to their environment and to changes in their environment

E. Earth and Space Systems, Soils in the Environment

E1. Relating Science and Technology to Our Changing World

- E1.1 assess the importance of soils for society and the environment
- E1.2 assess the impact of human activity on soils, and describe ways in which humans can improve the quality of soils and/or lessen or prevent harmful effects on soils