LEARNING THROUGH GARDENING

Keep it Growing!

Lessons To Grow All Year Long!

November 2022

Table of Contents

Maize Unit..... 3
- Maize Video..... 4
- The Corn Belt (SS)..... 4
- Corn Husk Dolls (SS)..... 4
- Parts of Corn (Sci)..... 4
- Sprouting Corn (Sci)..... 5
- Experiment with Corn (Sci)..... 5
- Make Your Own Plastic & Putty..... 5
- Tortillas in Bag..... 6
- No Bake Cornflake Cookies..... 7
- Let's Estimate! (Math)..... 7

Christmas Tree Farm..... 8
Christmas Trees are Growing Farms..... 10
- How to Grow Norway Spruce seeds..... 11

Discovering Phototropism.....13

Jack and the Beanstalk..... 17
First Peas to the Table (3-5)..... 19
First Peas to the Table (k-2)..... 25
First Peas to the Table Contest..... 28
Entry Form..... 31
Three Sisters' Garden..... 32

LEARNING THROUGH GARDENING

Maize

A cross-curricular unit compiled and adapted by the New Jersey Agricultural Society Learning Through Gardening program

Thanks to the Nebraska Foundation for Agricultural Awareness & Nebraska Agriculture in the Classroom

Background Information:

Native Americans grew many varieties of corn.Different varieties had red, black, blue or pink kernels.Some had bands, spots and/or stripes.Corn was the only grain used by Native Americans, and it was their main food. Their lives depended on it.Festivals celebrating the planting and harvesting of corn were commonplace.

When the pilgrims came to see the new land from Europe, they had never seen corn before.They called the new food maize, or Indian corn.Corn became just as important to the pilgrims as it was to the Native Americans. In fact, it saved their lives.

The Native Americans gave the pilgrims corn to eat and also showed them how to grow it.When the Native Americans saw the tiny oak leaves unfolding in the trees, they knew it was warm enough to plant their corn. They taught the pilgrims how to dig in the ground using a pointed stick or a sharp rock shell or bone. They also taught them to plant a dead fish with the small kernels to help the corn grow better.The Native Americans taught the pilgrims how to grind and cook the corn.Cornbread was a favorite dish, also called whole cake, Johnny Cake, or corn pone.Together, the pilgrims and Native Americans gave thanks for the corn harvest with the 1st celebration of Thanksgiving.

The Pilgrims learned many other uses for corn from the Native Americans. They stuffed mattresses with husks and made corn Shuck dolls. They also made pipes out of the corn cobs and used corn cobs for fuel.They even began to use corn as a form of money.Trading it for goods and services.

Corn is a tall member of the grass family of plants. Other plants in the grass family are wheat, oats, sorghum, foxtail, and bluegrass. Unlike many types of grasses.Coordinates an annual plant.Meaning that it cannot survive the winter and must be planted again each year.Because we can plant the corn seeds whenever we need corn, we call it a renewable resource.

Corn has a strong solid stem and long narrow leaves.Corn leaves encircle the stem and are attached alternately on opposite sides of the stem.Corn plants usually have an extensive

root system.Their flowers are small and grow in dense spikes or open branching clusters called panicles.

Corn is one of nature's most amazing energy storing devices.A corn seed weighs about 100th of an ounce.Yet this tiny seed can produce a corn plant that will grow 7 to 10 feet tall and will produce between 600 and 1,000 seeds like the one from which the plant started.The seeds are commonly known as corn kernel what's this on an ear of corn.The kernels are arranged in rows along the ear.An ear of corn may have as few as eight or as many as 36 rows, but the number of rows is always even.The kernels that you find on an ear of corn will become corn seeds to plant corn for the next year.

The corn seed or kernel is composed of three main parts.The seed coat or pericarp.The endosperm and the embryo.Each of these three parts has a role to play in producing a new corn plant.The pericarp is a hard outer coat that protects the seed both before and after planting.It prevents bacteria and fungi fungi from entering and destroying the seed.The endosperm makes up about 4/5 of the kernel's weight.Its chief function is to provide food energy for the young plant until the plants roots have grown enough to make food energy on its own.The embryo of the corn seed has two main parts.The tiny plant itself and the cotyledon.

Illinois and Iowa are the major corn producing states in the United States.American farmers use more land for corn than any other crop, and corn provides more food for people than any other crop grown altogether. About 4000 of the products in a typical supermarket contained some product or byproduct of corn.

- Maize Video ~ https://youtu.be/RbzhFznIX2s
- Social Studies: The Corn Belt

  Have students label the eight states that make up the “corn belt”.

corn belt.pdf

- Social Studies: Corn Husk Dolls

  Native Americans were the first to invent a cornhusk doll.Corn husks were dried, tied and fashioned into chiefs, warriors and women.Than faces were painted and sometimes sticks were added for arms and legs.

  cornhuskdoll.pdf
- Science: Parts of Corn

  Students label the parts of the corn plant using the following words: tassel, primary, tirp, germ, hull, endosperm, silk.

partsof corn.pdf

NJSLS: Science LS1.A

Science: Sprouting Corn

Lay an ear of dried corn in a long, shallow dish at 1 inch of water. Watch what happens over several days.Make sure you change the water often.Corn can sprout underwater! Amazing!

NJSLS: Science LS2.A

SCIENCE: Experiment with Corn

Materials: paper cups, potting soil, sand, clay corn seeds, water, salt, vinegar

1. Review the three conditions that allow corn to grow and develop well.(Fertile soil,sun,moisture)
2. Hypothesize what would happen if any of these conditions were altered.
3. Divide the class into groups.Each group will select one of the conditions that they will alter in this growing experiment.The teacher could monitor the control plant. (For example, one group will plant in sand with all the other conditions matching the control plant.One group could place their plant in a very shaded area.Another group could water their plant with salt water or an acid solution, etc.)
4. Select the time frame for the experiment to run.
5. Each group should predict what the outcome of their group's plant will be in comparison to the control plant.
6. Keep a daily log including the date, amount of moisture added, height of the plant and the general overall condition of the plant.
7. At the end of the experiment, discuss the outcomes compared to the predictions.

experimentwcorn.pdf

NJSLS: Science: LS1.C

Science: Use Corn to make your own: Plastic and Putty

Biodegradable Plastic:

1. Place a tablespoon of cornstarch in a paper cup or plastic bag.
2. Add two drops of corn oil to the cornstarch.
3. Add 1 1/2 tablespoons of water to the oil and cornstarch.
4. Stir the mixture.
5. Add two drops of your favorite food coloring to the mixture and stir well.

Microwave your biodegradable plastic for 20 to 25 seconds on high.

1. What happens to your plastic?
2. Form your plastic into a ball and describe what it will do.

Scientific observations.

1. What do you notice about your biodegradable plastic?
2. Is your biodegradable plastic the same as the others biodegradable plastic?
3. What could you make with this biodegradable plastic if you let it harden?

Corn Putty: Play with it like clay, then watch it become liquid again.

- 1 cup cornstarch
- 1/4 cup plus one tablespoon of water
- Food coloring

Blend mixture with fork. It should flow when the bowl is tipped, but feels solid when you touch it.If it's too thick, add a little water.If it's too runny, add a little cornstarch.

This is a great activity for teaching the states of matter: is it a solid or liquid?

NJSLS: Science PS1.A;

Math: Tortillas in a Bag

1 1/2 cups all-purpose flour.
1 teaspoon salt.
1/2 teaspoon baking powder.
3 tablespoons shortening or butter
1/2 cup hot water, 125 to 130 degrees F

In a large plastic bag, combine flour, salt and baking powder.Close the bag and shake to mix.Add the shortening to the bag and work with mixture with fingers until the ingredients form a soft dough that pulls away from the sides of the bag.Add the hot water to the bag. Close the bag and mix with the fingers until the ingredients form soft dough that pulls away from the sides of the bag.

Turn the dough out onto a lightly floured surface, divide the dough into four equal pieces and shape into balls.Each child will receive two balls, cover them with the plastic bag and let them rest for 15 minutes.

Roll or pat the dough into 8-10 inch circles.Place each circle on a griddle or frying pan heated to medium high heat.Cook until dark brown spots appear.Turn the tortilla and cook on the other side until brown.

The tortilla can be rolled up with cheese, salsa and refried beans.Or sprinkle with cinnamon and sugar on top.

NJSLS: Math MD.A.2

Math: No-Bake Cornflake Cookies

1 cup white corn syrup
1 1/2 cups crunchy peanut butter
1 cup of sugar
5 cups corn flakes

Boil syrup and sugar together for one minute.Remove from stove and add to cereal and peanut butter.Drop by teaspoon on wax paper.Cool.
NJSLS: Math MD.A.2

Math: Let's Estimate

- When filling a jar full of seeds or popcorn kernels, have students predict how many spoonfuls it will take.
- Using corn seeds or popcorn, fill up a jar, have students guess how many there are.
- Create a mini-exploration of area, volume or linear measurement using the popcorn kernel as the unit of measure.
- When popping popcorn, have students predict how long it will take for the first kernels to pop.

What did the Popcorn say to the Baby corn?

You've got your Mother's ears!

LEARNING THROUGH GARDENING

Christmas Tree Farm

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

Overview & Purpose

In Mary Lyn Ray's book Christmas Farm, Wilma and her young helper Parker order 62 dozen evergreen seedlings to start a Christmas tree farm. Year after year, the pair nurture their trees, keeping careful count of how many perish and how many grow into fine, full Christmas trees. The book is full of math problems for upper elementary students and has the added benefit of teaching students the process involved in growing Christmas trees.

GRADES: 3-5

Objectives

Math: The students will be able to create and solve word problems throughout the book to determine how many Christmas trees are left on the farm.
Social Studies: The students will be able to describe the process of growing Christmas trees.

Materials Needed

The book Christmas Farm by Mary Lyn Ray

Activity

Divide students into small groups to problem solve.

Teacher reads Christmas Farm, stopping the story at the first potential math problem – Wilma buys 62 dozen trees. Ask small groups to devise a way to determine

how many trees is 62 dozen trees? Small groups report back on both their method of solution and their answer.

Teacher continues reading the story until he/she comes to the next potential math problem – Wilma and Parker measure 24 straight rows and plant 744 trees. What information is missing? (How many trees are planted in each row?) And how can you find the answer? Again, students work in small groups and report back to the whole class.

Teacher continues reading the story until he/she comes to the next potential math problem – If at the end of the winter 719 trees remain on the farm, what information is missing? (How many trees were lost.) How can you find the answer? The teacher continues to read the story, stopping at each potential word problem.

There are eight more potential math problems throughout the book. When finished reading the book, ask the students to outline the process of growing the trees. What did Wilma and Parker have to do for the trees while they grew? (Planted, weeded, mowed, shaped, tagged, planted again.)

EVALUATION:

Math: In small groups, students correctly write and solve word problems to answer questions about the number of trees on the Christmas tree farm.
Social Studies: In small groups, students correctly outline the steps required to grow Christmas trees.

NJSLS: Science ESS3.A; Math MP.4.1; OA.A.1; ELA: W2.3

– The author's note in the back of the book contains a short history of Christmas tree growing and a growth rate chart for evergreens.

CHRISTMAS TREES ARE GROWN ON FARMS

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

Do your students know where Christmas trees really come from? They are not cut from forests, they are grown on farms! This lesson teaches students about Christmas tree farming in New Jersey and also explains how coniferous trees are different from deciduous trees.

GRADES: K-5

OBJECTIVES

The student will be able to:
- Describe the process involved in growing Christmas trees.
- Describe how coniferous trees are different from deciduous trees.

MATERIALS NEEDED

- The New Jersey Agricultural Society powerpoint presentation Christmas Trees Are Grown On Farms: https://youtu.be/k3UURAX-u8U
- Optional: Norway Spruce or Douglas Fir or other evergreen tree seeds
- Seed starter soil
- Black construction paper
- Small plant pots or recycled containers such as milk or yogurt cartons with hole poked in the bottom for drainage
- Small plastic baggies

ACTIVITY

Ask students if they know where Christmas trees come from. Where do all those trees come from that you see in nurseries and stores in December? Explain that Christmas

trees are not cut down in forests. They are grown on Christmas tree farms, including many in New Jersey.
Optional:

- Show the powerpoint presentation Christmas Trees Are Grown on Farms, stopping periodically to ask questions and discuss information.
- Plant some evergreen tree seeds to germinate in the classroom.

HOW TO PLANT EVERGREEN SEEDS :

The best seeds to plant in the classroom are Norway Spruce or Douglas Fir seeds because they can be planted directly. Other evergreen tree seeds need special treatment or stratification before planting. Some seeds need a period of cold before they will sprout and some seeds need to be soaked in water. If you use a different variety of seed, be sure to research how to plant it ahead of time. You might be able to find some evergreen seeds from a local nursery or you can dissect closed pine cones and remove the seeds inside.

Fill small plant pots or recycled containers with soil. Seed starting soil is best, but if none is available, you could try using potting soil. Water the soil so that it is moist but not drenched. Place two or three seeds on top of the soil and barely cover them with soil, no more than 1/8-inch deep. Cut squares of black construction paper that are about two inches bigger than the top of the container. Place each container in a warm place on top of a black square. The black square will absorb light and keep your seeds warmer. Place a plastic baggie over the top of each container.

The seeds should sprout in about 10 days. Remove the baggies when you see a sprout. Then place the pots on a windowsill or under a light. Be sure that the pots are kept warm. Transplant the tree seedlings into bigger pots filled with potting soil when they are 3-6 inches tall.

EVALUATION:

- Younger students can draw pictures showing how an evergreen tree grows.
- Older students can write a paragraph or essay about how Christmas trees are farmed or how coniferous trees are different from deciduous trees.

EXTENSION:

Read a book about Christmas tree farming:
For grades K-2: Christmas Tree Farm by Ann Purcell

For grades 3-5: Christmas Farm by Mary Lyn Ray. This book is full of math problems for older students. Wilma and her young helper Parker order 62 dozen evergreen seedlings to start a Christmas tree farm. Year after year, the pair nurture their trees, keeping careful count of how many perish and how many grow into fine, full Christmas trees.

Visit a local Christmas tree farm or invite a local Christmas tree farmer to the classroom to talk to students.

NEW JERSEY LEARNING STANDARDS

Science: K: LS1.C 1: LS1.A 2:LS2.A 3:LS1.B 4:LS1.A 5:LS2.A Social Studies: K-2:6.1.2.Geo.GI.1, 6.1.2.EconEM.1,2; 6.1.2.EconNE.1 3-5:6.1.5.GeoHE.2, 6.1.5.EconEM.1, 2; 6.1.5.EconNM.4, 6

LEARNING THROUGH GARDENING

A MAZE FOR PLANTS - DISCOVERING PHOTOTROPISM

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

This experiment will prove to your students that even though plants are stuck in one place in the soil, they can move. Plants will turn and stretch toward the light. This phenomenon is known as phototropism. Students create a maze for a climbing plant, such as beans or peas. Then they check the maze daily to see if their plant can find its way to the light.

GRADES: PreK-5, Younger grades can do this as a whole-class experiment, with the teacher creating the maze for the students to observe.

OBJECTIVES

The student will be able to:
• explain that plants move toward the light, and why
• explain how they can prove plants move toward the light
• record the day-to-day results of an experiment

MATERIALS NEEDED

- Shoe boxes, enough for each group of three or four students, or one if you are demonstrating the experiment to the whole class
- Small plant containers filled with soil, one for each shoe box, about 3-4 inches high. Half Pint milk cartons from the cafeteria will work fine – just be sure to poke some drainage holes in the bottom.

- Pole bean or pea seeds (Make sure the seed package says ‘pole’ beans and not ‘bush’ beans. Pole beans are the ones that grow on a vine.)
- Scraps of light cardboard (like that used for posters)
- Dark tape such as duct tape or masking tape
- Transparent tape
- Rulers
- Optional: science journals

PREPARATION

Before starting the activity, use a sharp knife to cut a rectangular hole in one small end of each shoe box. To make creating the maze easier for students, it is a good idea to put together a model shoe box maze according to the instructions below, so that students can visualize their instructions.

INTRODUCTION

Begin the discussion by asking students how they know something is alive. Encourage answers such as grow, breathe, reproduce, move, eat or require nourishment. Next ask how we know that plants are alive.

Ask the students what plants need to live. Ask if plants move. Ask if they have ever seen a plant move. Ask why they think a plant would move. Discuss their answers.

Next, tell students that they are going to do an experiment to prove that plants will move toward the light. Ask students if they know what a maze is and if they have ever seen one. (Answers may include a corn maze, a hedge maze, or a puzzle maze drawn on paper.) Now tell students they are going to create a maze that a plant will have to solve in order to reach the light.

ACTIVITY

Divide students into groups of three or four to make the mazes and give each group a prepared shoe box. Ask the students to hold the boxes up to the light. If there are any spaces where light shines through (except the cut hole on top), have students tape over the spaces with the dark tape.

Making the maze:

Distribute the cardboard, rulers, and transparent tape. Give the students the following instructions or write them on the board:

1. Measure two pieces of cardboard into rectangles so that: Two parallel sides are half the width of the shoe box The other two parallel sides are the same height of the shoe box.

2. Measure the length of the shoe box and divide by three. Make a mark at the points at one-third and two-thirds of the box.
3. Tape one cut cardboard piece on the left side of the box at the one-third mark, lining up the side equal to the height of the box.
4. Tape the other cardboard piece on the right side of the box at the two-thirds mark.
5. Plant two or three pole bean or pea seeds in the small plant container one-inch deep. Water the pot and press the soil down gently.
6. Stand the open shoe box on the small end that does not have the cut whole. Place the small pot gently on its side underneath the first piece of cardboard.
7. Gently place the lid on the box while it is still standing on the uncut small end. The cut end should be facing up.
8. Place the shoe box on a sunny windowsill.

Ask students to check the inside of the box daily and record their observations in their science journals. When checking the box, they should remove the lid very carefully. Remind students that they must water the plant. Check the soil for moisture and stand the pot up and water it whenever the soil is dry. The plant will not grow without water.

Over the next two or three weeks, allow the students to regularly observe the plant as it twists and turns toward the light inside the maze. Students can write their observations in their science journals. When the plants have reached the top of the maze, gather the class and discuss the results of the experiment.

EVALUATION:

Students write a paragraph or paragraphs (depending on their grade level) explaining what they hoped to prove with the experiment, what they observed during the experiment, and what the conclusion was. Students complete their observations of the experiment in their journals.

EXTENSION:

Have students research other plant tropisms, such as gravitropism or hydrotropism.

NJSLS:

Science: PS4.B; ETS1.A, ETS1.B,ETS1.C

Jack and the Beanstalk

This classic story pairs well with the phototropism lesson. When the plant reaches the top of the maze, it looks just like Jack's beanstalk. You can even decorate the maze before inserting the plant. Paint the inside blue, paint the bottom green, and glue cotton balls on the cardboard obstacles for clouds. Students can use cardboard to design Jack's cottage at the bottom and the giant's castle at the top. Then let the pole bean grow through the maze, and you have a stage for Jack and the Beanstalk. Students can make stick puppets and act out the story.

There are so many versions of this story for students to read and compare. One great version is Jack and the Beanstalk by Steven Kellogg. They can pick their favorites, and in small groups they can create dialog for a play. Then they can act out their Jack in the Beanstalk story in the garden or using their plant mazes.

Another great book is Trust me, Jack's Beanstalk Stinks! The Story of Jack and the Beanstalk as Told by the Giant by Eric Braun. This would be a great book to use to teach point of view and perspective.

Jack and the Beanstalk makes a great mock trial subject. Divide students into prosecution, defense, and jury. Give them time to research the crimes Jack might have committed (theft, for example, or perhaps kidnapping, if the singing harp is a sentient being). As a class, research how trials are arranged and conducted, and try to recreate a trial scene with as much accuracy as possible. You could also add a judge, reporters, witnesses, and police officers.

Read Jim and the Beanstalk by Raymond Briggs as a launch to activities involving measuring! In this story, Jim cheers up the giant by giving him glasses, false teeth, and a wig. Naturally, he has to do some measuring to make sure these gifts are the right size. Bring out tape measures and let the story inspire some measuring!

Making Your Own Jack and the Beanstalk- based on a lesson from Maryland Ag in the Classroom

Give the students the following directions.

Gather these materials:

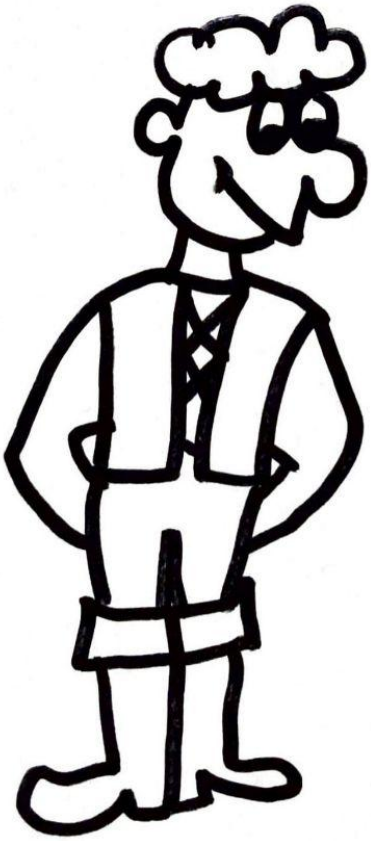
- Picture of Jack and the castle

- Crayons
- Scissors
- Tape
- Cup
- Dowel
- Soil
- Two to three bean seeds
- Water

1. Color Jack and the castle.
2. Cut out Jack and the castle.
3. Tape Jack to the outside of the cup.
4. Tape the castle to the top of the dowel.
5. Fill the cup 3/4 full of soil. Use a pencil to make holes for the bean seeds. The holes should be about 1/2 inch deep.
6. Put the seeds in the holes.
7. Cover the seeds with soil.
8. Put the dowel in the soil next to Jack.
9. Water your seed and check it every day.Too much water will rot your seed.
10. Place your seat in a sunny spot.
11. Watch and measure your plant as it grows up to the castle.

NEW JERSEY LEARNING STANDARDS

Science: PreK:5.1.1-5, 5.3.1-4, 5.4.2 K:LS1.C 1:LS1.D 2:LS2.A 3:LS4.C 4:LS1.A 5:PS3.D English Language Arts: K:W.K.2,3 1:W.1.2,7 2:W.2.2,4,8 3:W.3.2.A-D, W.3.4,8 4:W.4.2.A-E, W.4.4,8 5: W.5.2.A-E; W.5.4,8



LEARNING THROUGH GARDENING

FIRST PEAS TO THE TABLE (3-5)

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

In Susan Grigsby's book First Peas to the Table, a class stages a contest like the one Thomas Jefferson had with his neighbors every spring to see who could grow the first bowl of peas. The students research Jefferson's experiments in gardening. They research how to grow peas, plant their own pea seeds, and keep a scientific journal of notes and drawings of their plants' progress. In this lesson, your students will compete in a similar contest, planting and growing peas and learning about Thomas Jefferson's gardening passion.

GRADES: 3-5

OBJECTIVES

The student will be able to:
• Explain Thomas Jefferson's spring pea contest, some of his contributions to agriculture, and the method he used to set up his garden.
• Describe the life cycle of a pea.
• Read and explain plant growth information on a seed packet.
• Grow and care for a pea from seed to pod.

MATERIALS NEEDED

- The book First Peas to the Table by Susan Grigsby
- Variety of pea seeds
- Potting soil Recycled containers (empty and washed half-pint milk containers, yogurt containers, or any small container with drainage holes poked in the bottom.)
- Miscellaneous sticks, string, yarn, twine, etc. to build trellises
- How to Grow Peas worksheet for each student

NOTE: In New Jersey, peas cannot be planted outside until late-March, making it difficult to harvest an abundance of peas before school ends in June. So instead of growing a bowl of peas, the contest winner could be the student who grows the first peas to maturity. Another way to modify the contest would be to use edible pea pods instead. The winner of the contest could be the first to harvest five pea pods, or could be the student who harvests the most pea pods by a specified date before school ends in June.

ACTIVITY

Read aloud First Peas to the Table by Susan Grisby. Discuss the contest. Allow the students time to reread the book together in small groups. Use the accompanying discussion questions to spur conversation about the book.

Pass out pea seed packages to students in small groups. Ask them to read the information on the back and answer the questions on the How to Grow Peas worksheet. In late February or early March, students plant pea seeds indoors in potting soil in the small containers. Students care for their pea seeds on the windowsills until late-March, when they can be transplanted outside. Students keep journals on the progress of their pea plants, including information such as: dates seeds were planted, observations of growth, measurements of weekly growth, drawings, dates, trellises were added, etc.

Students transplant their peas into an allotted space in the outdoor garden. They continue to care for their pea plants over the next few weeks, watering as needed, perhaps adding fertilizer, and fashioning trellises for them to climb.

Determine the winner of the contest depending on the rules set at the beginning: student who grows first peas to maturity, student who first grows five pea pods, student with the most pea pods by harvest date, etc.

JOIN OUR FIRST PEAS TO THE TABLE CONTEST!

EVALUATION:

Students' detailed scientific journals on their experiences growing the peas.

EXTENSION:

Learn more about Thomas Jefferson's work in agriculture from the book Thomas Jefferson Grows a Nation by Peggy Thomas.

NEW JERSEY LEARNING STANDARDS

Social Studies: 3-5: 6.1.5.EconNM.4, 6.1.5.HistoryCC.3 Science: 3:LS1.B 4:LS1.A 5:LS2.A English Language Arts: 3:RL.3.1-7 4:RL.4.1-7 5:RL.5.1,2,4,5

NAME_____

How to Grow Peas

Use the information on the back of a pea package to help you answer these questions:

1. What is the variety (type) of the pea seed?

2. How deep should you plant the pea seeds?

3. How far apart should the pea plants be?

4. How far apart should you plant the rows of peas?

5. How many days will it take until you can harvest your peas?

6. How many weeks is that? How many months?

7. How long does it take seedlings to emerge (germinate)?

8. How much sun do pea plants like?

9. Look for New Jersey on the map of planting zones. When is it recommended to plant pea seeds outdoors?

First Peas to the Table Discussion Questions

In the story, Shakayla wins the contest. Discuss the questions below with the class to hypothesize how she might have won.

1. Maya's first group of successful pea plants was planted on March 1. What is the earliest date on which Shakayla's peas could have been planted? (Hint: On what day did the students receive their seeds?)

2. Can you write a mathematical equation to determine how much older Shakayla's plants could have been compared to Maya's? What is the answer?

3. Why did the first group of seeds that Maya planted fail?

4. Maya kept Jefferson's notes about soaking the pea seeds a “secret.” Do you think that Shakayla may have also read about that idea? Where might she have found the information?

5. Thomas Jefferson would test many different varieties of the same plant to determine information such as which ones grew fastest, tasted best, and yielded the most food. Different varieties of a plant can grow at different rates. How many varieties did Maya plant? How many varieties did Shakayla plant? Do you think that some of the pea varieties could have grown faster than others? Can you look at some seed packets (or Internet seed sites) to investigate this further?

6. What kind of books does Maya see Shakayla carrying home? Why do you think she was reading them?

7. What factors do you think might have helped Shakayla to win the contest? Think beyond the story in the book to come up with additional answers. Make a class list, noting which are supported by clues in the book and which are based on your knowledge of plants' needs.

8. Ask the students to use the list in question #7 to form some hypotheses that they could test in the classroom or school garden. Discuss how to set up the experiments and record the data. Then let students test their ideas

FIRST PEAS TO THE TABLE(K-2)

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

Thomas Jefferson, our third president, was an avid gardener. In this lesson, students learn about the life cycle of a pea while they learn about the yearly contest Jefferson had with his neighbors to see who could grow the first bowl of peas.

GRADES: K-2

OBJECTIVES

The student will be able to:
• Describe the life cycle of a pea.
• List plant needs.
• Sequence events.
• Write with the purpose of describing, informing, and/or explaining.

MATERIALS NEEDED

- 8 1/2 x 11 piece of green construction paper for each student
- Light green paper
- Circle pattern (preferably 2 inches or less in diameter)
- Glue sticks
- Markers or colored pencils
- Scissors
- First Peas to the Table book by Susan Grigsby

BACKGROUND KNOWLEDGE

Plants undergo a series of changes from the time the seed is planted to the time that the plant is full grown. First the seed must germinate or sprout. To do this, the seed requires moisture, warmth, air, and space. While the seed does not need soil to sprout, it does need the soil's nutrients in order to grow to maturity. After germination, the seed

will grow roots down into the ground and shoots will begin to poke out of the ground. This is the seedling stage. Next, leaves and blossoms will appear on the young plant. After the blossom is pollinated, the plant will bear fruit. This process is the same whether the plant is growing in the wild, in a backyard, or on a farm.

ACTIVITY

Read and discuss First Peas to the Table by Susan Grigsby. Discuss the contributions of Thomas Jefferson.

Discuss the life cycle of a pea plant as shown in the book. Include how long the plant takes to grow to maturity, the basic needs of the plant, and the planting season. Create a model of Ms. Garcia's class garden on the board or a large piece of paper. What plants might be grown in what sections?

Students draw or trace and then cut out 5-6 circles 2 inches or less in diameter. (Tracing a small bathroom disposable cup works well to create 2-inch circles.) Then they list each step of the life cycle of a pea on a circle. Younger students can draw pictures of each step of the life cycle. (The teacher can model this on the board.)

Then, direct the students to: fold an 8 1/2 x 11 piece of green construction paper vertically in half. Draw a pea pod along the fold of the paper large enough to cover the entire half page. Cut out the pea pod around the fold creating a bi-fold pea pod model. Arrange the steps of the life cycle inside the pea model. Glue the “peas” down to create a bi-fold book illustrating the life cycle.

EVALUATION:

Correctly completed pea pod

EXTENSION:

Write a six-sentence summary of the life cycle of the pea. Create a bulletin board with a trellis, pea vine, and attach the student's pea pods.

PLANT PEAS IN THE CLASSROOM:

School milk cartons work well as containers for seedlings. Open the cartons and wash the inside. Poke a few holes in the bottom so excess water can drain. Fill the cartons about three quarters full with soil. Have students plant 1-3 pea seeds in each carton about 1-inch deep.

Place a tray underneath the cartons to catch excess water. Water lightly and place on a sunny windowsill. Water when dry. Record growth observations. Peas can be transplanted into the school garden in late March or early April in New Jersey. They will need a trellis to grow on as they grow larger.

NEW JERSEY LEARNING STANDARDS

Science: K: LS1.C 1: LS1.A 2:LS2.A Social Studies: K-2:6.1.2.EconEM.1, 6.1.2.HistoryCC.3, 6.1.2.HistoryUP.1 English Language Arts: K:RL.K.1-10 1:RL.1.1-4,6 2:RL.2.1-7

LEARNING THROUGH GARDENING

FIRST PEAS TO THE TABLE CONTEST!

Join the First Peas to the Table Contest and compete with other LTG gardens to grow the first peas of the year! Peas are one of the earliest vegetables you can plant in the school garden and should be ready to harvest by the end of the school year.

Contest Guidelines and Rules

Goal: To be the first team to grow and harvest 2 cups of peas. without using a hot house.

Runner-up prizes given for the following categories:

- ☐ Heaviest Harvest
- ☐ Most Peas Harvested
- ☐ Tallest Pea Plant
- ☐ Most Creative Pea Trellising

Rules:

- ☐ The contest is open to all Learning Through Gardening School gardens.
- ☐ Schools may have more than one team; once teams have been established they are not permitted to merge with another team.
- ☐ Pea seed will be supplied for two teams per school. Please ask for more seeds if needed. Each team may use no more than twenty pea seeds.
- ☐ These should be garden shelling peas (often called English Peas), not snow peas or snap peas.

- ☐ You may not begin the contest until the official start date of **February 21**. In other words, your pea seeds must not be placed in soil, other growing mediums, or water before **February 21, 2023,** you may choose not to start until after this date. Your planting date is yours to determine.
- ☐ You may not use a hot house or greenhouse of any kind..
- ☐ Winner will be the first team to harvest 2 cups or more of shelled garden peas. Runner up contests will end on **May 15, 2023**, last growing/harvest day. . Submissions for runner up contests are due by **May 19, 2023**.

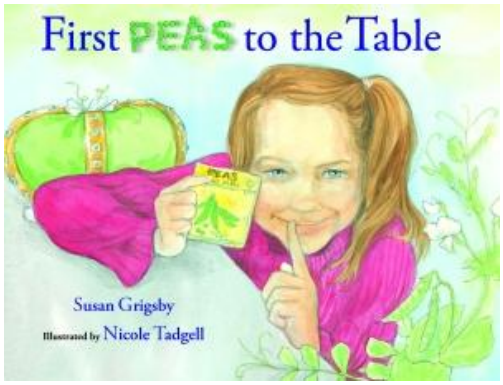
Submission:

- ☐ One entry form should be completed for each team.
- ☐ Teams must also submit a pdf of their pea growing log: sample attached, can be used or you can modify and make it your own:)
- ☐ Photo of their shelled pea harvest being measured
- ☐ A group photo of the winning team members for posting on social media with express permission for such usage.
- ☐ Entries must be submitted via email to mail to: nosterberg@njagsociety.org; no later than 5 days after the date that your peas are harvested, measured and recorded.
- ☐ The contest will close when a winner is announced for the first peas to the table and the runners up on **May 22, 2023**.

Certificates of Participation are available in the Teachers' ToolBox!

Lesson Ideas to Extend Learning: plant life cycles, plant adaptations, trellis engineering, and measuring!

This contest is based upon this book: First Peas to the Table: How Thomas Jefferson Inspired a School Garden (written by Susan Grigsby, illustrated by Nicole Tadgell),



Thomas Jefferson, our third President, held a pea growing contest with his neighbors every spring. The first person to have a bowl of peas ready to bring to the table was declared the winner and would invite his neighbors over for a dinner that included the dish of peas.

To help determine your seed plant date:

To determine the plant date use a calendar and the seed packet.

According to the seed package, how many days will it be until the peas are ready to harvest?

Using the calendar, decide what day you want to begin harvesting? From there, work backward to find the date planting should take place.

Seed plant date:

Ideas for Student Log:

- Begin with planting date and continue monitoring seeds/seedlings and recording changes in journal throughout the growing cycle.

Introduction video: https://youtu.be/kpO6I_JQ4T0

First Peas to the Table Contest!

Entry Form

Team Members:

Team name (optional):

Contest:

- ☐ First Peas to the Table - 2 cups
- ☐ Heaviest Harvest
- ☐ Most Peas Harvested
- ☐ Tallest Pea Plant
- ☐ Most Creative Pea Trellising

Artifacts:

- ☐ One entry form should be completed for each team.
- ☐ Teams must also submit a pdf of their pea growing log: sample attached, can be used or you can modify and make it your own:)
- ☐ Photo of their shelled pea harvest being measured, with exception of creative pea trellising, a photograph of the trellis is sufficient.
- ☐ A group photo of the winning team members for posting on social media.

LEARNING THROUGH GARDENING

Three Sisters Garden

A cross-curricular unit compiled and adapted by the New Jersey Agricultural Society Learning Through Gardening program
Thanks to KidsGardening.com

Students will explore the benefits of companion planting by investigating the historical Native American planting of Three Sisters Gardens.

Background Information:

Native peoples from different parts of North America have used a wide range of agricultural techniques. Perhaps the best known is the interplanting of corn, beans, and squash – a trio often referred to as the "three sisters." Cultivating these companions in your school garden, a small patch near the building, or even a barrel, can inspire studies of Native American customs, nutrition, and folklore.

In a three sisters planting, the three partners benefit one another. Corn provides support for bean vines. Beans, like other legumes, have bacteria living on their roots that help them absorb or “fix” nitrogen from the air and convert it to a form that the bean plants can use. As the roots of bean plants decompose after the crop is harvested (or if bean leaves and stalks are turned back into the soil after harvest), some of this nitrogen becomes available for other crops to use in coming seasons. Corn, which requires a lot of nitrogen to grow, benefits most from this nitrogen boost. The large, prickly squash leaves shade the soil, preventing weed growth, and deter animal pests. The three sisters also complement each other nutritionally, providing people with sources of both starches and proteins along with diverse vitamins and minerals.

It's hardly surprising that these crops – considered by many to be special gifts from the creator – played such an important role in the agriculture and nutrition of most of the native people of the Americas. Because of the sisters' central role as "sustainers of life," a host of stories, customs, celebrations, and ceremonies are associated with them.

Introduce :

Introduce students to the concept of symbiotic relationships. Begin by giving them the definition of a symbiotic relationship: “the relationship between two different kinds of living things that live together and depend on each other” (Source: Merriam-Webster’s Learner’s Dictionary). As a class, brainstorm examples of symbiotic relationships that the students are familiar with.

Plant a Three Sisters Garden

Each Native culture that grew the three sisters had a unique planting system. Below are the guidelines for one type of setup.

1. **Plan and select a site.** You'll want to plant your three sisters' garden in late spring once the danger of frost has passed. Choose a site that has direct sunshine for most of the day and access to water. Once students have determined their site's dimensions, challenge them to plan their three sisters' garden on paper. They can use the layout suggested below or research and try others.
2. **Prepare the soil.** First, break up and rake the soil. Next, build a mound about 12 inches high and between 18 inches and 3 feet in diameter. If you're in a dry area, flatten the top of the mound and make a shallow depression to keep water from running off. The number of mounds your students create depends on the size of your growing area. Mounds should be 3 to 4 feet apart in all directions.
3. **Plant corn.** Some gardeners suggest soaking seeds overnight before planting; other gardeners feel pre-soaking increases the chances that seeds will rot in the soil. If you choose to pre-soak seeds, limit soaking time to 24 hours maximum. (Or experiment – try both techniques and see which works better in your conditions.) Plant four to seven soaked or unsoaked corn seeds about 6 inches apart in the center of each mound. (You'll eventually thin to three or four seedlings.) Many Native people honor the tradition of giving thanks to the "Four Directions" by orienting the corn seeds to the north, south, east, and west. By doing the same, students can learn to use compasses and observe the sun's movements.

4. **Plant beans and squash.** After a week or two, when the corn is at least 4 inches high, plant six pole bean seeds in a circle about 6 inches away from the corn. (You'll eventually thin to three or four bean seedlings.) At about the same time, plant four squash or pumpkin seeds next to the mound, about a foot away from the beans, eventually thinning to one. If you are planting a large area, you can also sow the squash in separate mounds (1 foot in diameter) between every few corn and bean mounds.
5. **Consider other additions.** Consider planting other traditional crops, such as sunflowers or Jerusalem artichokes (a tuberous perennial sunflower), around at the edge of the three sisters garden. Put them on the north side so they won't shade your other plants. Potatoes, sweet potatoes, and other native crops can be planted in nearby plots. (Some of the many other indigenous plants used by native North, South, and Central Americans include melon, tobacco, chili pepper, cotton, blueberry, wild rice, and hazelnuts.) Let your students' creative juices flow as they create a unique scarecrow; a number of Native culture's gardens incorporate these familiar figures.
6. **Maintain your traditional garden.** As corn plants grow, weed gently around them and mound soil around the base of each stem for support. When the corn is knee-high and again when silks appear on the husks, "side-dress" by putting a high nitrogen fertilizer (such as a granular organic fertilizer or fish emulsion) on the soil surface near each plant. If beans aren't winding their way around the corn, youngsters can help by moving tendrils to the stalks. (Keen observers may notice a pattern in the direction in which the bean vines wind.) To allow room for corn and beans to grow, gently direct squash vines into walkways, garden edges, or between mounds. Once students observe young fruits, side-dress the squash plants with compost or a complete organic fertilizer. If you pinch off the tips of squash runners after several fruits have started to form, the plants will devote more energy to producing squash.
7. **Enjoy your harvest.** Harvest plants when they reach maturity. If possible, plan a harvest festival to celebrate a successful growing season.
8. **Save seeds (optional).**
   You may want to leave a few fruits on your plants to allow the seeds to mature and dry (seeds will not be fully mature when the fruits are ready for consumption). By saving and replanting some of the seeds from their three sisters' gardens, Native cultures brought the cycle of life full circle. Your students may want to save some to replant or package and give to other gardeners. Below are some tips for gathering and preserving the seeds.

Corn

Leave several ears on the stalk until husks dry and turn brown. Remove and peel back the husks and hang them to dry, out of direct sun, for a month. Once they're dry, remove the individual kernels. Store them in an airtight container.

Beans

Leave several pods on a plant until they turn brown and brittle. Break open the pods and remove the seeds. Leave them on a flat surface or screen, out of direct sun, to air dry for a few days. Put them in an airtight, dark container protected from extreme heat and cold.

Squash

Scoop out the seeds with a spoon and rinse them with water in a colander. Follow the same instructions as listed for drying and storing beans.

(Note: If you save and replant seed from hybrid varieties or you grow more than one variety of corn or squash near enough for cross pollination between varieties to occur, the plants that grow from your saved seeds will not show all the same traits of their parent plants.)

Alternate Growing Method: Raising Three Sisters in Containers

If your growing space is limited, you can create a mini three sisters garden in an outdoor container, such as a bucket or barrel. Although students may not be able to see the crops grow to maturity, they should be able to observe the pole beans twine around the corn and the large squash leaves form a mat. To simulate this planting system, use a large container with drainage holes in the bottom and fill it with potting mix and compost. Follow the above instructions, but plant only 3 corn seeds (and thin to1), 2 bean seeds, and 1 mini pumpkin seed. Place the container where it will receive at least six hours of sunlight (or 12 hours of grow lights) each day.

Extension:

Invite your students to and document, in their garden or science journals, the emerging plant parts and life cycle changes that occur in your three sisters garden. They may notice the corn tassels, the husks protecting the seeds, and the silks pushing out of the tops of the ears. Some questions to inspire thought include: What color do these turn as the fruits ripen? Which way do bean vines twine? How do they hold on? What types of flowers does each sister feature? Who visits them? What happens to

flowers and where do fruits come from? What do they contain? You can also have small student groups create models, drawings, or a play depicting the unfolding life stories of the three sisters.

As the three sisters grow, consider challenging students to try to figure out just how each one grows up. Does growth occur from the top of the plant or from the base? Your young scientists might draw a dot on stems of corn and bean plants with a waterproof marker. Each week, they can use a ruler to measure the distance from the ground to the dot on each stem. (Since corn, a grass, grows from the bottom, the distance between the dot on the corn plant and the ground will increase over time. On bean plants, which grow from the tip, this distance should not change.)

NJSLS: Science LS1.C

Cross-curricular :

Nutrition – Native people who grew and honored the three sisters were well aware that they were nutritionally rich and complementary. Have students research the nutritional value of each of the three sisters and the benefits of eating them in combination. They should discover that corn supplies carbohydrates and a variety of important amino acids. Beans have protein, including two essential amino acids that corn lacks. Squash contributes vitamin A. Squash seeds also contain quality fats that corn and beans lack. Encourage students to learn about some of the many ways — from grinding corn to making breads — in which different native cultures prepare and eat the three sisters. Cook some traditional meals using recipes found online.

Science – Some Native cultures fertilized soil by burying a dead fish (or fish carcass) under each three sisters mound, just beneath the seeds. As the fish decomposed, it was said to provide nutrients to the growing plants. Ask students, How might you test the effectiveness of this gardening lore? They will likely want to compare mounds planted with and without dead fish. Although you may want to allow them to pursue such an investigation, consider encouraging them to use dried fish bones (from a fish store) or liquid fish emulsion fertilizer, which are less likely to attract unwanted critters.

Literature – Explore the role and importance of the three sisters in Native cultures through stories, celebrations, and art. Native stories often use nature to teach about relationships between people and between people and the natural world. After hearing or reading authentic Native stories, students might want to create their own tales or

plays based on their growing experiences. Planting rituals and harvest celebrations, which youngsters enjoy, reveal even more about the connections people had to the three sisters. Your class might also search for artistic representations of any or all of the crops in the art, music, clothing, or housing decorations of Native cultures under study.

Social Studies – 7,000 to 10,000 years ago, what we call corn (and much of the world calls maize) was merely a wild grass. Over time, Native people systematically collected seeds from the plants best suited for eating, and corn became, well, more corn-like! Today we have colorful flint corn (often called Indian corn), which is mainly used for feed; sweet corn; dent corn; flour corn; and popcorn. (Popcorn is a flint corn with small hard kernels. When they are heated, natural moisture inside turns to steam. The trapped steam builds up pressure and the kernel explodes to reveal the fluffy air-filled endosperm.) Nearly 20 percent of the world's food calories come from corn, but it also enriches our lives in a host of other ways. Consider challenging your students to scour their kitchens and conduct research to uncover some of the products we reap from corn. Cornflakes may be obvious, but consider some of these other corn-based items: corn oil, corn syrup, fuel, fertilizer, plastics, cosmetics, and alcohol.