



# The Book Planter



## Ag in the Classroom

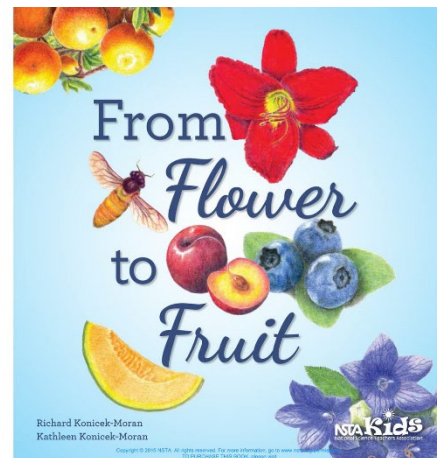
Post Office Box 27766 | Raleigh, NC 27611 | (919) 782-1705  
ncagintheclassroom.com

April 2021: *From Flower to Fruit*

Written by:

Richard & Kathleen Konicek-Moran

*From Flower to Fruit* will transform curious readers—children and adults—into budding plant scientists. The book draws you in with the charms of rich illustrations and an engaging narrative, but this is more than just a pretty storybook. It sparks curiosity about the parts of a flower and the vital roles bees and seeds are to plant reproduction. Six kid-friendly activities and background information for parents and teachers compliment the text. The authors also encourage you to explore several agricultural mysteries!



### Fun Facts

- A tomato is considered a fruit botanically (meaning, the flower becomes the “fruit” which contains seeds), but we classify it as a vegetable when we talk about it in the context of gardening or cooking.
- **Seed banking** is a means of storing the genetic diversity of plants off-site and apart from the natural environment. The North Carolina Botanical Garden’s seed banking program has been in operation for over 45 years, with some of the oldest seed collections dating back to 1982.<sup>2</sup>
- North Carolina’s state fruit is the scuppernong grape. North Carolina’s state berry is the strawberry.
- North Carolina’s fruit production ranks in the top ten nationally for peaches and apples.<sup>5</sup>



### Activity 1: A Seedy Fruit Challenge<sup>3</sup>

#### For the teacher demonstration:

- Seeded orange
- Apple or pear
- Peach, plum, apricot or other stone fruit

#### For the class:

(Three of each or adjust to what is available)

- Seeded orange
- Apple
- Peach
- Bell pepper

- Pea pod
- Tomato
- Cucumber
- Berries
- Peanut
- One paper plate for each piece of fruit
- Scales for weighing fruit

**For each partnership:**

- An assortment of three different fruits, such as: seeded orange, apple, bell pepper, and a peanut
- Paper towels
- Sharp plastic knife
- One paper plate for each fruit given

**For each student:**

- *A Seedy Fruit Challenge* student lab worksheets (**Links** section)

**Procedures**

1. Facilitate a discussion with students about different fresh foods they eat that have seeds. Make a list of these foods on the board. Ask them if the foods are fruits or vegetables (botanically, fruits have seeds; vegetables come from another part of the plant and do not contain seeds).
2. Tell students that they will dissect fruits to observe and record where the seeds are located, how many seeds they have, and the size, color, texture, and shape of the seeds in each fruit.
3. Distribute student lab, *A Seedy Fruit Challenge*, to each student. Explain what is expected of the students with the lab worksheet. Demonstrate how to make a bar graph.
4. Divide students into groups of three or four. Distribute newspaper, paper plates, plastic knife, paper towels, and 3-5 pieces of fruit to each group.
5. Instruct students to weigh each piece of fruit before cutting into it.
6. Instruct students to place each piece of fruit on a paper plate and carefully dissect it with a plastic knife being careful to keep the fruit's juices on the plate.
7. Upon completion, discuss the results as a class.

**Activity 2: Vines, Shrubs, and Trees<sup>4</sup>**

1. Print one copy of the file [Tree Shrub Vine Fruit Pictures PowerPoint](#) (see **Links**). Cut out the individual fruit pictures.
2. Place the pictures of the tree, shrub, and vine on the board. Describe each plant to the students and explain that most fruit grows on one of these three types of plants.
  - a. **Tree:** Many trees produce various types of fruits and nuts. Fruit trees have a stem and branches made of wood. They produce flowers in the spring, which mature into fruit.

- b. **Shrub** (sometimes called a bush, but shrub is the scientifically correct term): A fruit shrub is fairly low to the ground. It has small wooden stems that branch out. The shrub is covered in leaves and the flowers mature into fruit.
    - c. **Vine**: Some fruits grow on vines. Vines such as those for grapes or kiwi fruits grow from a woody stem and are usually supported on a trellis. Watermelon and cantaloupe are examples of fruits that grow from vines with a soft, herbaceous stem.
3. Choose students in your class and give them a picture of a fruit (you can also group students together if you have more students than pictures). Ask each student to place their fruit card on the board by the type of plant that it comes from. You could have the students guess or allow them to research the fruit to find out where it grows.
  - a. Fruits that grow on trees: Lime, grapefruit, orange, apple, pear, cherry, peach, banana
  - b. Fruits that grow on a shrub: Pineapple, raspberry, blueberry
  - c. Fruits that grow on a vine: Grape, strawberry, watermelon, and cantaloupe
4. Summarize that the fruit we eat is grown on a farm. Fruit farms are found in many areas of the United States and the world.
5. Extension: Students can research the fruits grown by farmers in North Carolina.

### Activity 3: Fruit Reactions<sup>4</sup>

#### Materials (one per group):

- 1 cutting board or tray
- 1 butter/table knife
- 1 small plate
- 1 set measuring spoons
- 1 spoon
- 1 plate for each group member
- 1 banana
- For Group B: 1 tablespoon sugar
- For Group C: 1 tablespoon lemon juice
- For Group D: ½ teaspoon cream of tartar and 1 teaspoon water

\*Note: If you have a large class, you might want to give each group two bananas so you have enough

#### Group A: Plain

1. Peel the banana. Place the banana on the cutting board or tray.

2. Use a butter knife to slice your banana into 12-14 pieces. Then cut each slice in half.
3. Put all of the pieces on a smaller plate. Leave the plate uncovered.
4. Wait 15 minutes.

#### Group B: Sugar

1. Peel the banana. Place the banana on the cutting board or tray.
2. Use a butter knife to slice your banana into 12-14 pieces. Then cut each slice in half.
3. Put all the pieces on a small plate. Use a spoon to sprinkle the banana pieces with sugar. Gently stir.
4. Wait 15 minutes.

#### Group C: Lemon Juice

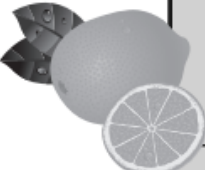
1. Peel the banana. Place the banana on the cutting board or tray.
2. Use a butter knife to slice your banana into 12-14 pieces. Then cut each slice in half.
3. Put all the pieces on a small plate.
4. Squirt each banana piece with lemon juice.
5. Wait 15 minutes.

#### Group D: Cream of tartar

1. Put ½ teaspoon of cream of tartar and 1 teaspoon of water on a plate.
2. Use a spoon to mix the cream of tartar and water.
3. Peel the banana. Place the banana on the cutting board or tray.
4. Use a butter knife to slice your banana into 12-14 pieces. Then cut each slice in half.
5. Put all of the pieces on the plate.
6. Use a spoon to gently stir the bananas and cream of tartar mixture.
7. Wait 15 minutes.

After 15 minutes, take one piece of banana from each group, and put on each student's plate. Serving one type of banana at a time may help avoid confusion. Students will study the color of each piece. Then, they may taste all four pieces. Have students share what they learned by filling in the table below. Students will circle the face that matches how well they liked the appearance and taste. Lastly, ask the question, "What is the best way to keep your bananas from turning brown?" Then ask, "Why did the lemon juice keep the bananas from browning? Do you think sugar or cream of tartar is an acid? Did any of the additional ingredients change the taste? How?"

## Browning Reactions



Group	Appearance (list the color)	Taste (sour, sweet or bitter)	Was browning stopped? Circle yes or no, and explain.
Plain: Group A	☹️ 😐 😊	☹️ 😐 😊	Yes      No Why:
Sugar: Group B	☹️ 😐 😊	☹️ 😐 😊	Yes      No Why:
Lemon juice: Group C	☹️ 😐 😊	☹️ 😐 😊	Yes      No Why:
Cream of tartar: Group D	☹️ 😐 😊	☹️ 😐 😊	Yes      No Why:

**What is the best way to keep your bananas from turning brown?**  
(Explain why.)

### Links

- A Seed Fruit Challenge worksheet (from Activity 1)  
[https://cdn.agclassroom.org/media/uploads/2015/10/05/Seedy\\_Fruit\\_Challenge.pdf](https://cdn.agclassroom.org/media/uploads/2015/10/05/Seedy_Fruit_Challenge.pdf)
- Tree Shrub Vine Fruit Pictures PowerPoint (from Activity 2)  
[https://docs.google.com/presentation/d/1HyYjk00R6-10LTP2a1ZsXy\\_rvkkVxz5tKjfmHMgWnd4/edit?usp=sharing](https://docs.google.com/presentation/d/1HyYjk00R6-10LTP2a1ZsXy_rvkkVxz5tKjfmHMgWnd4/edit?usp=sharing)
- 

### Sources

1. <https://www.sciencelearn.org.nz/resources/103-seed-dispersal#:~:text=Because%20plants%20cannot%20walk%20around,%2C%20animals%2C%20explosion%20and%20fire.>
2. <https://ncbg.unc.edu/research/plant-conservation/seed-banking-ecology/>
3. <https://www.agclassroom.org/matrix/resource/267/>
4. <https://horticulture.ces.ncsu.edu/horticulture-fruits/#:~:text=North%20Carolina's%20local%20and%20regional,nectarines%2C%20raspberries%2C%20and%20strawberries.>
- 5.

## **K-5 Subject Areas**

Writing, Speaking and Listening, and Science

### **NC Standard Course of Study**

#### **Writing**

- **W.K.3** Use a combination of drawing, dictating, and writing to narrate a single event or several loosely linked events, tell about the events in the order in which they occurred, and with guidance and support, provide a reaction to what happened.
- **W.K.5** Participate in shared investigation of grade appropriate topics and writing projects.
- **W.K.6** With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question
- **W.1.6** With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
- **W.2.6** Recall information from experiences or gather information from provided sources to answer a question.
- **W.3.6** Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.
- **W.4.5** Conduct short research projects that build knowledge through investigation of different aspects of a topic
- **W.5.5** Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

#### **Speaking and Listening**

- **SL.K.1** Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.
- **SL.K.3** Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
- **SL.K.4** Speak audibly and express thoughts, feelings, and ideas clearly.
- **SL.K.5** Add drawings or other visual displays to descriptions as desired to provide additional detail.
- **SL.1.1** Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.
- **SL.1.4** Produce complete sentences to describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.
- **SL.1.5** Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.
- **SL.2.1** Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.
- **SL.2.4** Tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking audibly in coherent and complete sentences.
- **SL.3.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly
- **SL.3.4** Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly in complete sentences at an understandable pace.
- **SL.4.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
- **SL.4.4** Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; adjust speech as appropriate to formal and informal discourse.
- **SL.5.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly
- **SL.5.4** Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; adapt speech to a variety of contexts and tasks.

#### **Science**

- **K.P.2** Understand how objects are described based on their physical properties and how they are used.

- **1.L.1** Understand characteristics of various environments and behaviors of humans that enable plants and animals to survive.
- **1.L.2** Summarize the needs of living organisms for energy and growth.
- **3.L.2** Understand how plants survive in their environments.
- **5.L.2** Understand the interdependence of plants and animals with their ecosystem.



# A Seedy Fruit Challenge

## Background Information

Seeds develop from flowers once the egg cell in the ovary of a flower is fertilized. Generally, the ovary ripens into the fruit and provides a protective structure around the seed. Sometimes, the ripened fruit comes from another part of the flower such as the ovary wall, receptacle of the flower, or the fleshy tissue of the ovary.

Fruit is the ripened ovary and the other structures that surround it at maturity. As the ovary develops into a fruit, its wall often thickens and becomes differentiated into three, more or less distinct layers. These three layers together form the pericarp, which surrounds the seed or seeds.

The three layers are:

- **Exocarp** – The outer layer consisting of the epidermis (skin)
- **Mesocarp** – The middle layer consisting of the fleshy portion that we often eat
- **Endocarp** – The inside layer varies greatly from one species to another

Most angiosperms (flowering plants) have simple fruits, which can be categorized as follows:

## Fleshy Fruits

These fruits have a pericarp that is soft and fleshy at maturity. Common fleshy fruits can be divided into groups as follows:

- **Drupe:** a fruit from a single carpel, in which the outer wall of the ovary has become fleshy and the inner part stony at maturity. Often termed a "stone fruit." Examples include peach, plum, apricot, cherry, and almond.
- **Pome:** Endocarp is papery, forming a core with several seeds, compound pistil; Examples include apple, pear and quince.
- **Pepo:** an accessory berry, with a relatively hard rind; Examples include watermelon, cucumber, pumpkin, squash, and cantaloupe.
- **Hesperidium:** a modified berry, in which the outer part of the ovary wall becomes leathery. Examples include orange, tangerine, lemon, lime, grapefruit.
- **Berry:** Ovary wall becomes fleshy throughout, one to many seeds. Examples: grape, eggplant, tomato, kiwifruit, and persimmon.

## Dry Fruits

These fruits have a pericarp that becomes dry and hard at maturity.

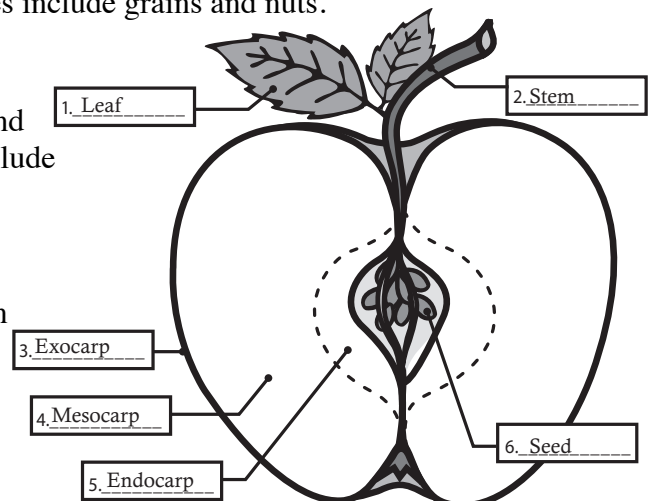
- **Legume (pod):** Splits open along two seams. Examples include pea, green bean, and peanut.
- **Capsule:** Two or more fused carpels, the fruit splits open at maturity. Examples include lily.
- **Indehiscent dry fruit:** Does not split open at maturity. Examples include grains and nuts.

## Aggregate Fruits

Clusters of several ripened ovaries produced by a single flower and produced on the same receptacle of a single flower. Examples include raspberry, blackberry, and boysenberry.

## Multiple or Compound Fruits

Clusters of several ripened ovaries produced by several flowers in the same inflorescence. Examples include pineapple.

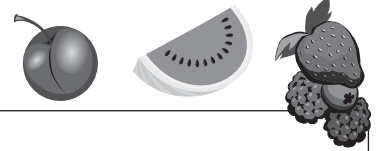




# A Seedy Fruit Challenge

Name: \_\_\_\_\_

Dissect and record the following information for each of your three fruits.



**Name of Fruit** \_\_\_\_\_

Draw dissected half and label the **Exocarp**, **Mesocarp** and **Endocarp**.

Number of seeds \_\_\_\_\_

Color of seeds \_\_\_\_\_

Shape of seeds \_\_\_\_\_

Texture of seeds \_\_\_\_\_

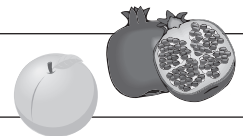
Mass of fruit \_\_\_\_\_

Mass of seeds \_\_\_\_\_

Check the type of fruit:

- ☐ Fleshy
- ☐ Dry
- ☐ Aggregate
- ☐ Compound

**Name of Fruit** \_\_\_\_\_



Draw dissected half and label the **Exocarp**, **Mesocarp** and **Endocarp**.

Number of seeds \_\_\_\_\_

Color of seeds \_\_\_\_\_

Shape of seeds \_\_\_\_\_

Texture of seeds \_\_\_\_\_

Mass of fruit \_\_\_\_\_

Mass of seeds \_\_\_\_\_

Check the type of fruit:

- ☐ Fleshy
- ☐ Dry
- ☐ Aggregate
- ☐ Compound

## A Seedy Fruit Challenge *(continued)*



<b>Name of Fruit</b> _____	
Draw dissected half and label the <b>Exocarp</b> , <b>Mesocarp</b> and <b>Endocarp</b> .	Number of seeds _____
	Color of seeds _____
	Shape of seeds _____
	Texture of seeds _____
	Mass of fruit _____
	Mass of seeds _____
	Check the type of fruit:
	<input type="checkbox"/> Fleshy
	<input type="checkbox"/> Dry
	<input type="checkbox"/> Aggregate
	<input type="checkbox"/> Compound

- How are seeds protected? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- Name three kinds of seeds that people eat: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- In what part of the flower do seeds come from? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- What is the seed's function? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## A Seedy Fruit Challenge *(continued)*

5. Name three ways seeds are transported in nature. \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

Use a bar graph to compare the mass of each fruit and the mass of its seeds.

*Example:*

