



## Knowledge of Knowing: North Carolina Sweetpotatoes Grades 3-5

### Purpose

The purpose of this unit is to encourage the understanding of the sweetpotato plant, its life cycle, the importance of a sweetpotato to North Carolina agriculture, and its nutritional value as a vegetable. Students will be exposed to the parts of a sweetpotato plant, understand how sweetpotatoes are grown, describe the importance of sweetpotatoes as a nutritious food, and its purpose as an exported commodity.

**Subject Area(s):** Reading, Math, Science, Health

### Common Core/Essential Standards

#### English/Language Arts

##### 3<sup>rd</sup> Grade

- **RL.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for answers.
- **RL.3.7** Explain how specific aspects of a text's illustrations contribute to what is conveyed by words in a story.
- **RI.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for answers.
- **RI.3.4** Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area.
- **RI.3.5** Use text features and search tools to locate information relevant to a given topic efficiently.
- **RI.3.7** Use information gained from illustrations and the words in a text to demonstrate understanding of the text.

##### 4<sup>th</sup> Grade

- **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **W.4.1** Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
- **W.4.6** With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of one page in a single sitting.
- **W.4.7** Conduct short research projects that build knowledge through investigation of different aspects of a topic.

##### 5<sup>th</sup> Grade

- **W.5.1** Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

- **W.5.3** Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.
- **W.5.6** With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting.

## Math

### 3<sup>rd</sup> Grade

- **3.OA.1** Interpret products of whole numbers, e.g., interpret  $5 \times 7$  as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as  $5 \times 7$ .*
- **3.OA.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- **3.MD.3** Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*

### 4<sup>th</sup> Grade

- **4.OA.1** Interpret a multiplication equation as a comparison, e.g., interpret  $35 = 5 \times 7$  as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
- **4.OA.2** Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

## Science

### 3<sup>rd</sup> Grade

- **3.L.2** Understand how plants survive in their environments.
- **3.L.2.1** Remember the function of the following structures as it relates to the survival of plants in their environment.
  - Roots – absorb nutrients
  - Stems – provide support
  - Leaves – synthesize food
  - Flowers – attract pollinators and produce seeds for reproduction
- **3.L.2.2** Explain how environmental conditions determine how well plants survive and grow.
- **3.L.3.3** Summarize the distinct stages of the life cycle of seed plants.
- **3.L.2.4** Explain how the basic properties (texture and capacity to hold water) and components. (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of

many plants.

#### **4<sup>th</sup> Grade**

- **4.L.2** Understand food and the benefits of vitamins, minerals, and exercise.
- **4.L.2.1** Classify substances as food or non-food items based on their ability to provide energy and materials for survival, growth and repair of the body.
- **4.L.2.2** Explain the role of vitamins, minerals and exercise in maintaining a healthy body.

#### **5<sup>th</sup> Grade**

- **5.L.2** Understand the interdependence of plants and animals with their ecosystem.
- **5.L.2.1** Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.
- **5.L.3** Understand why organisms differ from or are similar to their parents based on the characteristics of organisms.
- **5.L.3.1** Explain why organisms differ from or are similar to their parents based on the characteristics of the organism.
- **5.L.3.2** Give examples of likenesses that are inherited and some that are not.

### **Social Studies**

#### **3<sup>rd</sup> Grade**

- **3.E.1** Understand how the location of regions affects activity in a market economy.
- **3.E.2** Understand entrepreneurship in a market economy.
- **3.C&G.2** Understand how citizens participate in their communities.

#### **4<sup>th</sup> Grade**

- **4.H.2** Understand how notable structures, symbols, and place names are significant to North Carolina.
- **4.H.2.2** Explain the historical significance of North Carolina's state symbols.
- **4.G.1** Understand how human, environmental and technological factors affect the growth and development of North Carolina.
- **4.E.1** Understand how a market economy impacts life in North Carolina.

#### **5<sup>th</sup> Grade**

- **5.G.1** Understand how human activity has and continues to shape the United States.
- **5.E.1** Understand how a market economy impacts life the United States.

### **Health**

#### **3<sup>rd</sup> grade**

- **3.NPA.1.2** Check the Food Facts Label to determine foods that are low in sugar and high in calcium.
- **3.NPA.2.1** Identify the sources of a variety of foods.

#### **4<sup>th</sup> grade**

- **4.PCH.3** Analyze health information and products.

## National Agricultural Literacy Outcomes

### Agriculture and the Environment

- (b) Explain how the interaction of the sun, soil, water, and weather in plant and animal growth impacts agricultural production
- (d) Identify the major ecosystems and agro-ecosystems in their community or region (e.g., hardwood forests, conifers, grasslands, deserts) with agro-ecosystems (e.g., grazing areas and crop growing regions)
- (e) Recognize the natural resources used in agricultural practices to produce food, feed, clothing, landscaping plants, and fuel (e.g., soil, water, air, plants, animals, and minerals)

### Plant, Animals, Food, Fiber, and Energy

- (c) Explain how the availability of soil nutrients affects plant growth and development
- (e) Understand the concept of stewardship and identify ways farmers/ranchers care for soil, water, plants, and animals

### Food, Health, and Lifestyle

- (a) Describe the necessary food components of a healthy diet using the current dietary guidelines
- (b) Diagram the path of production for a processed product, from farm to table
- (g) Identify food sources of required food nutrients

### Science, Technology, Engineering & Mathematics

- (d) Provide examples of science being applied in farming for food, clothing, and shelter products

### Culture, Society, and Geography

- (b) Discover that there are many jobs in agriculture
- (d) Explain the value of agriculture and how it is important in daily life

## Essential Questions

- Why are sweetpotatoes important to North Carolina?
- What is the life cycle of a sweetpotato?
- What are the living parts of a sweetpotato plant?
- What can sweetpotatoes provide for the human body?

## Materials

- [\*From Farm to School – Crops of North Carolina: Digging for Sweetpotatoes\*](#) by Heather Barnes and Karen Baltimore (book)  
Printed by North Carolina Department of Agriculture and Consumer Services  
Publication supported by U.S. Department of Agriculture's (USDA) Agriculture Marketing Service North Carolina
- Chart paper
- Gloves (for each student)
- Markers
- 5-gallon bucket
- Sweetpotatoes (at least 5)
- Soil
- Plastic cups (*Activity 3 & 5*)

- Plastic celled tray (optional)
- Computer
- Crayons
- Document camera (optional)
- SMART Board
- Notebook paper
- Index cards
- Water
- Watering can or container
- White paper
- Magnifying glass (student size)
- Pencil
- Push pins
- Rulers (inch/centimeter)
- Toothpicks (5-6 per student group)

### Essential Files/Links

- [From Farm to School – Crops of North Carolina: Digging for Sweetpotatoes](#) (book)
- Observation Journal (*Activity 1 & Activity 4*)
- Observation Journal with Answers
- Sweetpotato Pictograph (*Activity 2*)
- Sweetpotato Division Worksheet (*Activity 3*)
- Sweetpotato Division Worksheet with Answers
- Life of the Sweetpotato (*Activity 6*)
- Health of Sweetpotatoes (*Activity 8*)

### Vocabulary

**Agriculture:** the science or practice of farming, including cultivation of the soil for the growing of crops and raising animals to provide food, wool, and other products.

**Commodity:** a raw material or an agricultural product that can be bought and sold, such as a sweetpotato.

**Consumer:** a person who purchases goods and services for personal use.

**Export:** sending (goods or services) to another country for sale.

**Fibrous Roots:** thin, branching roots growing from the stem. Fibrous roots are shallow roots that collect water for plant growth.

**Flower:** part of the plant for reproduction that can produce seeds.

**Greenhouse:** a building which plants are grown needing protection from cold weather.

**Harvest:** to gather or pick a crop when it has reached maturity.

**Hill:** a group of sweetpotatoes growing below the surface of the soil.

**Import:** bringing (goods or services) into a country from abroad for sale.

**Leaves:** part of the plant that uses energy from sunlight for photosynthesis.

**Nodes:** part of a plant stem where one or more leaves will emerge.

**Producer:** a person, company, or country that makes, grows, or supplies goods or commodities for sale.

**Root:** part of a plant which attaches it to the ground or to a support for transporting water and nutrients to the plant.

**Slips:** shoots that are grown from a mature sweetpotato also called **sprouts**.

**Soil:** non-living organic matter needed for plants to grow found in the upper level of earth.

**Stem:** the body or stalk of the plant.

**Storage roots:** roots that are specifically modified for storage of starch, water, and nutrients such as carrots, beets, and sweetpotatoes. They usually grow underground as protection from plant-eating animals.

**Sunlight:** light from the sun needed by plants for photosynthesis.

**Sweetpotato plant:** member of the morning glory family, cultivated as an annual that sends out roots in favorable seasons to bear sweetpotatoes underground.

**Transplanting:** replanting a plant in a different location.

**Water:** a colorless, transparent, odorless liquid that forms the seas, lakes, rivers, and rain and is the basis of the fluids of living organisms.

### NC Ag Facts

- North Carolina grows nearly 60% of all United States sweetpotatoes (more than any other state in the United States).<sup>1</sup>
- The sweetpotato is North Carolina's state vegetable.<sup>1</sup> The single-word term helps differentiate the sweetpotato from the white or Irsih potato, which is a tuber, not a root, and possess a different nutrient profile. Sweetpotato – *Ipomoea batatas*, a storage root is part of the morning glory family.<sup>7</sup>
- North Carolina sweetpotatoes are available every month of the year.<sup>1</sup>
- Most sweetpotatoes are grown in the piedmont and coastal plain regions of North Carolina because of the well-drained, sandy soil.<sup>1</sup>
- There are hundreds of varieties of sweetpotatoes and many are grown across North Carolina. Some you may see most often in grocery stores include the Japanese sweetpotato, the White sweetpotato, and the orange flesh Covington sweetpotato.<sup>1</sup>

### Background Knowledge

Did you know that a sweetpotato is actually part of the morning glory family? It is a perennial (perennials regrow every spring); though it is cultivated as an annual (annuals live for one growing season, but often cannot be overwintered). The creeping stems of this amazing plant can grow up to 20 feet long and frequently send out roots at the nodes which, in favorable seasons, bear small potatoes. There are three main types of leaves: round, shouldered, and lobed or split. The color of the stems and leaves varies from dark green to light purple. No flowers are produced except in southern latitudes.<sup>2</sup>

The skin color of a sweetpotato can range from white to yellow, red, purple, or brown. The flesh also ranges in color from white to yellow, orange, or orange-red.<sup>3</sup>

So, is it a yam, a sweetpotato, or are they the same thing? The truth: yams and sweetpotatoes are not the same thing at all. There are thousands of sweetpotato varieties. Sweetpotato varieties are classified as either ‘firm’ or ‘soft’—firm varieties were produced before soft varieties. When the soft varieties were grown there was a need to differentiate between the two (firm or soft). Africans actually named the ‘soft’ sweetpotatoes ‘yams’ because they resembled the yams in Africa. Their native word was ‘nyami’ and if the n & i are removed the term ‘yam’ remains. Despite this identification, it is not true. In fact, while the ‘soft’ varieties look like yams, they are not yams at all; it is just a variety of sweetpotato.

Yams are often imported from the Caribbean; they are rough and scaly—very different from our smooth, orange flesh variety sold in the United States. In the United States, people often use the word sweetpotatoes and yams interchangeably; however, this is not correct and often adds confusion for the consumer. When a consumer goes to the store and purchases ‘yams,’ they are more than likely purchasing a different variety of sweetpotato. Today, the U.S. Department of Agriculture requires labels with the term ‘yam’ to be accompanied by the term ‘sweetpotato.’<sup>3</sup>

According to the North Carolina SweetPotato Commission, North Carolina has ranked number one in sweetpotato production in the United States since 1971 (2018). North Carolina’s hot, moist climate and rich, fertile soil are ideal for cultivating sweetpotatoes. Sweetpotato production in North Carolina averages nearly 60% of the U.S. supply.<sup>4</sup>

### **Climate**

Sweetpotatoes can be grown where there is a long frost-free period with warm temperatures in the growing season.<sup>4</sup> Most cultivars require a minimum frost-free period of 90-120 days, with a minimum average daily temperature of 77 degrees Fahrenheit. Sweetpotatoes also require an inch of water per week uniformly distributed throughout the growing season for highest yields.<sup>4</sup>

### **Uses for Sweetpotatoes**

Sweetpotatoes have many uses. They can be prepared in a number of dishes, canned, pureed, preserved and dehydrated. For drying, clean washed potatoes are placed in a suitable basket and immersed in boiling water for a short time; when taken out of the basket, they are cut into thin slices and spread over mats and exposed to the sun for two or three days. In order to make a superior quality, the skin of the potato is peeled off before slicing. Instances were reported wherein the dried product was successfully ground into flour.<sup>2</sup> In North Carolina, a company named Glean produces a sweetpotato flour.<sup>5</sup> Sweetpotatoes can also be used as food stock for animals. They have been successfully fed to hogs, cattle, horses and poultry.<sup>2</sup>

### **Student Motivator**

Before the lesson begins, place the sweetpotatoes in the bottom of a 5-gallon bucket and fully cover them with soil. Have students come as a whole group to a designated area in the classroom and bring out the 5-gallon bucket. Sit the bucket in the middle of the floor and have students form a circle around the bucket. Ask one of the students to lift up the bucket (it will be heavy so guide them as they try to pick it up). Ask the students to guess what is inside the bucket (the students should notice the soil and identify it quickly). Give students clues such as, “In the soil, you may find something you can eat,” or “It is orange.” Allow time for the students to guess. If they are struggling with guesses, give them simpler hints such as, “Sometimes in the lunchroom you eat this food like fries but you don’t use ketchup (at least most of you don’t).” Allow students to stick their hands in the soil (just in the top). They will find they cannot feel anything except the soil. Reach into the bucket and pull out a sweetpotato for the students to see. Ask to see if any students know what it is. Tell the students, “This is a sweetpotato!” Tell the students that today and for most of the week, they will be learning interesting facts about sweetpotatoes.



<https://www.hobbyfarms.com/build-five-gallon-bucket-garden/>

## Procedures

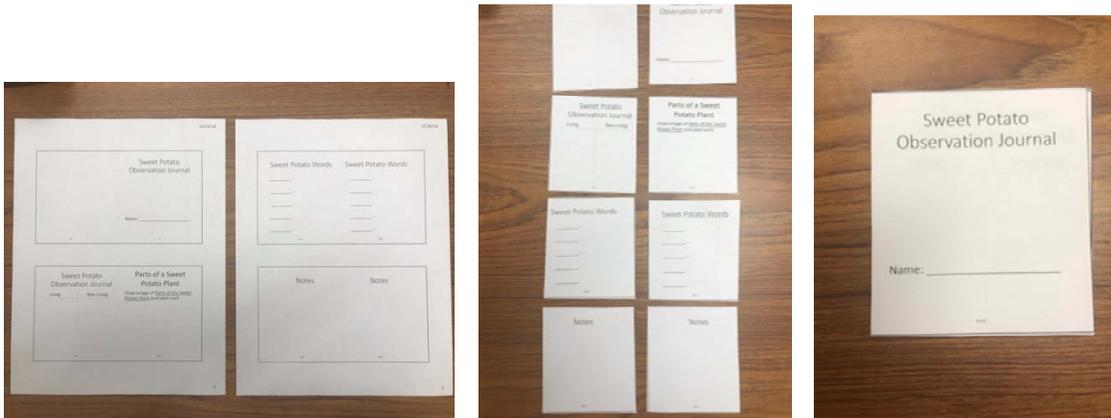
### Activity 1: Parts of the Sweetpotato Plant

**Students will differentiate between the living parts of a sweetpotato plant & the non-living components it needs for survival.**

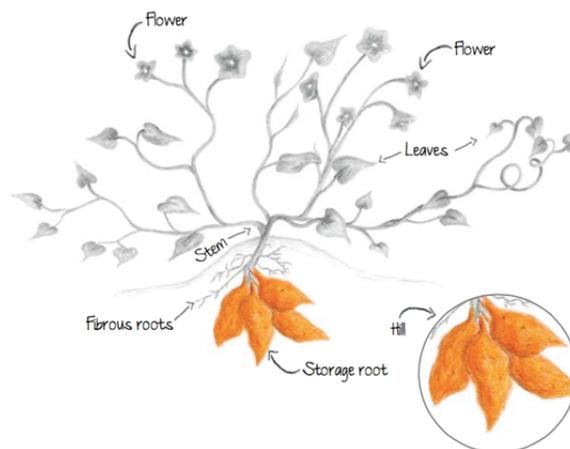
*Activity 1 is continued in Activity 4*

1. Place a large sweetpotato on a plate or on a document camera where students can easily see and make observations. Explain to students that they will be conducting observations of a sweetpotato during the next few weeks (*this will also take place in activity 4*).

2. Provide students with an *Observation Journal* (see **Essential Files**). Ask students to cut out each piece to create a page in their journal. Ask students to write their name on the front of the journal. Then staple the cutouts together on the top, left-hand corner or two staples down the left side.



3. Ask the students, “Do you think this sweetpotato is a living or a non-living thing?” Discuss the characteristics of living and non-living things, and how they work together to make things grow or change? *Students should identify that the sweetpotato plant is indeed a living thing, but non-living things such as the soil, water, and sunlight are necessary for growing sweetpotatoes.*
4. After a discussion of living and non-living things, show students parts of a sweetpotato plant.



*Photo credit Farm to School - Crops of North Carolina: Digging for Sweetpotatoes*

5. Share the image above with students. Read page 7 of *Farm to School - Crops of North Carolina: Digging for Sweetpotatoes*, “A sweetpotato vine has a **stem, leaves, flowers, and fibrous roots** like other plants.” All of the parts of a sweetpotato plant are living things.
6. Encourage student discussion by saying, “A sweetpotato is a living organism, but it depends on

non-living things like sunlight and nutrients from the soil to grow. What do you find interesting about sweetpotatoes? Did you know a **root** could be edible? The sweetpotato is a **storage root** specifically modified to store non-living nutrients such as starch and water. What non-living nutrients do you need in order to grow?"

7. Students will use this time to draw a diagram of a sweetpotato plant in their journal and include content words such as **slip**, **sweetpotato plant**, **sunlight**, **soil**, **water**, and **greenhouse** pertaining to the growth of sweetpotatoes they have learned thus far.
8. Have students add a phrase for each word pertaining to the sweetpotato plant that describes its function. Review their definitions from the list of vocabulary terms.
9. To finish this lesson and allow student observations, skip down to *Activity 4*.

### Activity 2: Organizing Sweetpotato Data (3<sup>rd</sup> Grade)

1. Explain to your students that they are going to learn how collecting data or information is important when growing sweetpotatoes.
2. Read page 8 of *Farm to School - Crops of North Carolina: Digging for Sweetpotatoes*, "Farmers don't plant sweetpotato seeds. Instead, they transplant sprouts, also called slips, grown in a field or a greenhouse." The slips also called **sprouts** are grown and collected from the seed sweetpotatoes and grow between 8 and 12 inches in length with no roots.
3. Show students pictures of sweetpotato sprouts planted in a field seen in the picture below on the left and sprouts grown in a greenhouse seen on the right. Tell the students that these sprouts will be transplanted in the farmer's field in raised beds also call a **hill**.



4. Ask students, "What math strategy could be used if the farmer needed to calculate the number of sweetpotatoes produced from each slip he/she planted? How could the farmer collect this data and use the information to improve production?" Discuss with students that math concepts such as multiplication and collecting data is important in agriculture for improving the yield of

sweetpotatoes each year.

5. Ask students to give an example of a time when they had to collect and use data.
6. Take a quick survey from the students of what they will be eating for lunch and create a bar graph on chart paper. Ask students, “What do you think is a favorite food among our class? Least favorite? How many more students eat pizza compared to salads? How many fewer students want sandwiches compared to pizza?”
7. Allow students to form groups of 3-4. Discuss how the data found in the bar graph can be used in a picture graph or a pictograph. Explain for the pictograph, each picture will represent 2 food items. With the help of students while asking questions, draw a pictograph using the data collected from the bar graph. Post both the bar graph and the pictograph in the classroom for reference.
8. Remind your students how to count by twos, fives, and tens for practice. Explain to students that skip counting is important to understand when reading graphs because the scale of the graph has different numerical measures. For example, if a pictograph has 2 pictures of pizza and each pizza represents 2 then there are 4 total pizzas. Another solution would be to use multiplication such as  $2 \times 2$ .
9. Have each group complete the *Sweetpotato Pictograph* (see **Essential Files**) explaining that one sweetpotato picture represents 5 items.
10. Next, have each group share out their answers from the pictograph. Discuss the importance of a sweetpotato farmer using math for collecting and recording accurate data. How do sweetpotato farmers use multiplication for predicting harvest yields? Would this also be an important part of the productivity of North Carolina farmers who produce corn, soybeans or cotton?

### **Activity 3: Multiplication, Division & Graphing (Grades 4<sup>th</sup> and 5<sup>th</sup>)**

1. Explain to your students that they are going to learn how multiplication and division are used as an important tool by sweetpotato farmers.
2. Share with students’ page 8 of *Farm to School - Crops of North Carolina: Digging for Sweetpotatoes*, “Farmers don’t plant sweetpotato seeds. Instead, they transplant sprouts, also called slips, grown in a field or a **greenhouse**.” When farmers grow plants (slips) for **transplanting**, they use whole potatoes known as seed stock. Below are examples of this process to show students.



*Pictures above show bedded sweetpotatoes. Left: shows bedded sweetpotatoes in a greenhouse, covered with potting soil. Right: shows bedded sweetpotatoes in open field, which are being covered with soil.*

3. Give students a scenario: Imagine you are a sweetpotato grower and it is time to plan your sweetpotato crop. You have  $X$  amount of sweetpotatoes to utilize for your upcoming crop (seed sweetpotatoes). How will you be able to determine how many plants will come from the bedded sweetpotatoes? Is it possible to use multiplication and division for this calculation? Allow students to brainstorm ideas and even come up with problems.
4. Once the sweetpotatoes have been placed in the field or in the greenhouse and covered with soil, sprouts will begin to grow.



*Pictures above show bedded sweetpotatoes in an open field.  
Pictures below show bedded sweetpotatoes in a greenhouse.*



5. After showing these images allow students to think for a moment about the process of growing sweetpotato sprouts or slips.
6. Ask the students, “How many slips do you think will grow from a portion of the sweetpotato?”
7. Teacher will show students a sweetpotato. Divide students into groups of 4-5 (depending on the size of class). Students will be conducting an experiment. Each group will need a sweetpotato (could use a pre-cut sweetpotato), potting soil, a plastic 5-gallon bucket, a plastic celled tray or individual plastic cups. Explain to students they will be using the process like a researcher from NC State University would use in growing sweetpotato sprout stock or as a farmer may use in growing sweetpotatoes. Show students all the tools they will be using in this experiment: plastic knife (optional), potting soil, 5-gallon bucket, gloves, and water.
8. The group will divide their sweetpotato (include the outer covering of the sweetpotato) into portions of 2 or 4 pieces and bury them into the **soil** (this symbolizes the bedding of sweetpotatoes). Designate different groups for using 2, 3 or 4 pieces of sweetpotato so comparisons can be made. Student groups will take an educated guess or create a hypothesis as to how many sprouts will grow from the pieces of bedded sweetpotato.
9. Next, create a class bar graph and graph each group’s educated guesses as to how many sprouts will grow from the pieces of bedded sweetpotato.
10. After the appropriate amount of time has passed, with appropriate care such as sunlight and light watering daily, the bedded sweetpotatoes will begin to grow stems within 6 days. Students will observe that one sweetpotato divided into 2, 3 or 4 pieces has the ability to create X number of sprouts which the farmer can use for growing sweetpotatoes.
11. Once observations have been made and the student groups have determined the number of sprouts that were produced, allow the students to create their own bar graph. Compare the graphs among the groups to determine which group had the closest calculation for the actual number of slips produced by their bedded sweetpotatoes.
12. Give each group a large piece of chart paper and markers. Challenge them to brainstorm and create other charts or graphs to depict this data.
13. Allow student groups to share out the new chart or graph and discuss possibilities for making changes in bedding their sweetpotatoes to produce the maximum number of viable sprouts. After

accomplishing this task, students will understand they are beginning to “think like a farmer.”

14. **Operations & Division Challenge:** Put a copy of *Sweetpotato Division Worksheet* (see **Essential Files**) on the document camera/projector to show students an example of a division problem that farmers may think about when growing their sweetpotatoes. Allow students to work together in groups. Remind them to identify key words for solving the problem.
15. Use the second problem on the *Sweetpotato Division Worksheet* (see **Essential Files**) as an exit ticket for individual students or to finish for homework.

#### **Activity 4: Life Cycle of a Sweetpotato**

**Students will understand each step and its purpose for the life cycle of a sweetpotato.**

1. Introduction and Discussion: Say, “You have briefly been introduced to sweetpotato plants and its parts. We have even discussed that a sweetpotato grows from a sprout, but where does the sprout come from?” Ask students, “Did you know that a sweetpotato can grow a new sweetpotato?” Ask the students using a show of hands for yes or no answers. Create a graph (possibly bar graph) with student responses. Explain that they have made a scientific prediction or hypothesis of what will happen in the experiment.
2. Explain to the students that with all scientific experiments and observations they need tools. Say, “Some of the tools you will need during this observation includes (hold up and show students) a student size magnifying glass, inch/centimeter ruler, an observation journal (from activity 1), and a pencil that we will be using often (daily or weekly).”
3. Provide each group of students with a sweetpotato, plastic cup larger than the sweetpotato, and 5-6 toothpicks. Explain to students that they will be conducting observations of their sweetpotatoes and documenting their findings on the notes page in their journals based on the changes they see.
4. Allow each student in the group to carefully stick toothpicks mid-way into the widest portion of the sweetpotato. The toothpicks should be equally spaced around the sweetpotato. Students will carefully put the sweetpotato into a plastic cup. Then, carefully pour water into the cup, allowing the water to touch just the bottom of the sweetpotato. Students will place the sweetpotato in a sunny spot in the classroom that is level and safe from being knocked over. *Refer to the examples pictured below.*

## Growing Sweetpotatoes

### Materials

Sweetpotato, tooth picks, and Large Mouth Mason jar or plastic cup – depending on the size of the sweetpotato you may need something more substantial to hold it up. Make sure to fill the jar or cup up as close to the top as possible, you can see that half of the sweetpotato is submerged in water. You do not have to add water daily, just when it starts to drop down below the sweetpotato add more so that it can get the hydration it needs. Also, if the water starts to smell or mold you may change it to fresh water.

Enjoy and have fun observing!



<https://www.thespruce.com/growing-sweet-potato-plants-in-pots-847888>

5. Students will conduct initial observations and make an educated guess on what will happen in 2 days and in 2 weeks. As the sweetpotato plant grows, students will measure the height of their sprouts in inches and centimeters. Students may also make observations and collect data by counting the number of leaves their sprouts have and recording all information in their journals. *Note:* In approximately 4 weeks, sweetpotato sprouts will have reached about 8-10 inches tall and produce several leaves. At this point it is time for transplanting. The teacher will carefully remove the sprouts by giving them a twist or cutting them with knife/scissors. Allow each student to receive a sweetpotato sprout.
6. After the 4 week mark, allow students to graph their sweetpotato observation data using a bar graph. Then allow students to compile their data creating a class bar graph or chart. A great extension to this activity would be to have students show other ways they could share and show the data they collected, creating other types of graphs (pictographs, pie charts, tally charts, etc.).
7. Transplant the sprouts. Sweetpotatoes need to be grown in well-drained, sandy, loamy soil. Prepare the soil by tilling and applying fertilizer (Miracle-Gro will be sufficient). Plant the sprouts 9 to 10 inches apart in the center of a ridge row at a depth of about 3 inches with at least 2 plant **nodes** (part of plant that will become stem/leaf) underground and 2 or more leaves above ground. Plants will need water immediately after transplanting. This is a great opportunity to integrate measurement into your lesson. Provide each student with a ruler and have them measure and mark the spot they will plant their sweetpotato sprout.

*Picture of sweetpotato nodes*



<http://www.mofga.org/Publications/MaineOrganicFarmerGardener/Spring2009/SweetPotatoes/tabid/1081/Default.aspx>

8. Discuss again with students the interaction between living and non-living things. Ask students to discuss what non-living conditions farmers depend on for growing sweetpotatoes and other North Carolina crops. Questions: What non-living things are necessary to grow sweetpotatoes in either a greenhouse or field? *Some examples of non-living things include water, light, temperature-students should explain the interaction between these things and that of the living/growing sweetpotato.*
9. **Extension:** Challenge your students to take sweetpotato sprout(s) home and plant them. Have them observe their own plants' growth as they did in class. Reserve time during class in several weeks to discuss the progress of their sweetpotatoes from home and take pictures for sharing. Encourage the students to eat their sweetpotatoes once they're ready for harvest at home. After caring for their sweetpotato have them write a paper about the important role of farmers and how important their job is caring for the food we eat every day.

#### **Activity 5: North Carolina Sweetpotatoes**

1. Discuss the background of sweetpotatoes regarding the origin and history of sweetpotatoes found in the **Background Knowledge** section.
2. Show students the following image from book *Farm to School - Crops of North Carolina: Digging for Sweetpotatoes*.

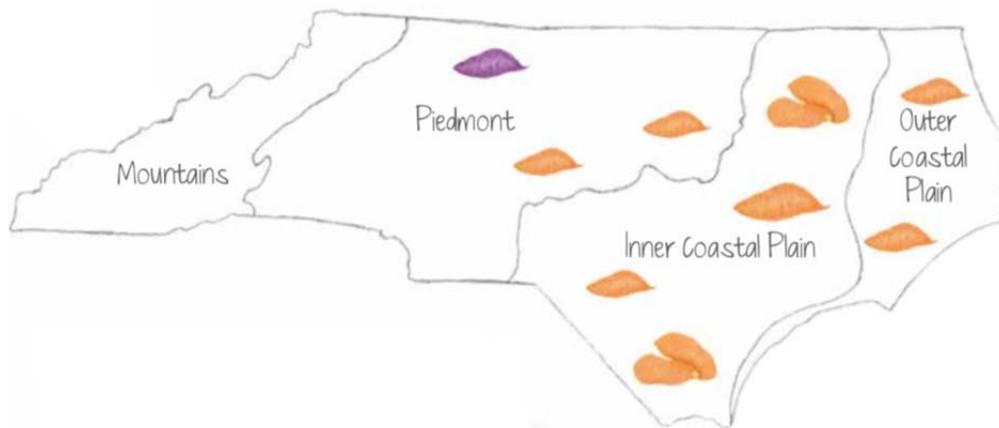


Photo credit Farm to School - Crops of North Carolina: Digging for Sweetpotatoes

3. Explain the different climates in each region of North Carolina. Students will be researching the different regions of North Carolina and how the climates help the sweetpotatoes grow.
4. Divide students into groups of 3: Piedmont, Inner Coastal Plain, and Outer Coaster Plain. Make note that even though they are not conducting research about the Mountain region of North Carolina there are still lots of commodities grown and raised in this region such as Christmas trees, greenhouse and nursery crops, turf grass, and beef cattle.
5. Have students create pamphlets/booklets/presentations about their region and the things they have learned about growing sweetpotatoes in that region. With adult supervision, allow students to conduct research using technology resources such as the internet with technology devices. Possible research topics: What varieties of sweetpotatoes are grown in specific regions of North Carolina? What is unique about the region you are researching? Explain the climate of your region. What are the non-living conditions needed to grow sweetpotatoes in your region?
6. **Extension/Higher Order Thinking:** Compare/Contrast the different regions from the completed projects. Have students write a one-page paper detailing the difference between two regions they selected and the similarities/differences of sweetpotatoes grown in each region.

**Activity 6: Students will use sequencing to understand the life cycle of a sweetpotato.**

**Sequencing:** putting things in order from beginning to end, using terms such as “first,” “next,” “then,” and “last.”

1. Students should have a solid understanding of sweetpotatoes. Say, “Today we are going to tie it all together and learn the life cycle of a sweetpotato.”
2. Using all of the things students have learned during previous activities, students will discuss the process the sweetpotato plant goes through to grow more sweetpotatoes. Ask the students, “What have we learned about our sweetpotatoes?” As the students are discussing facts and interesting details, write them on chart paper (this can be used as students complete their writing activity).
3. Show the students a copy of the *Life of the Sweetpotato* (see **Essential Files**). As the students see the images, they will begin to understand how sweetpotatoes are used to grow sprouts in order to grow more sweetpotatoes. Students will make note of the way sweetpotatoes grow.

Sweetpotatoes grow under the ground and have green leaves and flowers above the ground. Around August, farmers begin to **harvest** their crop. They use tractors and plows to lift up the soil so the sweetpotatoes can be dug up or brought to the surface of soil. Sweetpotatoes are grown for specialty dishes and are very healthy for us to eat. Farmers also feed parts of the sweetpotato plant and sweetpotatoes to livestock on their farms. After sweetpotatoes are sold to markets and eaten, the leftover sweetpotatoes are used to be planted in the ground again to make sprouts for new plants. The process continues in a full circle (life cycle).

4. Students will take all of this information and write a grade level appropriate sequence of the growth of a sweetpotato using transition words such as first, next, then and last.
5. **Extension Activity:** Students can draw/illustrate the life of a sweetpotato.

**Higher order thinking question (Blooms Taxonomy & Real World Situations):** If you were a worker in the sweetpotato processing plant, which potato would you choose and why? Think about what the **consumer** (people who eat the sweetpotatoes) likes to eat and how they will like it to look. Imagine how hard a farmer, the producer, has to work to ensure he/she produces a good quality product that consumers will buy and enjoy. *Remember to reiterate the role of a producer and a consumer.*



**Higher order thinking question (Blooms Taxonomy & Real World Situations):** As a consumer, imagine going to the grocery store to purchase sweetpotatoes. Can you identify all the different ways sweetpotatoes can be purchased from a grocery store or a farmers market? *There are many ways sweetpotatoes can be purchased, here are a few: sweetpotato chips, dried sweetpotatoes, microwave ready sweetpotatoes, individual sweetpotatoes, sack of sweetpotatoes, baby food, pureed sweetpotatoes, candied yams bought in a can, sweetpotato syrup (seasonal/locational), sweetpotato baking flour, sweetpotato butter (seasonal/locational).* Encourage students to visit a grocery store (with an adult) and walk around to look at the different things they can find relating to or pertaining to sweetpotatoes.

## Activity 7: Sweetpotato Geography

Students will understand the geographical relevance of sweetpotatoes in North Carolina, the United States of America, and around the world.

1. North Carolina is the leading producer of sweetpotatoes in the United States; in fact the sweetpotato is North Carolina's state vegetable. Pose the question, "Do you think sweetpotatoes are grown anywhere else in the United States? How about around the world?" Allow student discussion and possible interaction between differing opinions. *Additionally, you may show this video clip The NC Sweetpotato goes Abroad <http://www.pbs.org/video/nc-sweet-potato-goes-abroad-jzu0ks/>*
2. Show students a map of the United States of America (on a SMART Board, pull down map, globe, etc.). Have a student come up and find the United States of America. Then have a student locate North Carolina. Explain to students that even though North Carolina is the leading producer in sweetpotatoes there are other states in the U.S. that also produce large amounts of sweetpotatoes.
3. On a piece of chart paper or on a white board, list the top producing states for sweetpotatoes: (1) North Carolina (2) California (3) Mississippi and (4) Louisiana.<sup>5</sup> The states listed are the highest producers, but there are other states in the U.S. that produce sweetpotatoes. Have students get into groups and locate these four states on the United States map. Students will identify each state and mark them with a push pin/sticker/etc. on the map. Students can chart the location of each state in its accordance to North Carolina, as well as look up the unique things about each of these states in regards to climate and growth pattern compared to North Carolina's growing seasons.
4. Show students a world map (on a SMART Board, pull down map, globe, etc.). Have a student come up and find the United States of America. Then have a student locate North Carolina. Explain to students that North Carolina exports large amounts of their sweetpotatoes to other states and some sweetpotato producers even export out of the country. Then have another student come up to locate Europe. *It is said that a large portion of NC Sweetpotatoes are exported to Europe.*<sup>6</sup> Canada and the Netherlands are also large importers of U.S. sweetpotatoes.
5. Explain the importance of imports and exports to students. An **export** is to send (goods or services) to another country for sale. An **import** is bringing (goods or services) into a country from abroad for sale. North Carolina's agriculture industry contributes \$84 billion to the state's economy and 1 out of 6 jobs in North Carolina are employed by **agriculture**. The exporting of an agriculture **commodity** such as sweetpotatoes are vital to North Carolina's economy.
6. Explain to students they will be conducting their own import and export activity. The students will imagine they are the owner of a sweetpotato packing company and they need to export a good quality product to countries around the world.
7. Students will brainstorm their ideas of imports and exports. Students will think about what things need to be in place to send a good quality product to specific areas and meet the demands of the consumer. Ask students to think about these questions: What ocean(s) are crossed when exporting sweetpotatoes to Europe? What precautions must be taken to ensure the product is

safe? What inspections take place when exporting fresh goods? How do you plan to keep your sweetpotatoes from bruising or getting crushed?

8. **Import and Export Activity:** Students will create a method of sending their sweetpotatoes to other countries from their sweetpotato packing company. The company will have a logo, shipment ID, and be packaged a certain way for best marketing practices to the consumer. Students should think about the process of curing sweetpotatoes and how they are held in containers. Students will use prior knowledge of sweetpotatoes to create their import and export activity.
9. Students will use a variety of materials to create replicas of packing boxes and shipping materials they feel would be useful in exporting their sweetpotatoes.
10. Once completed, the students will share out their ideas and how they plan to make improvements to increase exports in coming years or how they plan to maintain their exports.

### **Activity 8: Sweetpotato: The Super Food!**

**Students will identify the purpose of eating healthy and the various ways to eat a sweetpotato.**

1. Pose the following questions to students, “Is it important to eat a healthy balanced diet? Is it important to exercise? Does it matter what foods we eat in order to be healthy?” Allow students to discuss and share out answers.
2. Explain to students that sweetpotatoes are indeed a vegetable that is good for our health. Front load students with nutrition facts about sweetpotatoes by saying, “sweetpotatoes are a very healthy food, they are rich in Vitamin A (stimulates production of immune cells to fight of disease and infection) and Vitamin C. They only have 100 calories, and are low in sodium, but do contain natural sugar. Due to their orange color, sweetpotatoes are also high in carotenoids (beta-carotene). They have many other vitamins including B5, B6, thiamin, niacin, and riboflavin. Health benefits include stabilizing blood sugar, high in antioxidants, boost brain function, enhance immunity, promote vision health, and aid in weight loss.” These are all important facts that can be added to the student *Observation Journals* (see **Essential Files**).
3. Pass out the non-fiction reading passage *Health of Sweetpotatoes* (see **Essential Files**) to each student.
4. Allow students time to read through the information. *Teachers this is a great opportunity to highlight non-fiction text features, process of road-mapping a passage in relation to end of grade test prep, etc.*
5. Students will work with partners or small groups to create an ‘infomercial’ using an iPad to teach other students about the health benefits of sweetpotatoes. Students will use creativity in their video to make it interactive using visuals, possibly exercise techniques, etc. Students will be graded on creativity, accuracy of their comments, and overall work of the group.

### **Concept Elaboration and Evaluation**

- **What is the life cycle of a sweetpotato?**

A sweetpotato vine has a stem, leaves, flowers, and roots like other plants. However, the part of the sweetpotato plant we eat is actually the plant’s storage root, which grows underground.

Sweetpotatoes are grown from sweetpotatoes! Sweetpotatoes are grown from sprouts to grow more sweetpotatoes. Sweetpotatoes grow under the ground and have green leaves and flowers above the ground. In August, farmers begin to harvest their crop. They use tractors and plows to lift up the soil so the sweetpotatoes can be dug up. After sweetpotatoes are sold to markets and eaten, the unusable roots are left in the fields to be disked back into the soil to replace lost nutrients. See the life cycle of a sweetpotato in **Activity 5**.

- **What can sweetpotatoes provide for the human body?**  
Sweetpotatoes are a very healthy food, they are rich in Vitamin A (stimulates production of immune cells to fight of disease and infection) and Vitamin C. They only have roughly 100 calories, and are low in sodium, but do have some natural sugar. Due to their orange color, sweetpotatoes are also high in carotenoids (beta-carotene). They have many other vitamins too, including B5, B6, thiamin, niacin, and riboflavin. Health benefits include stabilizing blood sugar, containing antioxidants, boosting brain function, enhancing immunity, promoting vision health, and aid in weight loss.
- **Why are sweetpotatoes important to North Carolina?**  
North Carolina is the largest producer of sweetpotatoes in the US and this export contributes to the revenue brought into the state and the country through agriculture. Sweetpotatoes are an important food, and historically was a staple food for Native Americans many years ago. North Carolina sweetpotatoes have become a large export to other parts of the world, especially Europe. The importance of the sweetpotato goes far beyond the fields it grows in, but the millions of consumers that eat them throughout the year.
- **What are the living parts of a sweetpotato plant?**  
A plant, including its cellular structure is a living organism. A plant cell is made up of multiple living parts including the cytoplasm, endoplasmic reticulum, ribosomes, Golgi body, lysosomes, mitochondria, chloroplast, and the nucleus. However, a plant cell is also made up of multiple non-living parts as well. A plant must consist of all parts: both living and non-living to survive. This is the scientific reasoning behind the growth of a plant; however, a plant has four basic parts: roots, stem, leaf, and flower. All of these parts have a purpose. Now, let's stop and think about a sweetpotato plant. A sweetpotato plant has a flower, stem, leaves, fibrous roots, and a storage root. These are all living parts of a sweetpotato plant. One interesting fact about sweetpotatoes is when eating one you are eating the living part of the plant.

### **Extension Activities**

#### **Sweetpotatoes Around the World**

**Recipe Writing:** Students will utilize the NC SweetPotato Commission website, [www.ncsweetpotatoes.com](http://www.ncsweetpotatoes.com) to research different recipes using sweetpotatoes from around the world. After researching the different recipes, students will write a recipe using sweetpotatoes as an ingredient. Students will share the recipe with the class. Some of the recipes can be cooked and tested in the classroom to show students what a recipe looks like from start to finish. This is a great time to integrate "How To" Writing (differentiation) and recipe format. For example: How to Make a Sweetpotato

Casserole, Step 1: Gather ingredients, Step 2: Mix together. This would also be an engaging class project—to create a recipe book highlighting many sweetpotato recipes.

### Suggested Companion Resources

- *From Farm to School – Crops of North Carolina: Digging for Sweetpotatoes* (Activity Book)  
<https://ncsweetpotatoes.com/wp-content/uploads/2013/03/Digging-for-Sweet-Potatoes-Activity-Book.pdf> [ncsweetpotatoes.com]
- A Sweetpotato Tale (video)  
<http://www.pbs.org/video/a-sweet-potato-tale-warnvs/>
- The NC Sweetpotato Goes Abroad  
<http://www.pbs.org/video/nc-sweet-potato-goes-abroad-jzu0ks/>

### Sources and Credits

1. <https://statesymbolsusa.org/symbol-official-item/north-carolina/state-food-agriculture-symbol/sweet-potato>
2. <https://archive.org/stream/sweetpotatocultu00pric#page/12/mode/2up>
3. <https://www.loc.gov/rr/scitech/mysteries/sweetpotato.html>
4. <https://ncsweetpotatoes.com/sweet-potatoes-101/how-to-grow-sweet-potatoes/>
5. <https://demography.cpc.unc.edu/2017/11/17/nc-in-focus-sweet-potatoes-2017/>
6. <https://www.thepacker.com/article/export-demand-still-growing-us-sweet-potatoes>
7. <https://cipotato.org/research/sweet-potato/sweetpotato-one-word-or-two/>

This publication was supported by the U.S. Department of Agriculture’s (USDA) Agricultural Marketing Service through grant 17-182-2001. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the USDA.

