GARDENS THAT POP

A 6-8 STEM EXPERIENCE

Created by C.I.T STEM Curriculum Team

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About this Experience

Gardens that Pop! integrates environmental science, art, literacy, and social emotional learning in a comprehensive study of our indelible connection to one another through our connection to and dependence upon plants.

Students will learn about the anatomy of seeds, the life cycle of plants, and how plants communicate. They will have the opportunity to create their own Lego planter to grow mint, which they can take home and share with their families. They will also plant their homemade wildflower seed bombs to add to the biodiversity and to beautify their community. All observations and reflections will be recorded in personalized Science Journals, which students can use to document their learning and growth throughout the program.

The Experience will culminate with a field trip to learn about composting, extending student learning and providing inspiration for future garden projects. By participating in Gardens that Pop!, students will develop essential skills, knowledge, and attitudes related to environmental awareness, plant care, and community engagement.

Note to Activity Specialist

NY Edge is thrilled to have you leading this experience! You will lead students on a journey of discovery, exploring the far-reaching impact of plants around the world.

During this program, students will dive into a variety of plant-related topics, including climate change in urban areas, carbon footprint, and how plants communicate along the wood wide web. Students will discover that although plants may appear passive and quiet, they actively communicate with one another and with other species. Scientific studies have revealed that they are also quite sensitive to negativity, just like us!

To ensure a smooth experience, please be sure to read all lessons in advance, so you have adequate time to prepare and organize all necessary materials. You will need a laptop or iPad with internet access to display videos and Google slides that are linked in the lessons.

The Essential Question will serve as the guiding theme for the program, and the Enduring Understanding will summarize the core concepts that students will explore throughout each lesson. These tools will help you tailor your instruction to meet the learning objectives and outcomes of the program.
We hope you and the students will enjoy exploring the power of plants through this exciting program. Thank you for your commitment to helping students grow their knowledge and appreciation of the natural world.

Family Letter

Greetings NY Edge Families!

We are thrilled to embark on an exploration of our deep connection to and reliance on plants. Through hands-on explorations, students will delve into the fascinating world of plants, from planting mint seeds to creating wildflower seed bombs that beautify their community and support vital pollinators such as bees and butterflies.

Students will plant in seed personal seed starter trays that act like a miniature greenhouse after learning about greenhouses from around the world. All observations, thoughts, and questions will be recorded in students' personalized science journals.

Plants connect us to one another. They are crucial for our survival. All of our food comes from plants directly, or from animals that eat plants. Plants provide nutrition, medicine, clothing, shelter, fuel, and purify the air we breathe. They also beautify our communities. Plants are also communicators. If we slow down and start listening with greater intention, perhaps we will understand them, ourselves, and the world a little better.

Here are questions to help start conversations at home around plants and climate change:

- How do changes in climate affect the growth and development of plants? How can plants contribute to addressing the effects of climate change?
- In addition to food, what other benefits do plants provide that are essential to our survival?
- What does the term "carbon footprint" mean? Why is it important to be aware of our own carbon footprint?
- What are some practical steps that individuals and communities can take to decrease their carbon footprint and help address climate change?

Here are some recommended resources about plants that you might find informative and engaging:

- Cucumber Mint Salad with Lemon Mint Dressing
https://www.youtube.com/watch?v=kl1UdLNNVPo
- Composting Service on Wheels Appears in New York City
https://www.youtube.com/watch?v=EIKGmKZ9Qao

- Make Compost with a Sandwich Bag
https://www.youtube.com/watch?v=QA7GzLYjk64
- What is a Carbon Footprint? What Can You Do About Yours?
https://www.youtube.com/watch?v=YseZXKfT_yY

- NASA Climate Kids
https://climatekids.nasa.gov/menu/big-questions/
- Plants Use an Internet Made of Fungus
https://ed.ted.com/best_of_web/4uORORJx
- Find a Community Park Near You (NYC Parks Dept.)
https://www.nycgovparks.org/greenthumb

We can't wait to get started on what is sure to be an enriching experience. Please do not hesitate to reach out with any questions or concerns. Email: STEM@NewYorkEdge.org

Warmly,
The NY Edge STEAM Team

Materials

Experience Slide Deck

Laptop or iPad to share videos and Google slides
Science journal (one per student)
NYC stickers (1 package per class)
Plant stickers (1 package per class)
Large chart paper
3 different colored packs of post-Its
Lego
Mint Seeds (3 seeds per student)
4" square plastic nursery pot (one per student)
Soil
Compostable plastic spoons (one per student)
Water
Spray bottles
White paper (one piece per student)
Pencils (one per student)
Colored pencils/markers

Color printout of **Slides 2-5**

Seed Bomb Materials: (source)
Wildflower seed mix
Air-dry clay (water-based)
Rolling pins (one per student)
Large heart metal cookie cutter (one per student)
Wax paper (one roll per class
3 large cookie sheets (per class)
3 water sprayers filled with water

Seedling Greenhouse:

Seed starting trays (1 tray per student)
(If the above seed starting trays are no longer on sale, another option is these seed starting trays)
Arugula microgreen seeds (9 seeds per student)
Basil seeds (9seeds per student)
Parsley seeds (9 seeds per student)
Sage seeds (9 seeds per student)
Compost (1 bag per class)
Coir (most likely enough for all participating classes; can be easily divided

Perlite (definitely enough for all participating classes; can be easily divided up)
5 Large bins to separate and later mix compost, coir, perlite
Spray bottles (3 per class)
Wide popsicle sticks (4 per student)
Thin permanent markers (1 package per class)
Compostable plastic spoons (1 spoon for each student)

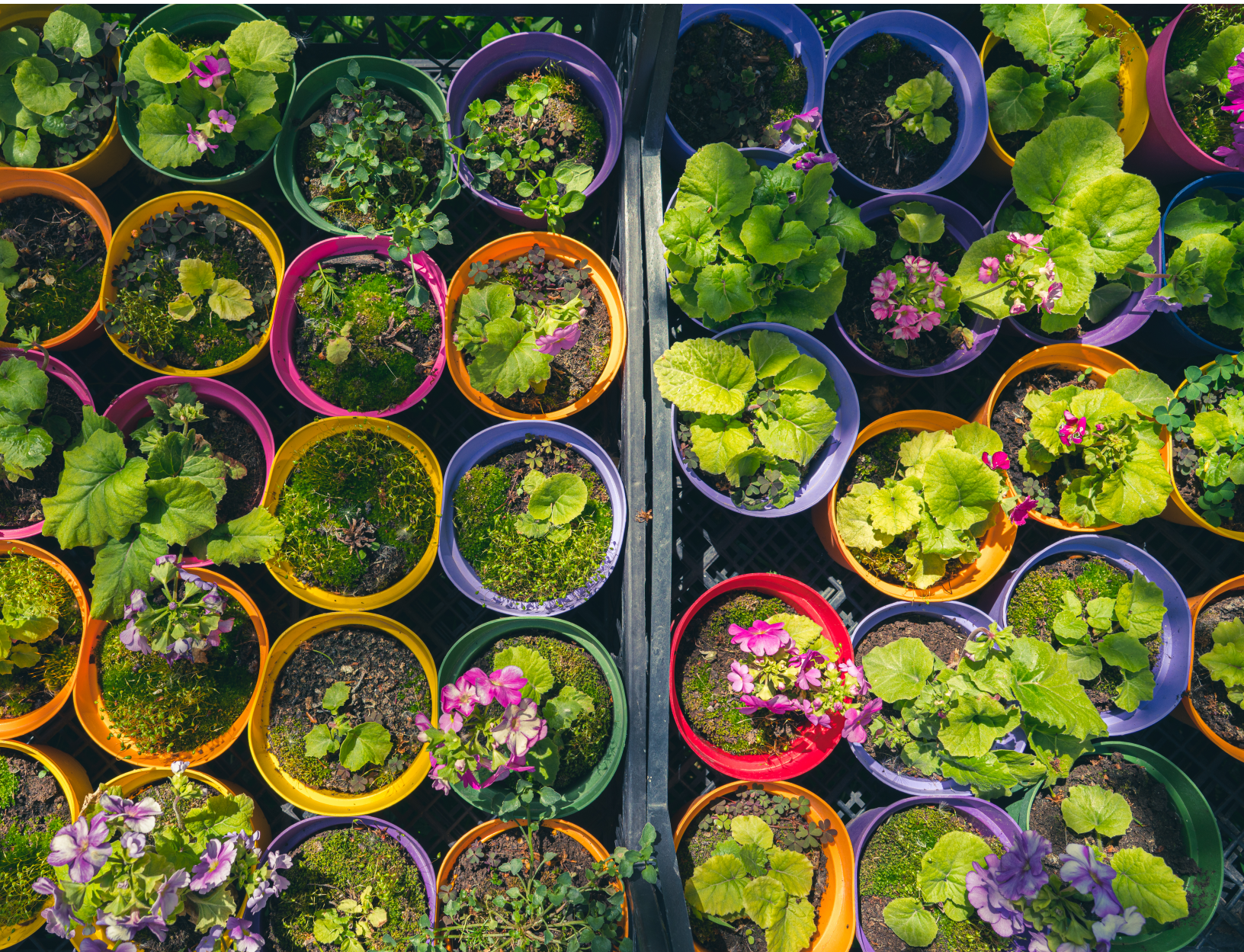
Compost Tea Bags:
Compost (leftover from planting in seed trays)
Drawstring mesh tea bags (2 per student)
Compost tea bag steeping and dilution instructions (one handout per student)
Sprayers (one for each student to take home)

Essential Question: How do plants connect all life on Earth?

Enduring Understanding: Plants are a fundamental component of the ecosystem, connecting all life on Earth. As primary producers, plants are the foundation of many food webs, making food that all living things depend upon. Plants help balance the Earth's climate by removing carbon dioxide from the air and releasing oxygen. Plants provide shelter, medicine, building materials, and fuel.

Overview of Lessons:

Week 1 Topic: Exploring the Power of Plants
Week 2 Topic: Decoding the Language of Plants
Week 3 Topic: Crafting Nature's Beauty with Botanical-Themed Pop-Up Cards
Week 4 Topic: Seed Bombing for a Greener Future
Week 5 Topic: Exploring Sustainable Practices through Composting & DIY Greenhouses Week 6: Field Trip - Exploring the Benefits and Techniques of Composting



Vocabulary

- Adaptation: a characteristic (i.e., a physical trait or behavior) of a living thing that helps it survive in its environment; also, a natural process by which a living thing becomes suited to its surroundings
- Adhesion: the process in which different particles stick together
- Aerobic: in the presence of oxygen
- Anaerobic: without oxygen
- Biodiversity: the rich variety of life on Earth
- Capillary action: when liquid flows in a narrow space (or within the spaces of a porous material) against the force of gravity due to the forces of adhesion, cohesion, and surface tension
- Carbon cycle: process in which carbon atoms continually travel from the atmosphere to the Earth and then back into the atmosphere
- Carbon footprint: total amount of greenhouse gases (including carbon dioxide and methane) an individual/organization releases into the environment through theier actions
- Climate change: refers to long-term shifts in temperatures and weather patterns; Since the 1800s (Industrial Revolution), these shifts have primarily been driven by human behavior and activities, but also do naturally occur
- Cohesion: particles of the same substance sticking together
- Coir: a stiff coarse fiber from the outer husk of a coconut
- Composting: the natural process that occurs when organic matter breaks down into a granular material; compost is rich in nutrients and is great for organic fertilizer
- Decomposer: an organism that breaks down dead, organic material (i.e., bacteria, fungi, worms, insects)
- Decomposition: to break up into its smaller parts; decay, rot
- Dispersal: the act of spreading something over a large area
- Food web: consists of all the interconnected food chains in an ecosystem; includes producers, consumers, and decomposers
- Germination: the sprouting of a seed (or spore), usually after a dormant period
- Greenhouse: an enclosed structure (made of glass or clear plastic) used for the cultivation or protection of plants
- Greenhouse effect: the way in which heat is trapped close to the Earth's surface by greenhouse gases (i.e., carbon dioxide, which makes up the vast majority, methane, and nitrous oxide); greenhouse gases are released during the combustion of fossil fuels (i.e., coal, oil, natural gas)

Vocabulary

- Hydroponics: method of growing plants in nutrient solutions without soil
- Landfill: a system of trash disposal in which the garbage is buried
- Leaves: part of a plant attached to a stem; helps plants collect sunlight to make their food through a process called photosynthesis
- Life cycle: the series of changes in the life of an organism (includes reproduction)
- Microgreens: the shoots of salad vegetables (i.e., arugula, Swiss chard, mustard, beetroot, etc.) picked just after the first leaves have developed
- Microorganism: an organism that can only be seen with a microscope
- Mycorrhiza (plural: mycorrhizae): the symbiotic association between plant roots and fungi; their primary role; permits the plant to get additional moisture and nutrients
- Native: born or raised in a particular place; a local resident (indigenous)
- Network: interconnected system
- Nitrogen: a colorless, odorless, tasteless gas that makes up most of the Earth's atmosphere and is needed for organisms to survive
- Nutrients: molecules in food (i.e., proteins, fats, carbohydrates, vitamins, minerals) that all organisms need to make energy, grow, develop, and reproduce
- Organic material: matter that comes from the remains of recently living organisms such as plants and animals, and their waste products in the environment
- Oxygen: a colorless, odorless, tasteless gas needed for plant and animal life
- Photosynthesis: the process in which green plants use sunlight to make their own food; necessary for life on Earth; without it there would be no green plants; without green plants there would be no animals
- Phytochemical: a chemical compound that naturally occurs in plants
- Pollinator: an insect or animal that transfers pollen from one plant to another to help it reproduce
- Ratio: a comparison of two or more numbers (of the same unit) that indicates their sizes in relation to each other
- Receptor: a cell, or group of cells that receive stimuli (i.e., anything that triggers a physical or behavioral change); sense organ
- Redlining: a discriminatory practice that originated in the U.S. in the early 20th century first practiced by the federal government and later private lenders and insurers; involved denying or limiting financial services such as mortgages, loans, and insurance to people living in certain neighborhoods based on their race, ethnicity, or socioeconomic status; the term "redlining" refers to the practice of drawing a red line on a map to designate neighborhoods that are considered high-risk for lending or insurance purposes

Vocabulary

- Reproduce: the process by which plants and animals produce offspring
- Restoration: to renew; to return to its original form or condition
- Seed coat: hard outside shell of the seed; the seed coat protects the embryo
- Seedling: a very young baby plant
- Sprout: a small growth on a plant; a new growth from a germinating seed; once the shoot reaches the surface, it becomes a sprout
- Stable: steady, well-balanced
- Stewardship: the protection, supervising, and careful management of something (e.g., stewardship of natural resources)
- Storyboard: series of sequenced illustrations that map out the important events in a story (Not all producers are plants, and not all plants are producers. Some parasitic plants use a host plant to get their energy, which makes them consumers. Other producers include: lichens, moss, bacteria, and algae.)
- Subterranean: underground
- Superorganism: a group of organisms (usually of the same species) that function as one organism, like a colony of ants, bees, or termites; some scientists make a distinction between complex interactions and interdependence between/among species (rather than among members of the same species) as a holobiont (i.e., plant species and the members of its microbiome)
- Symbiosis: relationship or interaction between two dissimilar organisms; the specific type of symbiosis depends on whether either or both organisms benefit from the relationship
- Wood wide web: the concept of the subterranean interconnections among plants (i.e., sharing food, water, and information) has evoked comparisons with the internet; made up of a complex underground interconnected web of roots, fungi, and bacteria nearly 500 million years old

Week 1: Exploring the Power of Plants

Essential Question: How do plants connect all life on earth?

Learning Objectives:

- Students will make connections between climate change and urban areas.
- Students will cite at least three ways to reduce their carbon footprint.
- Students will construct a unique Lego planter for cultivating their mint plant in a visually appealing way.
- Students will customize their science journal to record their observations and inquiries.

Materials:

- Experience Slide Deck
  - Internet access
- Laptop/iPad to show video
- Pencils (one per student)
- Lego compatible 5" X 5" base plates (one base plate per student)
- Lego (assorted bricks)
- Buckets (one bucket of filled with Lego for each group of 4 students)
- Mint seeds (3 seeds per student)
- Potting soil
- Compostable plastic spoons (one per student)
- 4" square plastic nursery pot (one per student)
- Water
- Spray bottles (3 per class)
- Science Journals
- NYC stickers (1 package per class)
- Plant stickers (1 package per class)
- Markers (one package for every two students)

Vocabulary:

- Carbon cycle
- Carbon footprint
- Methane

Instruction Description

Hook

Show students this 2-minute video: *The Carbon Footprint*

Ask:

- **What are some ways you contribute to the carbon footprint?**
- **What are some ways that you could reduce your carbon footprint?**

A: Some possible answers could include:

- Follow the 3 Rs: Reduce, Reuse, Recycle
- Walk, ride a bike, or use mass transit rather than take a car
- Carpool when using a car
- Reduce the electricity you use (e.g., turn off the lights when you leave a room)
- Eat less meat
- Lower your thermostat in the winter and raise it in the summer
- Use a low-flow showerhead
- When possible, eat locally grown, in season produce
- Compost compostable food scraps
- Use reusable lunch bags, utensils, straws, etc.
- Use energy efficient light bulbs
- Donate old clothes and shoes
- Purchase only what you need (i.e., don't over consume)
- Buy products and services from companies that are environmentally responsible and sustainable

Teach/Demonstration

Teacher Note: Show students the first the Google slide: *Global Carbon Footprint*

Africa contributes less than 3% of the world's energy-related carbon dioxide emissions, yet is greatly impacted by water and food scarcity, heat waves, sea level rise along the coastlines resulting in coastal flooding and erosion, and extreme weather events due to climate change. The African continent is particularly vulnerable to climate change in part due to high rates of poverty, technological constraints, and its reliance on rain-fed agriculture. Research indicates

that as the planet warms, soil in areas near the equator will dry up, reducing its resilience to swings in temperature.

Ask: How do our actions impact others around the world?

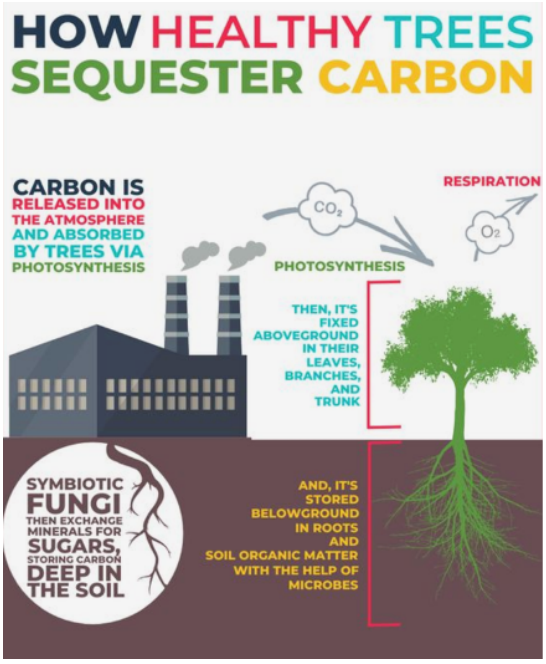
Teacher Note: Show students Slides 2 & 3

Gases that trap heat in the atmosphere are called greenhouse gases. The four main greenhouse gases are: carbon dioxide, methane, nitrous oxide, and fluorinated gases. Today we will focus on carbon dioxide since it is the primary greenhouse gas emitted through human activity.

Although carbon dioxide is naturally present in the Earth's atmosphere, circulating among the atmosphere, oceans, soil, plants, and animals. Since the industrial revolution, human activity has added more carbon dioxide to the atmosphere, which has thrown off the balance.
It enters the atmosphere mainly through burning of fossil fuels: coal, natural gas, and oil. We burn fossil fuels for transportation, heating, generating electricity, and creating products (e.g., computers, cosmetics, paint, household appliances.) Plants absorb and remove carbon dioxide from the atmosphere.

Teacher Note: Show students the 3-minute video: The Carbon Cycle

This image may help you explain to students the role of trees and plants in the carbon cycle.



(image source)

Ask: What is the connection between climate change and cities?

Cities are responsible for more than two-thirds of global greenhouse gas emissions, leading to climate change. Urban life is and will continue to be greatly impacted by climate change. Rising global temperatures cause sea levels to rise and increase the number of extreme weather events, such as floods, droughts, and storms. This has many negative impacts on city infrastructure (e.g., flooding of subways) and the lives of humans, plants, and animals.

Ask: Why are plants important in urban areas?

Plants are an important part of urban ecosystems. Aside from beautifying the city, plants lower the surface and air temperature by providing shade and through transpiration. By releasing water into the air through their leaves, plants not only cool themselves, but also cool the surrounding environment. Tree leaves also absorb light energy, which reduces reflected heat. This means less need for air conditioning! Plants can also improve air quality by absorbing pollutants.

<u>Optional Extension Question, Grade 8:</u>

Ask: How can restoring our forests and planting trees help reduce global climate change?

The global tree restoration project (published in the journal *Science,* 2019) found that there is enough suitable land to increase the world's forest cover by one-third, without affecting existing cities or agriculture. However, this land is quickly shrinking as global temperatures continue to rise. The study states that forest restoration is today's best climate change solution. The study indicates that if we act now, we could cut the levels of carbon dioxide in the atmosphere by up to 25 percent, which would be the lowest levels of carbon dioxide in almost a century. But new forests take decades to grow and it could take more than 100 years to add enough mature forest to achieve sufficient levels of carbon reduction. Of course, we would still need to protect existing forests and work towards drastically reducing the use of fossil fuels.

Every year, 40 billion tons of carbon dioxide from burning fossil fuels are being added to the atmosphere.

Trees not only capture carbon dioxide from the air during photosynthesis and release oxygen, they also help the soil capture carbon.

With the help of Google Earth Engine mapping software, scientists found that six countries have more than half the potential to restore trees: Russia, USA, Canada, Australia, Brazil, and China. The top forest restoration hotspots are all in Africa: Rwanda, Uganda, Burundi, Togo, South Sudan, and Madagascar.

...

Today we are going to help restore our local ecosystem by planting mint. Mint attracts beneficial pollinators, including bees, wasps, hoverflies, and tachinid flies. When planted outdoors, its rapid, dense growth helps stabilize the soil, preventing erosion.

Mint not only has a refreshing aroma, but is included in many different types of recipes from around the world. It can be eaten plain to freshen your breath, or used to make tea.

Teacher Note: At the front of the room, have:

- 1 large container of potting soil
- 3 spray bottles filled with water
- 1 square plastic nursery pot to each student
- 1 compostable plastic spoon to each student
- 3 mint seeds per student

Call up students in groups of three to take one square plastic nursery pot. Have them use one of the spoons to fill their pot between ¾”-1” below the rim with potting soil.

Have students lightly moisten the soil with a sprayer. Then plant the 3 mint seeds about 2-inches apart from one another, ¼” beneath the soil.

Distribute one bucket filled with assorted Lego pieces to each group of 4 students. Give every student one 5” X 5” Lego compatible base plate on which they will place their potted mint seeds to build a decorative “pot” or encasement around.

Here are examples made with larger Legos (called Duplo) that may serve as inspiration for students: IMAGES

Teacher Note: Students will transplant their seedlings in a sunny outdoor location about 3 weeks after they sprout, or when they have 1-2 sets of leaves.

Independent Practice

As scientists, we will observe our planted mint with our sense of sight, smell, touch, and taste. We will record our observations in our Science Journals, to track changes over time. This will help us determine if our mint is thriving, or not doing well. Based on our noticings, we can make informed decisions on how to best care for our mint.

Today you will receive a Science Journal to customize with drawings and very special stickers around the themes of plants and NYC.

Teacher Note: Distribute Science Journals, markers, and stickers to students. Students decorate their Science Journals.

Share

Students share their unique Lego pots and science journals.

Link

Today you planted mint from seed. Remember to water your mint when the soil is dry to the touch. You will most likely need to water it every 2-3 days. If the soil is dry the day after you watered it, add a bit more water. Throughout our time together, record your observations and inquiries in your science journals.

Exit Ticket: Have students record their response to the prompt in their Science Journal.

Cities have more roads and buildings than areas outside the city. These roads and buildings absorb and re-emit the sun's heat more than natural landscapes, such as bodies of water and forests. This is called the *urban heat island effect* because urbanized areas experience higher temperatures than surrounding areas.

Teacher Note: Show students Slide 4

If you were an urban planner, how would you work towards lowering the urban heat island effect?

(Possible written responses could include: increase tree/plant cover, protect existing and increase public green spaces, install green roofs, install reflective roofs, use cool pavements that are either reflective or permeable)

Teacher Note: Permeable pavement reduces pavement temperature in two ways: 1) its large, connected pores allows water to drain through and reduce pavement temperature, 2) the water in the pores also evaporates, reducing pavement temperatures

NYS Science Standards

- MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

NYS Social Emotional Learning Standards

- 1A.3b. Apply self-regulation skills to effectively express emotions, including strong emotions.

Week 2: Decoding the Language of Plants

Essential Question: How do plants connect all life on earth?

Learning Objectives:

- Students will compare the communication systems of plants and humans.
- Students will identify at least two ways human behavior disrupts the wood wide web.
- Students will create a storyboard depicting “conversations” that occur along the wood wide web.

Materials:

- Experience Slide Deck
  - Internet access
- Laptop/iPad for showing video
- Science journals
- Pencils (one per student)
- Colored pencils
- White paper (one sheet per student)
- Color printout of Slides 2-5

Vocabulary:

- Receptor
- Superorganism
- Symbiotic
- Wood wide web

Instruction Description

Hook

Show students the 2-minute video: *The Wood Wide Web*

Ask: Why might scientists refer to a forest as a superorganism?

A: A superorganism is a group of organisms (usually of the same species) that function as one organism, like a colony of ants, bees, or termites. The forest might be called a superorganism because of the deep interconnections and interdependence among the forest's species of trees, plants, fungi, and microbes. The forest is a complex system, made up of many parts that work together to form the whole.

Teacher Note: Some scientists call a collection of closely associated species that have complex interactions a holobiont, rather than a superorganism.

Ask: What is one similarity between plant and human communication?

A: Both plants and humans can detect, produce, and decode information to communicate. Plants communicate with one another and with different species (i.e. fungi and bacteria) through the detection, production, and decoding of molecule combinations that contain information for their survival, while ignoring non-meaningful signals. Humans communicate with one another (and sometimes with different animal species, such as pets) through the detection, production, and decoding of sound combinations, while also ignoring non-meaningful signals.

Teach/Demonstration

Beneath every forest and wood there is a complex underground web of roots, fungi, and bacteria connecting trees and plants to one another. This nearly 500-million-year-old subterranean ecosystem has been coined the wood wide web. It is an ancient network, like the internet, allowing trees and plants to freely communicate and share nutrients. For example, adult trees can share sugars they produce during photosynthesis with younger trees. Sick trees can contribute their remaining resources back to the network for others' benefit. Warnings about insect invasions can be communicated to surrounding plants and trees, so they can release pest-repellent chemicals, or attract other organisms that will threaten the invaders.

The relationship between the thread-like fungi called mycorrhizae and the plants and trees is mutually beneficial, or symbiotic. Both parties benefit from the friendship. One type of mycorrhizae link into plants' roots and receive food (in the form of sugars) from the trees and plants, whereas the trees and plants receive nutrients (i.e., phosphorus and nitrogen) that the mycorrhizae fungi have taken from the soil.

In short, millions of fungi and bacteria species trade nutrients between soil and the roots of trees, creating an extensive, interconnected, and interdependent web of organisms. Just like any urban area, the wood wide web engages in the trading and sharing of resources.

It is worth noting that one type of mycorrhizae in the wood wide web can help fight climate change through its ability to store carbon. Unfortunately, this type of mycorrhizae is also most vulnerable to rising global temperatures. As climates warm, bacteria cut off plants' free flow of information with mycorrhizal fungi networks.

Ask: How could decoding the messages sent along the wood wide web help in agriculture and forestry?

A: It could help us decide which plants to place near one another.

Ask: How could deforestation and other human behaviors disrupt the wood wide web?

A: Human activities that disturb the soil can break up the wood wide web networks, which are difficult to repair. Activities that disturb the soil include digging, cutting down trees, and changing the chemistry of the soil by adding chemicals. Planting non-native species can also alter the ecosystem, which negatively affects communication along the wood wide web. Non-native plants can become invasive quickly. Non-native species may displace native plants, prevent native plant growth, and reduce biodiversity.

Independent Practice

Teacher Note: Show students the wood wide web art exhibit features on slide 3 to provide inspiration for their storyboard.

Give each student:

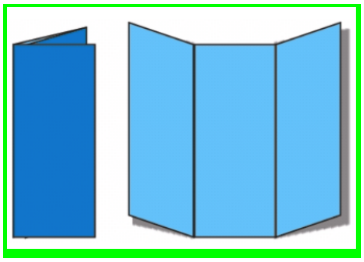
- one sheet of white paper
- one pencil
- colored pencils
- color printouts of Slides 2-5

Today we are going to storyboard an imagined "conversation" taking place along the wood wide web, based on our understanding of underground plant communication. A storyboard is a series of illustrations that map out the most important events of a story in order.

To do this fold your paper in half horizontally.

(image source)

Then we will make a vertical trifold.



(image source)

The result of the two types of folds are 6 equal-sized boxes.

Teacher Note: You can watch the first minute of this video to clarify how to fold the paper into 6 equal-sized boxes: 6-box fold

You may brainstorm with a partner to develop potential ideas for your wood wide web conversation. Keep in mind that the wood wide web has two main purposes: 1) to share food and nutrients, 2) to relay danger signals

Once you settle on an idea to flesh out, break down your dialogue into its 5 most important parts. Each part of the story will go in a separate box. There are 6 boxes because the first box is where you will write your title and the author and illustrator's name – that's you! You can also include an illustration in that first box (which would be similar to an illustration on the cover of a book). You can use speech bubbles to capture dialogue or thought bubbles to capture internal dialogue.

Share

Have students share their storyboards.

Link

Plants are active communicators. They continuously release information into their surrounding environment, particularly through sounds and chemicals. We are only just beginning to uncover how plants communicate with other plants and animals. Just because we can't hear the distress signal from a flower that has just been picked, does not mean it hasn't been made.

Exit Ticket: Have students record their response to the following two questions in their Science Journal.

- Name one advantage of (nonverbal) communication for plants.
- How have you used nonverbal communication to your advantage

NYS Science Standards

- MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli, resulting in immediate behavior and/or storage as memories

NYS Social Emotional Learning Standards

- 1A.3b. Apply self-regulation skills to effectively express emotions, including strong emotions.

Week 3: DIY Greenhouses with Seed Starter Trays

Essential Question: How do plants connect all life on earth?

Learning Objectives:

- Students will make their own seedling mix using the correct ratio of compost, coir, and perlite.
- Students will plant 36 seeds (4 compartments with 3 seeds in each compartment: arugula microgreens, basil, parsley, sage) in their seedling starter tray, which acts as a greenhouse.

Materials:

- Experience Slide Deck
  - **Internet access**
- **Laptop/iPad to view videos/Google slides**
- **Science journals**
- **Seed starting trays (1 tray per student)**

(If the above seed starting trays are no longer on sale, another option is these seed starting trays)

- **Arugula microgreen seeds (9 seeds per student)**
- **Basil seeds (9 seeds per student)**
- **Parsley seeds 9 seeds per student)**
- **Sage seeds (9 seeds per student)**
- **Compost**
- **Coir**
- **Perlite**
- **5 large bins to separate compost, perlite, and coir (2 bins for coir) & 1 bin to later mix**

- **Water sprayer**
- **Wide popsicle sticks (4 per student)**
- **Thin permanent markers (1 package per class)**
- **Compostable plastic spoons (1 spoon for each student)**

Vocabulary:

- Coir
- Greenhouse
- Greenhouse effect
- Microgreens
- Phytochemical

Instruction Description

IMPORTANT ADVANCE PREP TEACHER NOTE: Break the coir brick in half. Soak each half of the coir brick in a bucket of warm water (or one large garbage bag) for at least 15 minutes. Add about 2 quarts of water to each half brick. Coir expands to about 8 times its original size, so it must be divided into two large buckets (or one large garbage bag). Let students know that you are doing this now, so they will have time to make their seedling starter mixture this session. Teachers and students should wash hands after touching to avoid getting any dust particles in their eyes.

Hook

Show students the 4-minute video, *How Greenhouses Work*

Ask: What is one benefit of growing plants in a greenhouse?

A: Greenhouses protect plants from insects and animals that could harm them and extreme weather conditions (e.g., torrential rains, snow, sleet, hail, drought). Since greenhouse temperature and light may be controlled, you can determine the optimal conditions for your plants year-round.

Teach/Demonstration

Today, you are going to plant seeds in a seedling starter tray that will act as a mini greenhouse.

You will plant four seed varieties: arugula microgreens, basil, parsley, and sage. This will provide you with a diversity of edible greens to enjoy with your family once they are ready to harvest. It will also allow you to compare similarities and differences in the plants' physical features and rate of growth.

Ask: What are microgreens?

A: Microgreens are the young seedlings of edible vegetables and herbs. Microgreen seeds are no different from regular seeds, so you do not need special seeds to grow microgreens.

Ask: What makes microgreens special?

A: Early research indicates that microgreens contain up to 40% more phytochemicals (beneficial vitamins and minerals) than when they are more mature and fully grown.

Phytochemicals are chemical compounds produced by plants. They usually help protect plants from fungi, bacteria, and plant virus infections. They also protect plants from consumption by insects and other animals. When we consume microgreens high in phytochemicals, they help strengthen our immune system. They help reduce inflammation, prevent DNA damage, promote DNA repair, and may slow some forms of cancers.

Teacher Note: Show students the 2 ½-minute video: *The Greenhouse Effect*
If needed, here is the Spanish version.

Ask: What is the greenhouse effect?

A: The greenhouse effect is the way in which heat from the sun (that is not absorbed by the Earth's surface) is trapped close to Earth's surface by greenhouse gases – namely, carbon dioxide, methane, and nitrous oxide. These heat-trapping gases act like a blanket that wraps around Earth, keeping the planet warmer than it would be without them in the atmosphere.

Ask: What major problems could result from the greenhouse effect, which increases the average temperature on Earth?

A: Answers could include: thawing of glaciers, flooding of islands and coastal cities (which is predicted to threaten 92 million people by 2100), devastating hurricanes, degradation of soil, impact on agriculture and livestock, food shortages, increase in pollution, spread of disease and pandemics (i.e., malaria, cholera, dengue)

Ask: How can we work to reduce the consequences of the greenhouse effect?

A: Answers could include: reduce fossil fuel emissions by increasing use of renewable energy, use mass transportation, reduce/reuse/recycle, reduce consumption of meat and food waste, become a climate activist.

Independent Practice

Teacher Note:

Have the following at the front of the room:

- Compost, coir, and perlite each separated into 4 large bins (2 bins for coir)
- 1 empty bin (to be used later for mixing compost, coir, and perlite)
- 3 sprayer bottles filled with water
- Compostable spoons (one per student)
- Seed starting trays (one per student)

We will plant 9 seeds of each of the following: arugula microgreens, basil, parsley, and sage.

Before we can begin planting, we need to prepare our seed starting mix.

Teacher Note: Have students come up to the front of the classroom. Guide them through the planting process.

Teacher will work with student volunteers to mix 2 parts compost, 2 parts coir, and 1 part perlite. It is the ratio (2:2:1) that is important (e.g., 20 cups compost, 20 cups coir, 10 cups perlite). If you do not initially make enough, you can easily make more. (Source)

Now it's time to start planting!

1. Place your seed starter soil mixture into each compartment of the seed starting container.
2. Lightly moisten the soil in each of the 12 seedling compartments with a water sprayer.

   We are moistening the soil before planting the seeds to prevent them from shifting around. You also want to avoid overwatering the seedlings, which lead to seed rots and fungal diseases.

3. Plant arugula seeds about 2" beneath soil mixture. Plant basil seeds ¼" deep. Plant parsley seeds between 1/8" - ¼" deep. Plant sage seeds about 1/8" (3mm) deep.

Teacher Note: The seeds would be distributed like this (with 3 seeds of each variety in each compartment):

Arugula (4 seeds)	**Basil (4 seeds)**	**Parsley (4 seeds)**	**Sage (4 seeds)**
Arugula (4 seeds)	**Basil (4 seeds)**	**Parsley (4 seeds)**	**Sage (4 seeds)**
Arugula (4 seeds)	**Basil (4 seeds)**	**Parsley (4 seeds)**	**Sage (4 seeds)**

4. Label each of the four popsicle sticks with the name of each seedling (i.e., arugula, basil, parsley, sage). Insert the labeled popsicle sticks into the seed starter tray compartment to indicate the seed variety in each column of the tray.

Share

Have students share which seeds they predict will sprout the first and why.

Teacher Note: After students make their predictions, if they have not already done so, show them the information on the seed packets to make more predictions based on information.

Link

Today we learned not only about the benefits of greenhouses, but the problems caused by excessive greenhouse gases trapped in Earth's atmosphere. We discussed actions we could take to help slow down the greenhouse effect. We also planted four varieties of greens in seedling starter trays that act like mini greenhouses.

Exit Ticket: Have students record their response to the prompt in their Science Journal.

How is the greenhouse effect and climate change related?

NYS Science Standards

- MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

NYS Social Emotional Learning Standards

- 2C.3b. Demonstrate cooperation and teamwork to promote group wellbeing and collective efficacy.

Week 4: Seed Bombing for a Greener Future

Essential Question: How do plants connect all life on earth?

Learning Objectives:

- Students will create wildflower heart-shaped seed bombs out of air-dry clay.
- Students investigate how several different seed adaptations impact their mode of dispersal.

Materials:

- Experience Slide Deck
  - Internet access
- Laptop/iPad to watch videos/Google slides
- Science journals
- Wildflower seed mix
- Air-dry clay (water-based)
- Rolling pins (one per student)
- Large heart metal cookie cutter (one per student)
- Wax paper
- 3 large cookie sheets
- 1 black permanent marker

Vocabulary:

- Adaptation
- Dispersal
- Germination
- Native
- Redlining

Instruction Description

Hook

Play the 12-minute video: *How Radical Gardeners Took Back New York City*

Ask: How did Hattie Carthan transform the landscape of NYC?

A: Hattie's reputation for bringing back trees to NYC resulted in the Parks Department offering to give six trees for every four planted, as part of the city's tree-matching program. Hattie started a group called the Tree Corps, enlisting local kids to join her in planting over 1500 trees in Bedford-Stuyvesant.

…

Redlining and other discriminatory practices led to the concentration of poverty and disinvestment in certain neighborhoods, particularly those with large populations of people of color. These neighborhoods often lacked access to greenspace, trees, and other natural features that help regulate temperature and reduce the urban heat island effect.

Urban heat islands form when cities absorb and retain more heat than surrounding rural areas due to factors such as increased building density, high concentration of heat-absorbing surfaces like asphalt and concrete, and limited vegetation cover. The result is higher city temperatures, particularly in areas with a high concentration of buildings and impervious surfaces. This can lead to a range of health problems for residents, particularly elderly and those with preexisting medical conditions. Some examples of medical problems that can be caused or exacerbated by the heat island effect include: heat exhaustion, heat stroke, respiratory problems, cardiovascular problems, diabetes, mental health disorders, and autoimmune disorders.

Increasing access to greenspace is a natural way to alleviate these problems.

Teacher Note: Redlining involves denying or limiting financial services such as mortgages, loans, and insurance to people living in certain neighborhoods based on their race, ethnicity, or socioeconomic status. The term "redlining" refers to the practice of drawing a red line on a map to designate neighborhoods that are considered high-risk for lending or insurance purposes. Redlining led to a concentration of poverty and disinvestment in certain neighborhoods, as well as limited access to quality education, healthcare, and other services. In recent years, efforts to address the legacy of redlining and its impacts on urban communities include initiatives such as community reinvestment, affordable housing, and anti-discrimination laws.

Teach/Demonstrate

Seeds are an essential component of greenspaces, as they are the starting point for the growth of all plants. Greenspaces, which include parks, gardens, and other natural areas, rely on seeds to create and maintain healthy and diverse plant communities.

Seeds are the reproductive structures of plants, containing all the genetic information necessary to grow and develop into mature plants. Seeds play a critical role in the creation and maintenance of greenspaces, as they are used to establish and diversify plant communities. Seeds also have cultural and ecological significance. Many indigenous cultures have long histories of seed saving and plant breeding, which are crucial for preserving traditional knowledge and biodiversity. Seeds provide the foundation for healthy and diverse ecosystems, thereby promoting ecological resilience.

Independent Practice

Since seeds are literally at the heart of greenspaces, providing the basis for healthy and diverse plant communities that are essential for the health and well-being of all living creatures, today we are going to contribute to local greenspaces by making and dispersing clay heart-shaped seed bombs.

Once our seed bombs are finished and have had time to fully dry, you can bring them home and choose a place in the community to launch it as a way to beautify your chosen area with wildflowers that will grow from the seeds embedded in your clay hearts. Flowers help bees and other pollinators thrive.

We selected wildflower seeds to put into our seed bombs because they should grow nicely in NYC during the summer. We chose a variety of wildflower seeds, so that we would have a better chance that some of the seeds would grow.

<u>Teacher Note:</u> Have the baking trays (or any type of tray) at the front of the class.

Distribute the following to students:

- A large piece of air-dry clay placed on a 6” X 6” piece of wax paper
(The size of the wax paper does not need to be measured; it is an approximation)
- One heart cookie cutter
- One rolling pin
- About 1 teaspoon of wildflower seeds.

Walk students through each step of the process:

1. Write each student's name in permanent marker in the top right corner of their wax paper.
2. Roll out your clay until it is about ¼-inch thick.
3. Use your heart-shaped cookie cutter to make a heart.
4. Remove the surrounding clay from the outside of the cookie cutter with your fingers.
5. Remove the cookie cutter from the clay.
6. Use your fingers to gently press the wildflower seeds into the surface of the clay heart. (The seeds do not need to be pressed too deeply into the clay – just enough to stick to the clay, without falling off. Students may be generous with the number of seeds they use, as not all of them will grow.)

Collect students' hearts (keeping them on the wax paper) and place them on the baking trays at the front of the room. Allow them to dry.

Share

Have students share where they plan to launch their seed bomb and why they chose to contribute to the resilience and beautification of that particular location within their local community.

Link

Today we constructed seed bombs to enrich our local community's greenspace. We purposefully selected seeds that should grow nicely in NYC during the summer. We chose a variety of wildflower seeds, to improve the chances of seed growth.

We did not want to select seeds that are not native to NYC. It can be problematic to introduce non-native plant species into a public space. Certain non-native plant species can become invasive and change a local ecosystem's food web by destroying or replacing native food sources.

Exit Ticket: Have students record their response to the prompt in their Science Journal.

Teacher Note: Sharing the following with students:

Seeds are crucial to agriculture, which is an important worldwide industry, including in urban areas. NYC has several urban farms and community gardens that grow fruits, vegetables, and herbs. These urban farms and gardens note only provide fresh produce to local residents, but they also serve as educational centers for urban agriculture. By studying seeds and their role in agriculture, you can explore how urban agriculture contributes to NYC's status as a global city by promoting sustainability, food security, and community development.

Have students respond to the following in their Science Journal:

What are some ways that growing food in cities can help us become more resilient to environmental and social challenges?

Teacher Note: This question encourages kids to think critically about the benefits of urban agriculture, including its potential to increase access to fresh, healthy food, reduce food miles and associated greenhouse gas emissions, promote biodiversity and ecosystem health, and provide opportunities for community-building and education. It prompts them to consider the ways in which urban agriculture can help cities become more resilient to environmental and social challenges, such as climate change, food insecurity, and economic inequality.

NYS Science Standards

- MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

NYS Social Emotional Learning Standards

- 1A.3b. Apply self-regulation skills to effectively express emotions, including strong emotions.

Week 5: Exploring Sustainable Practices through Composting & Compost Tea Bags

*Teacher Note: This lesson may take two sessions to complete.

Essential Question: How do plants connect all life on earth?

Learning Objectives:

- Students will identify at least three benefits of composting.
- Students will determine which items are compostable using photographs from a Google slideshow.
- Students will make compost tea bags to produce a liquid fertilizer for the seeds in their personal seed starter trays to promote the use of organic gardening practices.

Materials:

- Experience Slide Deck
  - Internet access
- Laptop/iPad to watch videos/Google slides
- Science journals
- Compost (leftover from planting in seed starter trays) separated into three large containers
- Drawstring mesh tea bags (2 per student)
- Compostable spoons (1 per student)
- Compost tea bag steeping and dilution instructions (one handout per student)
- Sprayers (one for each student to take home)

Vocabulary:

- Aerobic
- Anaerobic
- Climate change
- Composting
- Decomposition
- Hydroponics
- Micro-organisms
- Organic material

- Stewardship

Instruction Description

Hook

Show students the 6-minute video: *Beginner's Guide to Composting*

Wow! This organization collects about 8 tons of compostable materials each week. That's about the weight of an Asian elephant, or a T-Rex, or a school bus!

Yet NY residents throw over 14,000 tons of food in the trash every week. That's about 8 cars or 14 walruses! So, there is still a lot more that can be done. Cities across the world are creating more composting programs. Currently, San Francisco, California is the city that composts the most.

Teach/Demonstration

Composting is simply the natural process of recycling organic matter, such as leaves and food scraps, into nutrient-rich fertilizer for plants, including the fruits and vegetables we eat.

Composting has many benefits, which include:

- *Reduces waste and saves money*

  By reducing the amount of waste sent to landfills, we save money on its pick up and disposal. It also reduces waste because the compost can be used to make our soil healthier for growing food.

  In landfills, bacteria chemically break down organic matter without access to much oxygen, which results in the emission of a harmful greenhouse gas called methane. Since compost decomposes organic matter with access to more oxygen, it mostly produces carbon dioxide as a byproduct. Although CO_2 is also a greenhouse gas, methane is a much more potent one. Methane traps about 30 times more heat than carbon dioxide. For example, banana peels will break down much slower in a landfill as compared to a compost pile. This means that the emissions from landfills spread over

longer periods of time as compared to compost emissions. Food waste in a landfill gives off three times more carbon than the same waste tossed into compost.

- *Creates healthier, nutrient-rich soil*

Composting can help improve poor-quality soil by encouraging the production of beneficial microorganisms (mostly bacteria and fungi), which help to break down organic matter (like our food scraps) to make the soil filled with more nutrients and able to hold onto more moisture.

- *Reduces the need for chemical fertilizers*

Since composting improves soil structure and the amount of nutrients in the soil, there is less need to add chemical fertilizers.

- *Greater growth of crops*

More crops grow when the soil is healthier, just like we grow and function better when we eat healthy foods.

- *Less plant disease*

Besides helping plants grow, compost can help fight off plant diseases by protecting plants with beneficial microorganisms.

- *Reduces greenhouse gas emissions*

Composting reduces greenhouse gas emissions in several ways: by diverting organic waste from landfills, capturing atmospheric carbon dioxide and storing it in the soil, reducing the need for chemical fertilizers, and lowering energy use (e.g., by reducing transportation of organic material to landfills).

Just like any recipe, your compost is only as good as the ingredients you put into it.

Have students determine which items can and cannot be composted: *Can This Be Composted?*

Compost needs browns, greens, water, and air (oxygen). A basic recipe for compost is a 3:1 ratio of browns to greens. This means that for every 3 parts of carbon-rich browns added, you must

add 1 part nitrogen-rich greens. So, if you added 3 buckets of browns, you should add one bucket of greens. If you add 6 buckets of browns, you need to add 2 buckets of greens.

Ask: If you add 18 buckets of browns, how many buckets of greens would you need to add to your compost? (Hint: Remember the ratio of 3 browns:1 greens)

Teacher Note: Examples of browns and greens:

Browns (carbon rich)	**Greens (nitrogen rich)**
Fall leaves, pine needles, twigs	Vegetable & fruit scraps
Straw/hay	Coffee grinds & tea leaves
Cob of corn	Fresh grass clippings, green leaves, flowers
Shredded newspaper & brown paper bags	Crushed eggshells
Wood chips	Manure
Dry seaweed	Wet seaweed

“Browns” tend to be drier, woodier plant materials that are older and have been dead longer. “Greens” tend to be wetter materials that died more recently and still have some color left in them. If there are too many nitrogen-rich greens, the compost will smell bad. If there are too many carbon-rich browns, it won’t break down.

Aerobic composting and anaerobic composting are two different methods of composting that rely on different conditions to break down organic matter into nutrient-rich soil.
Aerobic composting involves adding air to the compost pile or bin, which promotes the growth of oxygen-loving bacteria that break down organic matter quickly. This process produces heat and results in a compost that is high in nitrogen and other nutrients. Aerobic composting requires frequent turning of the pile or use of a tumbling compost bin to ensure proper aeration.

Anaerobic composting, on the other hand, involves composting without oxygen. This process relies on anaerobic bacteria to break down the organic matter. Anaerobic composting is slower than aerobic composting and produces a compost that is lower in nutrients. It also has a distinct

odor due to the production of methane gas. Anaerobic composting is often used for composting large amounts of organic waste, such as in a landfill or a biogas plant.
Overall, aerobic composting is faster, produces a higher quality compost, and is more commonly used for home composting. Anaerobic composting is slower, produces a lower quality compost, and is more commonly used for large-scale composting operations.

In urban areas, the most effective form of composting is generally aerobic composting using a small-scale composting system such as a compost bin or compost tumbler. This method is effective for several reasons:

- Space Efficiency: Aerobic composting systems are usually compact and can be easily placed in small outdoor areas such as balconies, patios, or rooftops.

- Low Odor: Aerobic composting systems are less likely to produce unpleasant odors than anaerobic composting systems.

- Quick Decomposition: Aerobic composting systems can compost organic materials faster than anaerobic systems because they use air to speed up the decomposition process.

- Low Maintenance: Aerobic composting systems require relatively little maintenance, as long as they are kept moist and are periodically turned or rotated.

- Soil Nutrient Quality: Aerobic composting produces nutrient-rich soil that can be used for gardening or landscaping projects.

- Environmental Sustainability: By composting food scraps and other organic materials, urban residents can divert waste from landfills and reduce greenhouse gas emissions.

Independent Practice

We are going to make compost tea bags to produce a liquid fertilizer for the seeds in your personal seed starter trays. We will make the compost tea bags in class. At home, you will steep your tea bags for a few days before using the resulting liquid to fertilize your plants. This is one way to develop our organic gardening skills.

Teacher Note: Walk students through the process of making compost tea bags. Each student will make two bags to bring home to steep and use to nourish the seeds in their seed starter trays.

At the front of the room have:

- 3 large containers filled with compost
- Mesh tea bags (2 per student)
- Compostable spoons (1 per student)

Have students use a spoon to fill each mesh tea bag with compost from one of the three containers up front, leaving enough space to tie the bag. Have students make sure to tightly pack the compost inside each mesh tea bag.

At home, you will steep each compost tea bag for 2-3 days. This means that you will place each tea bag in a container with about 2 ½ cups of water. Cover the container with the submerged mesh tea bag with a breathable cloth, such as a cheesecloth or an old t-shirt to keep out debris and insects. When steeping the bags, it is important to make sure that they are fully submerged in the water to allow the nutrients to fully dissolve. It is also important to occasionally stir the mixture to help aerate the water and promote the growth of beneficial microorganisms. After 2-3 days have passed, remove the compost mesh tea bag from the water and discard the contents (which can be added to a compost pile!). After following the dilution steps below, you can use the resulting liquid to fertilize your seeds. It's best to dilute the tea with water to prevent over-fertilization, which can harm seedlings.

To use compost tea to water seed trays, follow these steps:

1. Dilute the compost tea with an equal amount of water.
2. Fill a spray bottle with compost tea.
3. Gently water the seed trays with the diluted compost tea, being careful not to overwater.
4. Repeat watering with the diluted compost tea as needed, based on the moisture needs of the seeds and seedlings.

It's important to note that compost tea should not be used as a substitute for regular watering, as it does not provide the same amount of moisture as plain water. Instead, use compost tea as a supplement to regular watering to provide extra nutrients and promote healthy growth.

Teacher Note: Remember to send home each student with a small sprayer (provided by NY Edge).

Share

Students will share something they learned today about composting that surprised them.

Link

Today we learned one way of increasing our environmental stewardship by composting our food waste. We used compost as part of our seed starting mixture, mixed with coir and perlite.

We also made compost tea bags. Compost tea is a natural fertilizer that provides plants with nutrients and beneficial microorganisms that can help promote healthy growth.

Exit Ticket: Have students record their response to the prompt in their Science Journal.

Teacher Note: Ask students to respond to two of the four questions below.

- What challenges do you think people might face when trying to compost in an urban area?
- What steps can individuals take to encourage more composting in their community?
- How can composting promote a sense of community and connection among people?
- How can we continue to learn and improve our composting practices over time?

NYS Science Standards

- MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

NYS Social Emotional Learning Standards

- 2C.3b. Demonstrate cooperation and teamwork to promote group wellbeing and collective efficacy.

Week 6: Field Trip - Exploring the Benefits and Techniques of Composting

Potential Excursions about Composting:

1. Tour of NYC Parks' Dept.'s Five Boro Green Roof, or one of their other programs: https://www.nycgovparks.org/learn/ecosystems
2. NYC Compost Project: The NYC Compost Project is a citywide program that works to reduce waste in the city by promoting composting. They offer workshops and classes on composting.
3. Tour a community garden
4. Queens County Farm Museum: The Queens County Farm Museum is an historic farm in Queens that offers educational programs and workshops on sustainable agriculture, including composting. They have a working compost operation on the farm.
5. Brooklyn Grange Rooftop Farm: The Brooklyn Grange Rooftop Farm is an urban farm located on the rooftops of buildings in Brooklyn. They use composting to fertilize their crops and offer tours and workshops on composting and sustainable agriculture.
6. The High Line: This elevated park features a variety of native plants and ecosystems. Kids can learn about the park's unique design and its plants.
7. The Central Park Conservatory Garden: This garden features a variety of plants for kids to explore.

Essential Question: How do plants connect all life on earth?

Learning Objectives:

Materials:

- Science journals

Vocabulary:

Instruction Description

Hook

Teach/Demonstration

Independent Practice

Share

Link

Exit Ticket: Have students record their response to the prompt in their Science Journal.

What is one surprising thing you learned today?

NYS Science Standards

NYS Social Emotional Learning Standards