Gardening Lesson Plans

Our gardening lesson plans come from the following kids gardening sites:

https://kidsgardening.org/lesson-plans/

https://www.wholekidsfoundation.org/downloads/pdfs/AHA_WKF_Curriculum.pdf

and https://growing-minds.org/garden-lesson-plans/

Essential Questions:

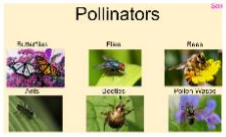
What does biodiversity mean to you?

Why is it important to measure biodiversity in our community?

Which site has the highest species richness?

Which site is the most diverse species ?

What is the best measure of biodiversity?



OBJECTIVE:

Students will be able to take sample size measurements of the biodiversity found in there community, so they can collect and graph data using a mathematical tables and graphs.

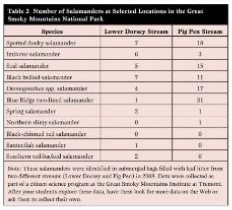


Table 2 Number of Salamanders at Selected Locations in the Great Smoky Mountains National Park		
Species	Lower Dorsey Stream	Pig Pen Stream
Spotted dusky salamander	7	10
Imitator salamander	6	3
Seal salamander	5	15
Black-bellied salamander	7	11
Dusky/spotted spp. salamander	4	17
Blue Ridge two-lined salamander	1	31
Spring salamander	3	1
Northern ravine salamander	0	1
Black-chinned red salamander	0	0
Junaluska salamander	1	0
Southern red-backed salamander	2	0

Note: These salamanders were identified in subtropical bags filled with leaf litter from two different streams (Lower Dorsey and Pig Pen) in 2009. Data were collected as part of a citizen science program at the Great Smoky Mountains Institute at Tremont. After your students explore these data, have them look for more data on the Web or ask them to collect their own.

Table 1 Number of Trees		
Species	Yard A	Yard B
Eastern redbud	3	5
Black oak	4	5
Post oak	5	5
White pine	3	5
Honey locust	1	5

EXAMPLES

Species	Plot 1: Woods	Plot 2: Field
Pillbug	30	10
Monarch butterfly	26	50
Seven-spotted lady beetle	35	0
Western honeybee	55	39

Insects	Back Yard	Front Yard	Totals
Western honeybee	10	55	
Seven-spotted lady beetle	50	60	
Totals			

Biodiversity is basically the variety within and among life forms on a site, ecosystem, or landscape. Biodiversity is defined and measured as an attribute that has two components — richness and evenness.

Richness = The number of groups of genetically or functionally related individuals. In most vegetation surveys, richness is expressed as the number of species and is usually called **species richness**.

Evenness = Proportions of species or functional groups present on a site. The more equal species are in proportion to each other the greater the evenness of the site. A site with low evenness indicates that a few species dominate the site.

Diversity can be use to describe variation in several forms:

- Genetic (species, varieties, etc.)
- Life form (grasses, forb, trees, mosses, etc.)
- Functional group (deep rooted, nitrogen-fixing, soil crust, evergreen, etc.)

WHAT IS BIODIVERSITY?

WHY IS BIODIVERSITY IMPORTANT?

BILL NYE

MEASURING BIODIVERSITY

Lesson Title: Measuring Biodiversity in Our Neighborhood

Objective: Students will be able to take sample size measurements of the biodiversity found in there community, so they can collect and graph data using a mathematical tables and graphs.

Essential Questions:

- What does biodiversity mean to you?
- Why is it important to measure biodiversity in our community?
- Which site has the highest species richness?
- Which site is the most diverse species ?
- What is the best measure of biodiversity

Learning Activities:

1. Introduction to biodiversity using teacher created slides and YouTube videos
2. Discuss essential questions as a class
3. Review how people collect data, and review data collection samples
4. Collect biodiversity sample from 3 sites in the neighborhood
5. Discuss data and analyze what type of math graph will display data more efficiently
6. Create math graph

A monarch that was tagged on Grand Manan Island, in New Brunswick, Canada, was recovered in the sanctuaries in Mexico! The monarch was tagged on August 19, 2000, and recovered on March 9, 2001.

If all the monarchs recovered in Mexico, this one has flown the farthest. How far did the monarch fly from Canada to Mexico?

The Migration of the Monarch Butterfly

Every year, monarch butterflies leave their summer grounds in the US and go on an amazing journey that takes them 3000 miles south to Mexico. Monarch butterflies have to migrate because they unable to survive the cold northern winters. Although most butterflies can survive winter in the north as a larva or pupa, monarch butterflies can not. They are the only butterflies that migrate long distances.

Monarch butterflies do not migrate in groups like birds. The butterflies travel by themselves during the day. When night time approaches, the butterflies stop and try to find other monarch butterflies. Usually there will be butterflies feeding near certain flowers, so the monarchs will be looking for these flowers. At night time, the butterflies roost overnight. Roosting is when butterflies huddle together for the night. Scientists think that roosting helps keep the butterflies warmer, but there may be other reasons as well.

Monarch butterflies cannot survive without the milkweed plant. The adult monarch butterfly will only lay eggs on milkweed plants. Milkweed is the only food for the monarch caterpillar.

The monarch's final destination is the southern forests of Mexico and California. There they hibernate until spring. During February and March, the butterflies become active and migrate back up north and east to lay their eggs on the leaves of a milkweed plant.

Name_____

The Migration of the Monarch Butterfly

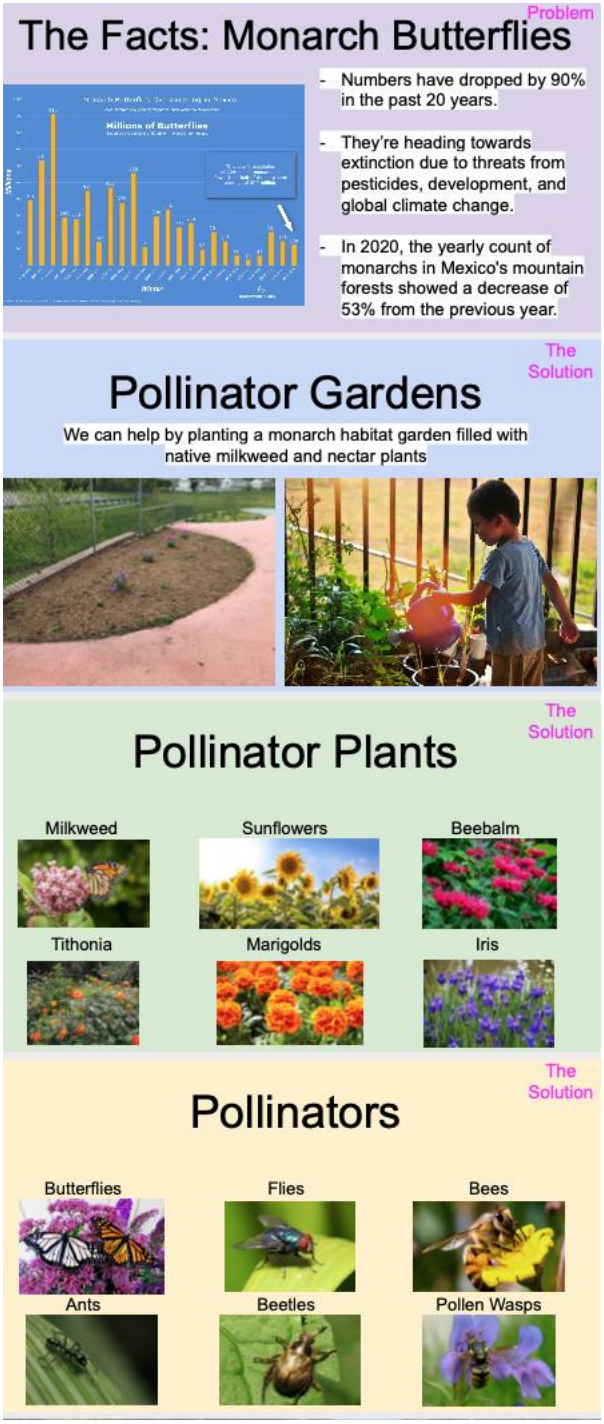
1. Write a one sentence summary of this article.

2. Why can't monarch butterflies survive the winter like other butterflies?

3. What is roosting? Why do butterflies do this?

4. Why do monarch butterflies need milkweed to survive?

5. What do monarch butterflies do in spring?



Below is a sample

Lettuce Be Healthy

Overview: Growing the makings of your own salad indoors is a fun and easy way to bring greenery into your classroom and your diet.

Grade Level/Range: K-5

Objective:

Students will:

- Review plant needs.
- Explore indoor gardening by growing lettuce.

Time: 1 hour to plan and plant; 6 to 8 weeks to grow and observe

Materials:

- 3-10 packets of lettuce seeds depending on the size of the group (see below for more information about popular seed varieties)
- Potting mix (1-2 16 quart bags)
- Planting containers – either pots or growing trays (you can make your own using recycled clear plastic lettuce containers – just add drainage holes)*
- Optional: grow light or shop light*
- Lettuce Growth Chart
  (Online template *https://kidsgardening.org/wp-content/uploads/2016/03/KG_Lettucegrowthchart.pdf*)
- KWL Chart
  (Online template *https://kidsgardening.org/wp-content/uploads/2016/03/KG_KWLChart.pdf*)

**Lettuce can be grown in a window with adequate sunlight, but you may want to supplement the light with a simple shop light or grow light to increase the light intensity and duration especially during winter months. Purchase a 2- or 4-bulb fixture and use either full-spectrum grow lights or a combination of cool-white and warm-white fluorescent tubes. These bulbs will give your greens seedlings the right combination of light wavelengths and intensity to grow strong and full.*

Background Information:

Lettuce is a cool weather crop that grows well in lower light conditions. It is economical to grow and nutritious to consume. Additionally, lettuce varieties are very diverse offering a wide assortment of textures, flavors, and colors to enjoy.

Laying the Groundwork:

An outdoor gardening space is not always available, but that does not mean your class can't participate in gardening activities. Ask students, What do plants need to grow? *Light, air, nutrients, water and space.* Can we provide all these needs in our classroom?

Explain to students that they will be growing lettuce plants to explore indoor gardening techniques. A "KWL" chart is often effective when trying to assess student's knowledge before beginning the activity. It also helps to provide student-directed learning and assessment. Below is an example of a KWL chart.

KWL Chart

What do you ***know***?	What do you ***want*** to know?	What did you ***learn***?
- Lettuce is good for you - Common lettuce types include romaine, and butterhead - Spinach is not a type of lettuce, but is great in salads and good for you	- How long does it take to grow lettuce? - Why is lettuce good for you?	- Yuma, Arizona is the lettuce capital of the world, supplying an estimated 95% of head lettuce, leaf lettuce, and romaine sold in the United States - Ancient Greeks and Romans held lettuce in high regard both as a food and for its therapeutic medicinal properties

Exploration:

1. Begin by selecting what type of lettuce varieties you would like to grow. Look for quick-maturing varieties, such as 'Tom Thumb' or 'Black Seeded Simpson'. Below is a list of popular lettuce varieties that have a host of flavors and textures. Other cool weather leafy greens like kale, spinach, and arugula, as well as herbs, are a great complement to any salad, but can be more difficult to grow in the classroom.

Lettuce	**Description**	**Taste**	**Estimated time seed to harvest**	**Notable Nutrients**	**Fun Fact**
Tom Thumb	Small cabbage-like green heads	Mild flavor	60 days	Vitamin A	An heirloom lettuce that dates to the 1850's.
Black Seeded Simpson	A leaf lettuce with large, upright heads of broad, frilled, light green leaves	Mild flavor	40-45 days	Vitamin A and C Calcium Iron	Tolerant of heat, drought and frost and one of the earliest leaf lettuces you can grow
Romaine	Deep green, long leaves	Crisp texture	28 days baby, 55 full size	Vitamins K, C, A Folate Fiber Manganese Iron	Also known as Cos
Crisphead	Green leaves on the outside, white and crisp on the inside	Crisp and refreshing	85 days	Iron Potassium A very good source of Dietary Fiber Vitamin A, C, K Folate Manganese	Iceberg is the most common variety
Butterhead	Large, soft, and tender leaves	Sweet flavor, soft leaves	60-75 days	Vitamins A, C, K Folate Iron Potassium Calcium Manganese	Best known varieties include Butterhead and Bibb
Leaf, try a baby leaf mix	Curly leaf and broad, found as green and red leaf varieties	Crispy texture, mild and delicate taste	25-35 days	Protein Fiber	Ancient Egyptians used green leaf as both a medicinal and culinary treat. Sweeter and more flavorful than Iceberg

2. Select a space for your lettuce garden. Locate a window that provides the most sunlight possible. Generally windows facing the south receive the most sunlight followed by those facing west. Optimally, choose a location with 8 more hours of sunlight available (indoor light will not be as intense as outdoor light thus making it important to receive a longer duration). The amount of sunlight will not only be determined by direction, but also by shade from roof overhangs, trees or surrounding buildings.

During winter months, the sun is at its lowest angle in the sky and its lowest intensity of the year. The days may be too short and dim for good plant growth. However, using a simple shop light or a grow light system, you can increase the light intensity indoors enough to grow greens even during the darkest months. Purchase a 2- or 4-bulb fixture and use either full-spectrum grow lights (the best option) or a combination of cool-white and warm-white fluorescent tubes. These bulbs will give your greens seedlings the right combination of light wavelengths and intensity to grow strong and full.

3. Once your site is selected, have your students fill their containers with moistened potting soil. Either small individual pots or trays can be used.
4. Plant the seeds as directed. Most lettuce seeds should be planted about 1 inch apart and just barely covered with soil. Laying a ruler across the surface of the soil can help serve as a good practice in learning to measure. If you are using different types of lettuce, make sure to have students create labels; popsicle sticks will do. This is a good writing exercise for any grade level. Make sure to use permanent markers as the labels may get wet when watering.

5. Cover the containers loosely with plastic wrap to hold in moisture. Make sure the wrap is not touching the soil or removing it later may also disturb their little roots that have not had time to gain a firm hold in the soil. If needed, you can create a little tent using toothpicks. Place them in a warm spot out of direct sunlight. Keep the soil mix moist. Moisten with a gentle spray of water from a spray bottle if needed.
6. As soon as the seeds begin to germinate, remove the plastic wrap and move the containers into your windowsill or under lights. If using lights, keep them on for 14 hours a day and positioned just a few inches above the seedlings. Adjust the lights daily as the plants grow. A timer is relatively inexpensive and you don't have to remember to turn the lights on and off. Keep the soil evenly moist but not soggy. If the leaves turn pale green or yellow, give the plants some liquid fertilizer when watering, being sure to follow the manufacturer's instructions.
7. Track the growth of your plants using the Lettuce Growth Chart. If you want to add an experimental element, you can try growing the plants in different locations. Here is an example:

Lettuce	Expected Growth Rate	Location	Week 1	Week 2	Week 3	Week 4	Week 5
Romaine	*28 days baby, 55 full size*	Grow lights					
		Windowsill					
		Closet					

   Results from your chart can be translated into graphs. When measuring, students can use the metric system and the U.S standard or it can be a chance to explore both. If students are actively using computers in the classroom, this can also be an introduction to the use of spreadsheets and digital charts.
8. Once the leaves on the greens are a few inches tall, it's time to start harvesting. Remember that you won't be growing full heads of lettuce. Harvest a few leaves at a time from each plant and then let them grow again. This is another opportunity to discuss plant growth. The plants won't take up too much space and you'll get multiple harvests.

Harvesting is easy. Using scissors simply cut the greens 1 inch above the soil line, leaving a few larger leaves in the center to keep plants healthy. Lettuce will grow back to yield another harvest in a couple of weeks. After a few harvests the plant stems may get thick and the leaves may remain small. This indicates it's time to compost the potting mix and roots, and start over.

Depending on the size and number of containers you and your students plant, your classroom can enjoy multiple fresh salads for weeks using this simple indoor growing system.

Making Connections:

Help students understand their findings by asking some of the following questions:

- Were we able to satisfy all the needs of our plants in our indoor garden? What did our growth chart tell us about the conditions we provided?
- What were some of the challenges of growing plants inside? What were some of the benefits?
- Do you think lettuce would grow better outside? Why?

Branching Out:

Nutrition – Celebrate the end of your unit with a Salad Party. Try mixing the lettuce with creative sides like beans, seeds, and other vegetables. If your indoor garden did not produce enough lettuce for everyone, you can supplement by purchasing store-bought greens. This would also give you a chance to conduct a blind test taste comparing homegrown and store-bought produce. Create a special classroom recipe book with ideas for creative and fun salads.

History – Research the origins of lettuce and how it was used by people in the past.

Art – Explore the concept of edible landscaping. You usually find fruit and vegetable plants in their own gardens rather than in more formal landscape plantings, but many edible plants are both tasty and visually appealing. Lettuce is a good example offering varieties that have leaves with vibrant colors and textures. Edible landscaping could help increase access to and consumption of fruits and vegetables, especially in urban areas. Plan an edible landscape for your school or another public area to serve as a demonstration and teaching garden for the community. Ask students to brainstorm ways to promote edible landscaping, such as writing newspaper articles and selling appropriate seeds or plants.

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