GEORGIA AG EXPERIENCE

A MOBILE CLASSROOM POWERED BY

GEORGIA FOUNDATION FOR AGRICULTURE

LESSON TITLE: "Cotton: The Snow of the South"

Subject: Agriculture - Cotton	Grade Level: 3rd – 5th Grade	Estimated Time: 45 – 60 minutes

Resources & Materials:

Activity 1:

- Square of jeans
- Towel square
- Pillow square
- Fake $100 bills

Activity 2:

- Video: https://www.youtube.com/watch?v=Ur-IssVtWnI

Activity 3:

- Cotton stalks
- Scissors or cutting edge
- Paper plates

Standards:

3FA1: Describe how agriculture impacts your daily life.

S3L2: Obtain, evaluate, and communicate information about the effects of pollution (air, land, and water) and humans on the environment.

5FA1: Construct a model of the supply chain from origination to end product of commodities/fiber/natural resources

5FA2: Explore and cite examples of agricultural history, economics, and inventions.

S5L3: Obtain, evaluate, and communicate information to compare and contrast the parts of plant and animal cells.

Learning Objectives:

1. The students will be able to identify 3 products that have cotton in them with 100% accuracy.
2. The students will be able to identify the number of pairs of jeans made from one bale of cotton with 90% accuracy.
3. The students will be able to identify the technology used to develop cotton into products that we use with 90% accuracy in a group via visuals.

4. The students will be able to identify different parts of the plant with 80% accuracy individually.

Guiding Background Knowledge & Fun Facts:

Can anyone name a crop we grow here in Georgia that produces zero waste?
(Let the students give some answers then reveal which is the correct answer, cotton)

Cotton! Excellent, let's learn where each part of the cotton plant goes once its harvested.

Cotton fibers are used to make products like t-shirts, jeans, and even money!
Cotton seeds are used to make cotton seed oil you buy in the grocery store as well as cotton seeds for animals to eat!
Cotton stalks are used to replenish the soil once the crop is harvested! It's important to add nutrients back in so we can grow more crops like peanuts or corn!

INTEREST APPROACH:

Estimated Time: 10 minutes

Materials:

- Crayons/Colored pencils
- Cotton balls
- Cotton Plant Worksheet

Instructions:

Give each student a standard 8.5" x 11" piece of paper. Have them draw a cotton plant in the middle circle on the paper. Next, give each of them 4 – 8 cotton balls to glue on their cotton plants (number of cotton balls depends on how many stalks they draw)

Ask the students to then label the three arrows pointing away from the cotton plant. One arrow should be labeled "Cotton Fibers", the second arrow should be labeled "Cotton Seeds", and the third should be labeled "Cotton Stalks". Ask the students to then tell you what each of those parts are used for. Once they answer correctly, they can either draw that item or write it out next to the arrow.

LEARNING ACTVITY #1: What Can Be Made From Cotton?

Estimated Time: 15 – 20 minutes

Resources & Materials:

- Jean square
- Towel square
- Pillowcase square
- Fake $100 bills

Vocabulary:

Bale of cotton – a commercial package consisting of cotton lint tightly compressed

Instructor Directions:

Students will all receive pieces of materials in their small groups. Students will have 5 minutes to touch and discuss the materials they have. Students will then be asked to identify the items they have.

How many items can you make from one bale of cotton?

- 215 pairs of jeans
- 249 bed sheets
- 1,256 pillow cases
- 313,600 $100
- 690 terry bath towels
- 4,321 mid-calf socks

And so much more!

So how does cotton transform from one tiny boll to a pair of jeans or other items you may be wondering. Well, technology has advanced so much over the past few years in order to develop the products that we have today! We'll explore more about the technology later but first, let's find out what products we can find cotton in!

Square of jeans: Typical composition of jeans are 75% cotton and 25% spandex, polyester, etc. 100% cotton jeans are typically harder to stretch, and are more resilient than other blends.

Towel square: This towel is 100% cotton. If you refer to the tags on towels you can see the percentage of cotton each towel is made of! Often you will hear different names for cotton such as Egyptian which some people believe is a higher quality cotton.

Pillow case: Cotton pillow cases are soft and breathable and typically what you will have in your homes!

$100 bill: The US $100 bill contains 75% cotton! The $100 bill you are looking at is fake money for visual use only. But isn't that neat that all your money is "made" by farmers?

Engage:

Students will all receive pieces of materials in their small groups. Students will have 5 minutes to touch and discuss the materials they have. Students will then be asked to identify the items they have.

Explore:

Students will receive cotton products to explore and learn how they are connected to the cotton plant.

Square of jeans: Typical composition of jeans are 75% cotton and 25% spandex, polyester, etc. 100% cotton jeans are typically harder to stretch, and are more resilient than other blends.

Towel square: This towel is 100% cotton. If you refer to the tags on towels you can see the percentage of cotton each towel is made of! Often you will hear different names for cotton such as Egyptian which some people believe is a higher quality cotton.

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Test and improve:
Students will be asked to list three products they use everyday that contain cotton using the summary worksheet.

Student will be asked to identify the number of different products that can be made from one bale of cotton using the summary worksheet.

- Jeans
- Bed sheets
- Pillowcases
- $100 bills
- Bath towels
- Socks

LEARNING ACTVITY #2: What's a Cotton Gin?

Estimated Time: 15 – 20 minutes

Resources & Materials:

- Video: https://www.youtube.com/watch?v=Ur-IssVtWnI

Vocabulary:

- **Patent** – a document that gives the inventor of something the right to be the only one to make or sell the invention for a certain number of years
- **Cotton Gin** – A machine for separating cotton from it's seeds
- **Revolutionized –** to change greatly or completely

Instructor Directions:

Up until the 1940's, cotton was picked by hand but today, we use machines. In the late 1930's a man named John Rust developed the first mechanical cotton picker. However, it was not made in a large-scale commercial setting until the 1940's! The first cotton gin was patented by Eli Whitney which revolutionized the growth of cotton, and it is now a hot crop in the United States. This mechanical cotton picker helped farmers clean and deseed the cotton. Then, the cleaned and deseeded cotton is pressed into bales and wrapped up! The bales are stored and transported to a facility until they are needed for use in further processing factories!

The technology used in the process of turning raw cotton is essentially cleaned and aligned parallel so they can be spun on a cone. Next, the weaving process consists of weaving the product together and packing for finishing.

Technology has enhanced the cotton process and made it easier for products to be made! Let's check out this video about the Cotton Gin and see how it works!

Video: https://www.youtube.com/watch?v=Ur-IssVtWnI

Content/Procedure: (Engage, Explore, Test & Improve)

Engage:
Students will discover the history of harvesting cotton and the technology advancements that have propelled cotton production to what it is today.

Explore:
They will learn about the mechanical cotton picker originally invented by John Rust as well as the patent that led to the invention of Eli Whitney's Cotton Gin. A short lesson will be taught on the history of the Cotton Gin followed by a video to show how the machines work.

Test and Improve:
The students will be asked to identify the technology used to develop cotton into products that we use today using the summary worksheet. The students will be asked to discuss how technology has improved the cotton industry in three different ways using the summary worksheet.

(OPTIONAL) LEARNING ACTVITY #3: Cotton Plant Dissection

Estimated Time: 15 – 20 minutes

Resources & Materials:

- Cotton stalks
- Scissors or cutting edge
- Paper plates

Vocabulary:

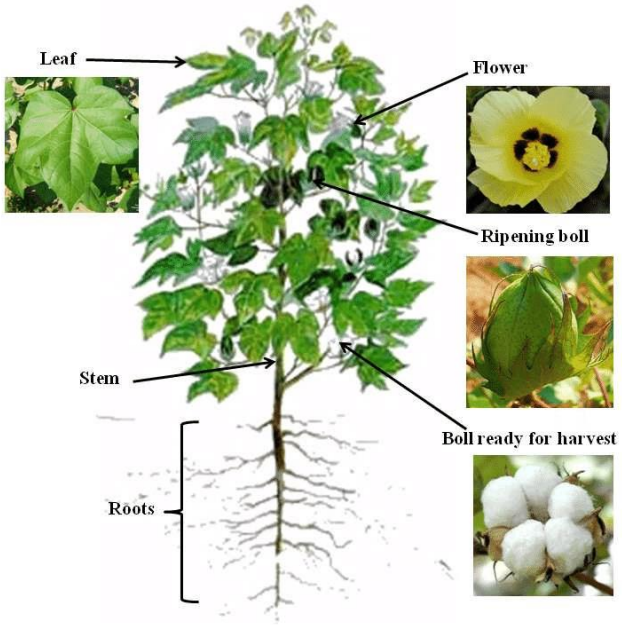
- **Roots** – part of a plant that is hidden under ground and help hold the plant in place and take water and food from the soil
- **Petiole** – a stalk that connects the blade with the leaf base
- **Node** – the point on the plant stalk where a joint with a side branch is formed
- **Photosynthesis** – the process which green plants use sunlight to make their own food

- **Chlorophyll** – chemical in the plant that allows it to store and use light to make food through photosynthesis
- **Stomata** – tiny opening or pore in a plant to help regulate the passage of gas and light
- **Apical Bud** – the primary growing point located at the top of the stem
- **Cotton Boll** – the seed-bearing part of the cotton plant in which the cotton fibers are formed

Instructor Directions:

Students will each get their own materials

Let's dive into the parts of the cotton stalk. Like all plants, the parts of the cotton stalk work together to be able to grow the best bulb possible. If one of the parts of the cotton stalk did not work properly, then the plant would not grow.



The instructor will go through each step one at a time, and then allow students to do that step while the instructor assists where needed.

First Step: Removing the roots

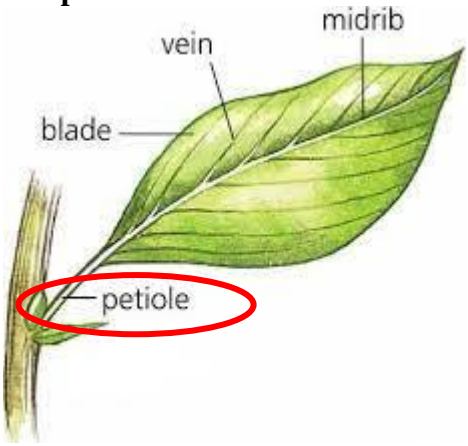
To remove the roots; the teacher will simply cut at the secondary root closest to the stem.

Roots are essential to the growth of any plant. Roots carry water and nutrients from the soil to the plant. Without the roots, the plant would not be able to obtain water efficiently or other important nutrients that they need to grow. Roots also help anchor the plant in place. This helps the plant from falling over from wind and rain. Essentially, without roots, a plant would not be able to maintain life.

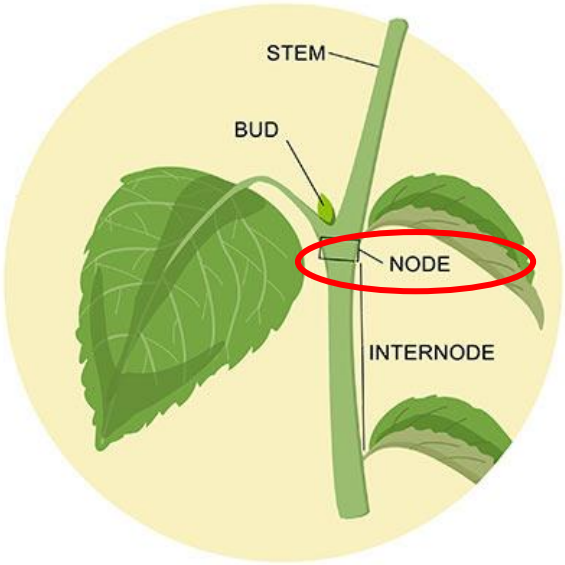
Second Step: Removing a single Petiole

To remove the **petiole;** the instructor will cut the **node** and then place is on the plate.

The **petiole** is a stalk that connects the blade with the leaf base:

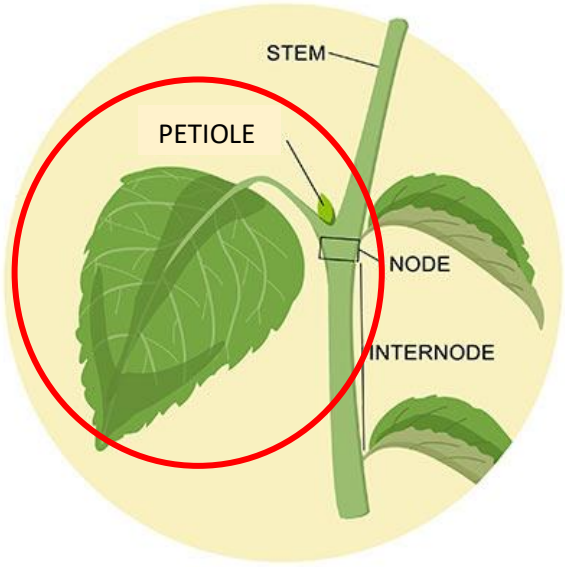


A mainstem **node** is the point on the plant stalk where a joint with a side branch is formed:

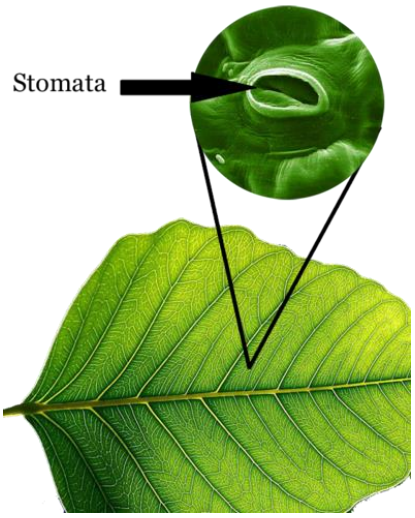


The stem of the plant is part of the shoot system of the plant. The function of the stem is to provide support to the plant. It holds the plant's leaves, flowers, and the buds. The stem also connects the plant's roots to the leaves. It helps transport the water and nutrients to the different areas of the plant. The stem also helps with photosynthesis by transporting the products of photosynthesis to the rest of the plant.

<u>Third Step: Removing a single leaf</u>
To remove the leaf; the teacher will simply cut the leaf at the node that is off of the petiole and place it on the plate.

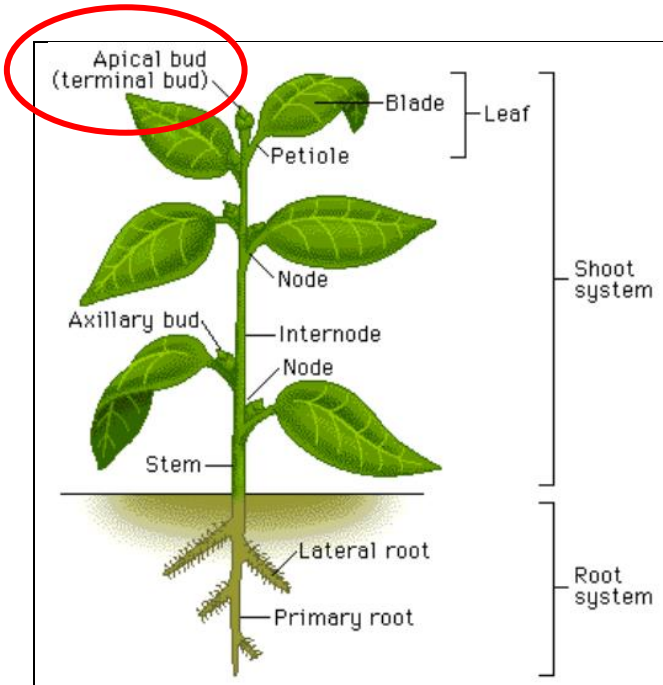


The leaf's sole purpose is to make food for the plant. This is done through photosynthesis. **Photosynthesis** is the food making process for the plant. It is very important that a plant has healthy leaves so that photosynthesis can take place. Leaves also contain an important chemical that is called **chlorophyll**. This is the chemical that makes the leaves green and is also the chemical that allows photosynthesis to occur. The leaves of the plant are arranged on the plant in a fashion that allows for maximum absorption of sunlight. Leaves also contain **stomates**. These are located on the underside of the leaves, and they regulate the passage of gases and water to and from the leaves.



<u>Fourth Step: Removing Ripening Boll or Boll Ready for Harvest</u>

To remove the Ripening/Harvest Ready Boll; the teacher will simply cut the leaf at the **apical bud** and place it on the plate.



The **cotton boll** is the "fruit" of the plant. Boll is the seed-bearing part of the cotton plant in which the cotton fibers are formed. It is the most important part of the plant in terms of cotton production. Cotton bolls are fairly small, they can weigh anywhere from 3-6 grams. Interestingly the seeds are 60% of the weight. The weather can affect how the boll forms. Factors such as temperature, sunlight intensity, water, and nutrient availability can affect the quality of boll growth.

Cotton boll suffers damage from flooding rains

Good quality cotton boll

Engage:
Students will receive hands-on experience learning about each part of the cotton plant by a dissection lab.

Explore:
Students will be given their own cotton stalk, scissors, and paper plate for the plant dissection lab. The instructor will help students dissect the plant step by step while learning what each part is and how it helps the plant to grow and produce cotton bolls for consumers.

Test and Improve:
Using the summary worksheet, students will be asked to identify the different parts of a cotton plant.

SUMMARY:

Estimated Time: 10 minutes

Lead students in a discussion to establish a supply chain from growth, harvest, and processing to create products they know and use every day.

Begin by asking student where cotton is grown in Georgia. They should identify the southwest area. Next, ask students to identify the different parts of the cotton plant on a diagram and define the following vocabulary words:

- Roots – part of a plant that is hidden under ground and help hold the plant in place and take water and food from the soil
- Petiole – a stalk that connects the blade with the leaf base
- Node – the point on the plant stalk where a joint with a side branch is formed
- Photosynthesis – the process which green plants use sunlight to make their own food
- Chlorophyll – chemical in the plant that allows it to store and use light to make food through photosynthesis
- Stomata – tiny opening or pore in a plant to help regulate the passage of gas and light
- Apical Bud – the primary growing point located at the top of the stem

Cotton Boll – the seed-bearing part of the cotton plant in which the cotton fibers are formed

Once the students have identified and reviewed the plant, ask them about the history of harvesting cotton.

- How was cotton harvested before the 1930's?
  - By hand
- Who is John Rust?
  - The man who invented the first mechanical cotton picker
- Who is Eli Whitney?
  - The inventor to patent the first Cotton Gin
- When did Eli Whitney patent the cotton gin?
  - 1940's
- What does a cotton gin do?
  - Cleans and deseeds the cotton
- What is done with cotton once it is run through the cotton gin?
  - Packed into bales and transported to the factory to be spun into fibers

Once students have responded to all the history questions, ask them about what is made of cotton that they may use every day?

- Jeans
- Bed sheets
- Pillowcases
- $100 bills
- Bath towels
- Socks

Ask students to recall how many of each item can be made from one bale of cotton:

- Jeans: 215 pairs
- Bed Sheets: 249
- pillowcases: 1,256
- $100 bills: 313,600
- Bath towels: 690
- Socks: 4,321

EVALUATION:

Estimated Time: 20 – 30 minutes

Summary Worksheet:

Name: _____

Date: _____

What Can You Make from a Bale of Cotton?

- Name 3 products that have cotton in them.
  -
  -
  -
- Which one of those products surprised you and why?

Video over Cotton Gin: https://www.khanacademy.org/humanities/us-history/the-early-republic/politics-so ciety-early-19th-c/v/the-market-revolution-part-1

- What are 3 facts in the video that you thought stood out?
  -
  -
  -

Cotton Dissection:

- Did you notice parts of the plant that give the plant nutrients?
- What do the roots of the plant do?
- Where are the seeds on the cotton plant?
- What does the leaf provide for the cotton plant?

Cotton Plant Worksheet

Name: _____

Date: _____