MAY

HARVEST OF THE MONTH

Lesson Plans and Activities

School Nutrition Programs
Virginia Department of Education

Harvest of the Month
School Nutrition Programs
Virginia Department of Education

Agriculture in the Classroom℠
AgInTheClass.org

STRAWBERRIES

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INTRODUCTION

Virginia Harvest of the Month (HOM) is a program that promotes eating seasonal foods, increasing fruit and vegetable consumption, and supporting local economies. Sponsored by the Virginia Department of Education, Office of School Nutrition Programs (VDOE-SNP), Virginia HOM provides ready-to-use materials for classrooms and cafeterias to educate children about the joys of eating seasonal, local foods.

In collaboration with Virginia Agriculture in the Classroom and Virginia Cooperative Extension Agents, VDOE-SNP developed nutrition education lessons for secondary students based on the HOM featured item. Additionally, with a select group of Virginia nutrition directors, VDOE-SNP created and tested recipes for school meals highlighting the Virginia HOM featured item. The recipe development team's culinary knowledge and student input were used to create the recipes that correspond with this lesson. Providing nutrition education with student meals creates an opportunity to engage students with how Virginia foods are grown, connect food and wellness, and promote the consumption of the HOM featured item.

In your school cafeteria this month, the recipe: Rise and Shine Strawberry Oats will be available. As you learn about the Harvest of the Month in the classroom, we encourage you to connect your classroom activities to the cafeteria and try the new student taste tested and approved recipes!

ACKNOWLEDGMENTS

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LESSON ONE:
FREEZER JAM

Grade Level: Grades 9-10
Lesson Length: 1 hour

Objective:

Students will:

- Explore food preservation by preparing an applicable standardized recipe.
- The student will recognize strawberries as a crop grown and marketed in Virginia.
- The student will understand farm to table concepts around Virginia food and food systems.

Related Competencies:

Introduction to Culinary Arts, 8249:

- Apply mathematical skills to job specific tasks
- Follow a standardized recipe
- Demonstrate basic knife skills
- Demonstrate technique for scaling and measuring volume and weight
- Demonstrate recipe conversion, using conversion factors and formulas
- Describe food science principles in food preparation (Optional)

Culinary Arts I, 8275:

- Describe professional knife safety
- Explain safe food handling, production, and storage procedures
- Explain requirements for receiving and storing raw foods
- Explain cooking and storage techniques that retain maximum nutritional value
- Demonstrate knife skills
- Follow a standardized recipe

Foundations AFNR (Agriculture, Food, and Natural Resources), 8006:

- Explain the role that food science plays in ensuring a nutritious, safe, and abundant food supply
- Describe methods of food preservation
- Perform a method of food preservation

Applied Agricultural Concepts, 8072:

- Identify characteristics of ripened vegetables and fruits
- Prepare food products for consumption or preservation
- Outline the procedure for processing fruits and vegetables
- Describe methods of preserving fruits and vegetables
- Demonstrate a method of preservation

Materials:

- 2 cups (1 pint) strawberries, ripe
- 4 cups (1 quart) granulated sugar
- ¾ cup water
- 1 package fruit pectin (1.75 oz. package)
- Freezer-safe 8 ounce containers
- Large glass or heat safe mixing bowl
- Potato masher or food processor
- Small saucepan
- Ladle
- Rubber spatula
- Access to a stove or hotplate

Background:

Strawberries are native to the Americas. The Native Americans were already eating strawberries with the Colonists first arrived. Today, about ninety-four percent of Americans eat strawberries. In Virginia, Strawberries generate about $9 million in sales each year. Strawberries are high in vitamin C and are a good source of manganese. Because they are soft and the seeds are so small, they make excellent jams and preserves. In this lesson, students will explore a food preservation technique. Freezing is a convenient and simple way to preserve food items. Once prepared, the following recipe will remain fresh in the freezer for up to one year.

Extension:

- Use this procedure to make freezer jams with other mashable fruit, such as blueberries and blackberries.
- Learn about the life and growth cycle of a strawberry plant. Grow your own strawberries in containers at school. (See the Companion Resource list below).
- Research genetic selection and learn about other food products that have changed throughout history.

References:

- University of Georgia Extension, National Center for Home Food Preservation

Companion Resource:

Factsheet: Freezing Food Preservation
Publication: Virginia AITC Strawberry Newsletter
Article: Tips for Growing Your Own Strawberries
Book Recommendation: *Grow it Again* - Find creative solutions to growing affordable plants in the classroom
Career Focus: Food Products and Processing Systems

Virginia Grown Strawberries: Freezer Jam

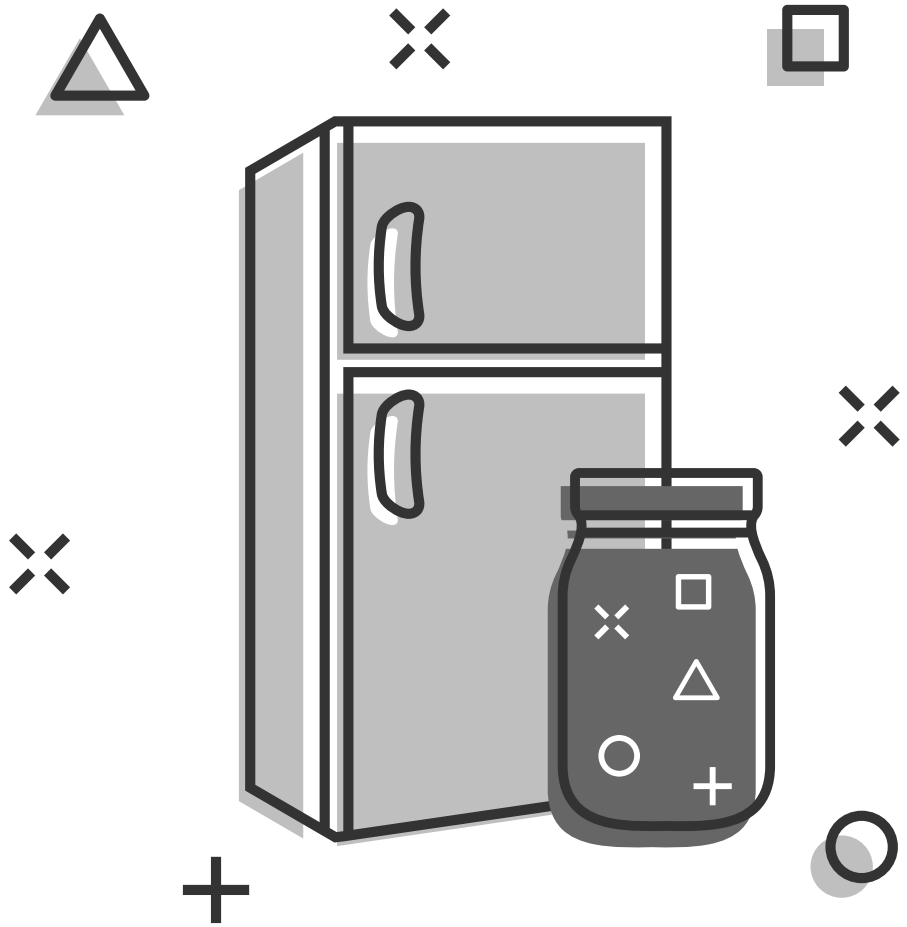
Your teacher has supplied you with fresh Virginia Strawberries. In this activity, you will learn how to make your own jam and store it in a freezer for up to a year. Follow the steps below to make your own delicious Virginia Freezer Jam!

Procedure:

1. Sterilize containers by washing in hot soapy water. Rinse and air-dry.
2. Wash the fruit.
3. Remove the green caps of the strawberries using a knife or straw.
4. Crush the berries in a mixing bowl with the potato masher or food processor.
5. Stir in sugar. Allow the mixture to sit for 20 minutes, stirring occasionally.
6. In a small saucepan, stir pectin into the water. Bring to a boil. Boil for one minute.
7. Pour pectin solution onto the berries. Stir and let sit for two minutes or until room temperature.
8. Ladle 8 ounces of jam into freezer safe containers. Use a rubber spatula to scrape the mixing bowl.
9. Store in the freezer for up to one year. Once thawed, store in the refrigerator for up to three weeks.

Materials:

- ❑ 2 cups (1 pint) strawberries, ripe
- ❑ 4 cups (1 quart) granulated sugar
- ❑ ¾ cup water
- ❑ 1 package fruit pectin (1.75 oz. package)
- ❑ Freezer-safe 8 ounce containers
- ❑ Large glass or heat safe mixing bowl
- ❑ Potato masher or food processor
- ❑ Small saucepan
- ❑ Ladle
- ❑ Rubber spatula
- ❑ Access to a stove or hotplate



TRY THIS!

Use this procedure to make freezer jams with other mashable fruit, such as blueberries and blackberries!

Lesson 1: Reflection Questions

After reading the passage and doing the activity, please answer the questions below by writing your response.

1. What did you learn from this lesson?

2. What surprised you about this lesson?

3. What was the most challenging part of this lesson? Why?

Lesson 1: Application Questions

After reading the passage and doing the activity, please answer the questions below by writing your response.

1. How can you apply what you learn through this lesson to other situations?

2. What types of preserved goods are served in your school cafeteria?

3. What other types of foods do you eat that are "value added", requiring additional ingredients and processing?

LESSON TWO:
DNA EXTRACTION

Grade Level: Grades 9-10
Lesson Length: 90 minutes

Objective:

Students will:

- Explain the role of genetics and heredity in agriculture and food systems.
- Extract DNA from living tissue by using everyday items.

Related Competencies:

Foundations AFNR (Agriculture, Food, and Natural Resources) 8006:

- Describe the influence of biotechnology on AFNR
- Describe the types of plants that are being developed using biotechnology

Biotechnology Foundations in Agricultural and Environmental Science, 8085:

- Identify careers related to biotechnology
- Demonstrate techniques for DNA extraction
- Explain nucleic acids
- Explain proteins
- Perform separation and purification of macromolecules

Materials (per group or student):

- DNA Source: Strawberries, ½ cup
- Water, 1 cup
- Salt, 1/8 tsp
- Blender
- Coffee filter
- Liquid Dish Soap
- Test Tube
- Meat tenderizer, pinch
- Rubbing Alcohol, 16 ounce Bottle
- Wooden Stick (BBQ skewer)

Extension:

- Try the same experiment with another DNA source such as spinach, chicken liver, onions, or soybeans.
- Use a different type of detergent and/or enzyme and compare results.
- Observe DNA under a microscope.
- Try extracting DNA from things that you think might not have DNA.

Background:

Deoxyribonucleic acid (DNA) is a nucleic acid that contains the genetic instructions used in the development and functioning of all known living organisms and some viruses. The main role of DNA molecules are the long-term storage of information. DNA is often compared to a set of blueprints since it contains the instructions needed to construct other components of cells, such as proteins and ribonucleic acid (RNA) molecules. The DNA segments that carry this genetic information are called genes, but other DNA sequences have structural purposes, or are involved in regulating the use of this genetic information. Chemically, DNA consists of two long polymers of simple units called nucleotides, with backbones made of sugars and phosphate groups joined by ester bonds. These two strands run in opposite directions to each other and are therefore antiparallel. Attached to each sugar is one of four types of molecules called bases. It is the sequence of these four bases along the backbone that encodes information. This information is read using the genetic code, which specifies the sequence of the amino acids within proteins. The code is read by copying stretches of DNA into the related RNA, in a process called transcription.

Within cells, DNA is organized into X-shaped structures called chromosomes. These chromosomes are duplicated before cells divide, in a process called DNA replication. Eukaryotic organisms (animals, plants, fungi, and protists) store most of their DNA inside the cell nucleus and some of their DNA in the mitochondria (animals and plants) and chloroplasts (plants only).

Prokaryotes (bacteria and archaea) however, store their DNA in the cell's cytoplasm. Within the chromosomes, chromatin proteins such as histones compact and organize DNA. These compact structures guide the interactions between DNA and other proteins, helping control which parts of the DNA are transcribed.

DNA is present in the cells of all living organisms. This procedure is designed to extract DNA from a food source in sufficient quantity to be seen and spooled.

Reference:

Lesson adapted from Soybean Science Kit from Indiana Soybean Board.

Companion Resource:

Video: 10 Foods that Originally Looked Totally Different
Publication: North Carolina Ag Mag
Career Focus: DNA Expressions in Agriculture - Careers in Biotechnology
Geography: Interactive Map of Virginia

Strawberry Science: DNA Extraction

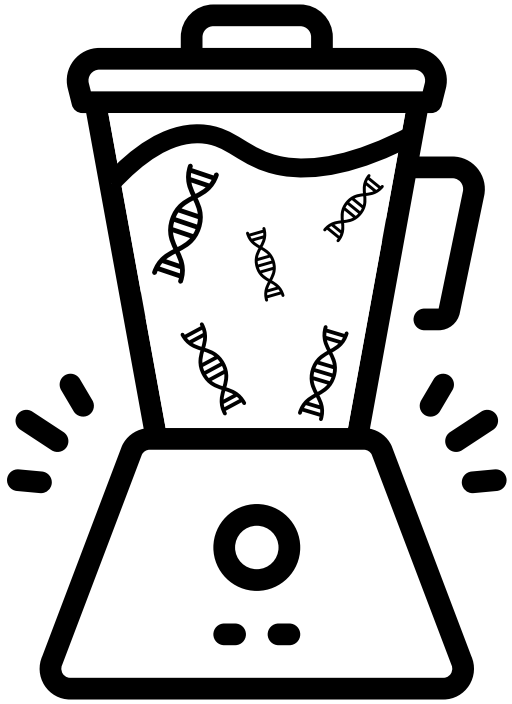
Your teacher has supplied you with fresh Virginia Strawberries. In this activity, you will learn how to extract DNA to study the genetics and heredity in agriculture and food systems. Follow the steps below to start the Strawberry Study!

Materials:

- ❑ DNA Source: Strawberries, ½ cup
- ❑ Water, 1 cup
- ❑ Salt, 1/8 tsp
- ❑ Blender
- ❑ Coffee filter
- ❑ Liquid Dish Soap
- ❑ Test Tube
- ❑ Meat tenderizer, pinch
- ❑ Rubbing Alcohol, 16 ounce Bottle
- ❑ Wooden Stick (BBQ skewer)

Procedure:

1. Place the following ingredients into a blender:
   - ❑ 100 ml or ½ cup of DNA source material;
   - ❑ 200 ml or 1 cup of water; and
   - ❑ 1 gram or 1/8 tsp salt.
2. Blend on high for 15 seconds.
3. Strain the mixture through a sieve (coffee filter) to remove the unblended material.
4. Add 20 ml or 2 Tbsp. of detergent. Swirl to mix. Let sit for 5-10 minutes.
5. Fill a test tube about 1/3 full with the mixture.
6. Add a pinch of enzymes (meat tenderizer) to each test tube and stir carefully.
7. Tilt the test tube and slowly pour an equal amount of alcohol down the side of the tube so that it lies on top of the mixture.
8. Stringy DNA should appear at the boundary between the mixture and the alcohol.
9. Use a wooden stick or a hook to gently move the mixture up into the alcohol so that more DNA will precipitate out; you can also let the tube sit for 30 minutes or more.
10. You can keep the DNA indefinitely in a sealed container with alcohol or dry it on paper.



TRY THIS!

Use this procedure with another DNA source such as spinach, chicken liver, onions, or soybeans.