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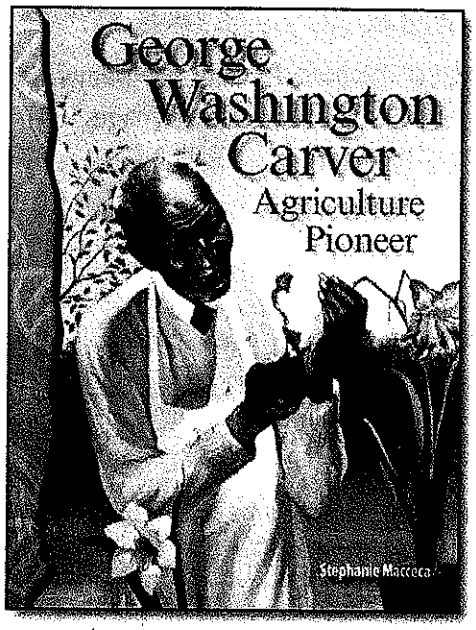
Science Readers

Lesson Plans for

George Washington Carver



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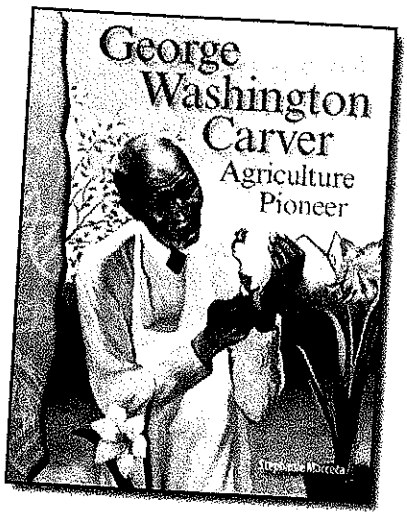
George Washington Carver: Agriculture Pioneer Reader



Learning Objectives

Students will identify and use text structure in order to understand text. (Nonfiction Reading Objective)

Students will write using examples from the text. (Writing Objective)

Students will explore concepts related to photosynthesis and agriculture. (Science Content Objective)

Materials

- writing paper and pencils
- *A World of Peanuts* activity sheet and transparency (page 108)
- *Grow a Peanut* activity sheet (page 109)
- *Rotating Crops* activity sheet (page 110)
- materials for Lab (see page 96)
- *Reader Quiz* (page 111)

Before Reading

Complete the Introductory Activity (page 92) with the whole class. Then divide the students into reading groups. The students who read this book should be below level.

Display the book *George Washington Carver: Agriculture Pioneer* and ask students to define "agriculture pioneer." Help them to understand that agriculture pertains to the science of farming and a pioneer is someone who leads the way in a particular area. Given this information, lead students to the understanding that George Washington Carver was a man who led the way in the area of farming.

Take time before reading to review any unfamiliar vocabulary with the students. After reviewing new words, ask students to predict how these words might be used in the reader and what they might learn from the text.

Open up the reader to pages 4 and 5 and show this spread to the students. Point out the main text. Then point out the sidebar information and pictures. Ask students why they think these are included along with the main text. Read all of the text aloud.

Explain that diagrams, photographs, sidebars, etc., all provide extra information that helps the reader to clarify and increase understanding.

Before Reading *(cont.)*

Tell students to use the sidebar information as they read to help them to better understand. Draw students' attention to the structure of each page spread. There is a section of main text. Then there is information and/or pictures. These are often examples that further explain the main text. Explain that reading sidebar information is an excellent way to find additional examples and information.

During Reading

Distribute the readers and have all students read through page 9. Then pause and ask the following questions:

- How did the sidebar information help you to understand the main text?
- On pages 8 and 9, it says that Carver was not able to attend the local school. What sidebar information is provided to indicate the books he used to become educated?

Continue discussion in this manner as students read the remainder of the reader.

Peanuts are not native North American plants. Discuss what this means with students. Reread page 15 about transplanted plants.

Display the *A World of Peanuts* transparency displaying a blank world map. Use a world desk or wall map as a reference. Explain that peanuts originated in South America (color in South America with one color of transparency marker), then moved to West Africa by Portuguese settlers and traders (color in West Africa with a second color). Finally, peanuts came to North America (color in North America with a third color). Today, peanuts are also grown in Argentina, Sudan, India, China, Thailand, and Indonesia (color these countries with a fourth color).

Discuss the regions of the world where peanuts are grown. What similarities do these countries share? Distribute *A World of Peanuts* (page 108) to students. (Students may need to reference a U.S. map.) Read the information and shade the states together. Then allow time for students to answer the questions. As a follow up, ask students, if they can, to bring in a peanut butter label. Working in groups, the students compare the ingredients among different brands, and look to see if the company boasts what percent of the product is peanuts.

After Reading

Ask students to respond to the following questions:

- How did Carver learn so much about agriculture?
- How did he become a scientist?
- How does his work in the past benefit people today?

After Reading *(cont.)*

Explain to the students that just as the examples in the reader were helpful for them to make sense of the text, they can also provide examples in the things that they write. Assign each student a section of the reader to summarize in a paragraph of four or five sentences. The student should write a sentence that tells the main idea of the section and then four sentences that provide supporting details. The student should include an example as part of the supporting details.

A peanut plant mostly grows like other plants, except for where the seed (peanut) grows—underground! Discuss with students the usual growth process of a plant. Illustrate the steps on the board as they recite them in order. Then reveal that peanuts are not really nuts (which grow on trees); they are legumes, in the same plant family as peas and beans. Discuss how these seeds grow in a pod.

Reread page 22 listing some products that can be made from peanuts. Distribute *Grow a Peanut* (page 109) to students. Read the information together, then allow students to complete the activity sheet independently. Invite students to try growing their own peanut plant. Use raw (un-roasted) peanuts in their shell and nutrient-rich, well-drained soil.

Southern plantation owners were quickly depleting their fields of needed nutrients. They planted cotton in the same fields every year. Reread page 4 about how crop rotation can help keep soil ready for planting.

Distribute *Rotating Crops* (page 110) to students. Read the information, then allow time for students to work the logic problem. Following, have them share their four-field crop rotation plan with the class.

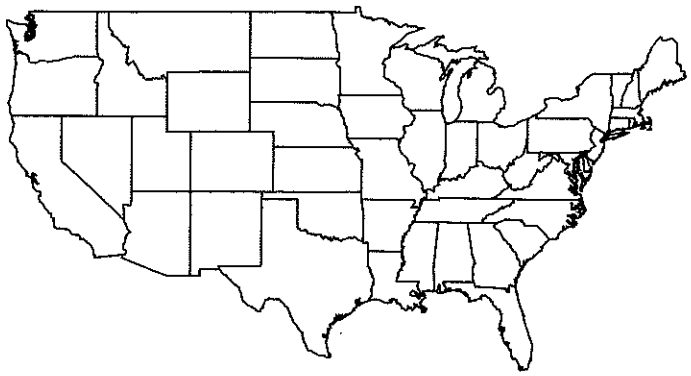
A *Reader Quiz* is provided (page 111). Use this to assess your students' understanding of the reader.

Finally, gather the students back together in a whole group to have them complete the lab activity (pages 95–96) and the Concluding Activity (page 93).

A World of Peanuts

David Grandison Fairchild studied and brought plants that could live in America. The peanut plant is not believed to have grown in North America before settlers brought it here. It began in South America. Portuguese settlers brought it to West Africa in the 1500s. It was then shipped along with slaves to the southern states. The slaves farmed the peanut fields.

Today, peanuts are grown in Alabama, Florida, North Carolina, South Carolina, Oklahoma, Texas, and Virginia. Find these states on the U.S. map below. Color them with a colored pencil. Indicate in the map key what the color stands for.



Georgia is another state that grows peanuts. It grows about half the supply of peanuts in the United States. Shade Georgia on the map with a second color. Indicate in the map key what this color stands for.

Directions: Use the information you read in *George Washington Carver: Agriculture Pioneer* to answer the questions.

1. Americans consume about 2.4 billion pounds of peanuts each year. Write this number in standard form.

2. About half of Americans' consumption of peanuts is from peanut butter. How many pounds of peanuts do Americans consume as peanut butter?

3. In the United States, in order for a product to claim itself as "peanut butter," it must be at least 90% peanuts. Check this peanut butter label. Assuming this product is 90% peanuts, what percent do the remaining ingredients make up? What are the other ingredients?

PEANUT BUTTER
INGREDIENTS: PEANUTS, SUGAR, VEGETABLE OIL, MOLASSES, SALT.

4. If Carver's food, industrial, and commercial products used peanuts following the same ratio where they are presently grown in the United States, from which state would manufacturers get about half their nuts?

5. Would Carver have been able to teach students about peanuts at the Tuskegee Institute?

   How do you know?

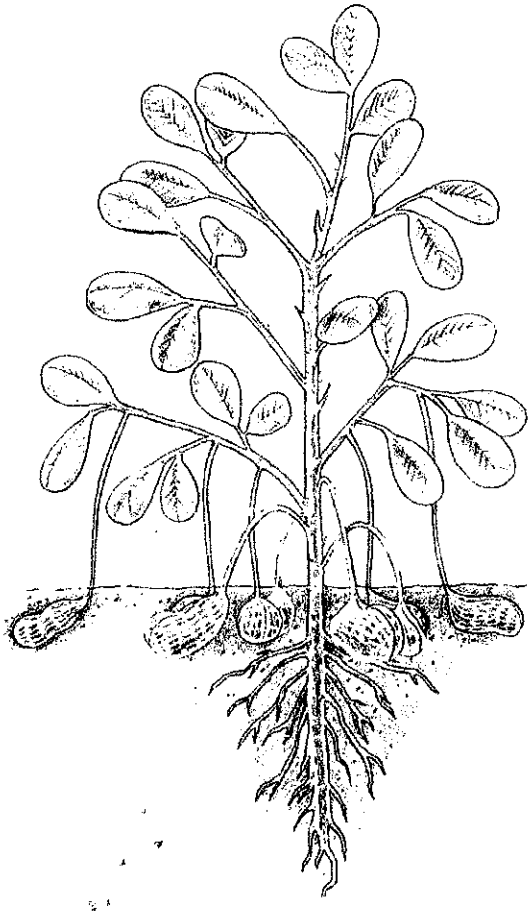
Challenge: Write your own question about peanuts on the back side of this page. Use reference materials to find the answer. Trade papers with a friend and try to answer each others' questions.

Grow a Peanut

Plants need several nutrients to grow. Plants take energy from the sun, and use carbon dioxide and water to make food (glucose) for themselves. This process is called photosynthesis.

Plants use their roots to draw water to the leaves, where photosynthesis takes place. Along with the water are nutrients from the soil. Nitrogen, phosphorus, and potassium are a plant's primary nutrients. George Washington Carver realized that farmers were depleting or using up all the soil's nutrients by planting only one crop year after year. Eventually, these crops died. The nutrients these plants needed to grow had been sucked out of the soil.

This illustration shows a peanut plant as it grows. Once planted, roots and stems sprout. The stems grow leaves. Small yellow flowers bloom on the stems. A peg grows from the flower to the soil. Seed pods form at the ends of the pegs. These are the peanuts in their shells.



Directions: Label each part of the peanut plant. Use these terms. Answer the questions.

Flower	Leaf	Nitrogen	Peanut	Peg	Phosphorus
Potassium	Root	Soil	Stem	Sun	

1. Where does the seed we eat (peanut) grow?

2. How is this different from nuts?

3. Why do you think peanuts are sometimes called "ground nuts"?

4. Peanuts are not nuts. They are legumes, most closely related to peas and beans. What do all three of these edible plants have in common?

5. Aside from peanut butter, what else can be made from peanuts? Why?

Rotating Crops

George Washington Carver discovered that farmers were depleting or using up all the soil nutrients when they continued to plant cotton year after year. He taught farmers how to rotate their crops so that the soil could remake the nutrients plants need to grow. Peanuts were one crop that was rotated with cotton on some plantations.

Early farmers used to plant their crops on two fields. They let one field lay unused (called fallow) while they planted on the second field. The next year they would switch the crop to the other field. Now farmers can plant in one field two years in a row before letting it rest for one year. Farmers keep three fields of crops to let this happen. This illustration shows a crop rotation over a period of three years.

	Field 1	Field 2	Field 3
Year 1	Kale	X (Fallow)	Watermelon
Year 2	Peanuts	Carrots	X (Fallow)
Year 3	X (Fallow)	Squash	Soy beans

No two plants from the same "family" should be planted in the same field two years in a row.

Directions: Use the clues to determine which fields had which family of vegetables. Write the color in the correct field.

1. Color in the nine boxes with green, yellow, blue, or red. Each color signifies a different crop family. Field 1 had no red or blue crops over three years. Field 2 had crops the first and second years. Field 3 had one green crop. Field 1 lay fallow its second year. A red crop was only planted in Year 1. Year 2 had a green and blue crop. A green crop was planted each year. Year 3 only had one green crop. At least two crops were planted each year, none the same color.

	Field 1	Field 2	Field 3
Year 1			
Year 2			
Year 3			

2. Use the color chart below to write the name of a crop in each of the colored boxes.

   Green = cucumbers, pumpkins, squash, or watermelon

   Yellow = carrots, parsley, celery, or dill

   Blue = kale, mustard greens, cabbage, or broccoli

   Red = peanuts, lima beans, soy beans, or peas

3. Create your own crop rotation plan with four fields. Peanuts should be one of the crops grown each year. Plants in the same family should not be planted in the same field for any two consecutive years. Each field should lay fallow for one year after being used for two years.

	Field 1	Field 2	Field 3	Field 4
Year 1				
Year 2				
Year 3				

Reader Quiz

Directions: Use what you learned from reading *George Washington Carver: Agriculture Pioneer* to choose the best answer for each question.

1. Of the 300+ uses for peanuts, which part of the economy does NOT offer a product made with peanuts?

   a. food b. industry c. commerce d. finance

2. How were George and his mother's situation different from that of other slaves?
   a. They bought land from the Carvers.
   b. They were allowed to stay together.
   c. The Carvers treated them like family.
   d. Their situation was the same as that of other slaves.

3. How did Carver overcome prejudice during his lifetime?
   a. He applied and was accepted into many colleges.
   b. He made up his own middle name.
   c. He did well in school and was offered many jobs.
   d. He wore a flower in his lapel to show that he had class.

4. What did Carver seek to accomplish in Tuskegee?
   a. He wanted the cotton crops to be more healthy and full.
   b. He wanted students to be self-sufficient.
   c. He wanted students to learn by doing.
   d. all of these

5. How did Carver's work with crossbreeding help farmers?
   a. He helped pollen reach more plants.
   b. He discovered ways to make stronger, healthier plants.
   c. He learned how to improve soil composition.
   d. He introduced better plants that were not native to the United States.

6. What was Carver's reaction to money and job opportunities that came with his discoveries?
   a. He turned down money and high-paying jobs to help people.
   b. He accepted money for his discoveries.
   c. He held many jobs across the United States.
   d. He ignored money to continue his research in chemurgy.

7. George Washington Carver's nickname is "The Peanut Man." Do you think this is a good nickname? Use details and examples from the book to support your answer.

George Washington Carver *Answer Key

A World of Peanuts

Check students' maps.

1. 2,400,000,000 pounds
2. 1,200,000,000 pounds
3. 10%; sugar, vegetable oil, molasses, salt.
4. Georgia
5. Carver would have been able to teach students at the Tuskegee Institute about peanuts if he took them in the Jesup Wagon to a peanut farm, but only if peanuts were grown in Alabama during his life like they are today.

Challenge: Check students' questions and answers.

Grow a Peanut

1. underground
2. Nuts grow in a tree above ground.
3. They grow underground.
4. Their seeds are all contained in a pod.
5. Answers will vary.

Rotating Crops

1. Year 1: Green, None, Yellow; Year 2: None, Green, Blue; Year 3: Yellow, None, Green
2. Answers will vary.
3. Check students' field layouts.

Reader Quiz

1. d 2. c 3. c 4. d 5. b 6. a
7. Answers will vary. Students should have justified their response with details from the story.

Lab Lesson Plan: Transportation within Plants

Before the Lab

Review with students what they learned about how a plant uses its parts to live.

Ask the students to think about how one part of a plant can or cannot live without another. For example, could a plant live without roots? A stem or stalk? Leaves? Why not?

Introduce the Lab

Read the introductory information with students, and look at the images.

Read the list of materials. Provide each lab group with the necessary materials. Or, have them ready to complete as a demonstration lesson in front of the class.

Read through all the procedures with the students at least once before they engage in the lab. Check for understanding of the required steps.

Have students verbally explain the process of the celery stalk bringing nutrients to the leaves. Why do the leaves need the nutrients and water?

Conduct the Lab

Allow time for lab groups to conduct the lab, or follow the steps as a class if conducting a demonstration lab.

Instruct students to record their conclusions and answer the questions at the end of the lab in their science journals.

After the Lab

Have each lab group share its predictions to question #2 in the conclusion. Have them justify their ideas with information from the reading.

Lab: Transportation within Plants

Materials

- beaker
- water
- red food coloring
- stalk of celery

Procedure

Fill a large glass or beaker with water and add red food coloring until it is dark red.

Place the stalk of celery into the beaker and allow it to sit for a while.

After some time, the red water will flow through the plant and turn the tips of the leaves red.

Peel off one stalk and slice it in half. You will see the small tubes that carry water and nutrients to the leaves.

Conclusion

Describe what you observe in the celery. Why do you think you see what you see?

What do you think would happen if you turned the stalk upside down and placed the leaves in the colored water? Why?

A World of Peanuts Transparency