

# DECEMBER HARVEST OF THE MONTH

Lesson Plans and Activities



# SPINACH



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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: Harvest Spinach and Apple Chicken Salad 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

**DR. SANDY CURWOOD**

Director of School Nutrition Programs  
Virginia Department of Education

**TAMMY MAXEY**

Programs Director  
Virginia Agriculture in the Classroom



# LESSON ONE:

## The Science of Salad

Grade Level: 9-10 Grades

Lesson Length: 2 hours

### Objective:

Students will:

- Demonstrate knowledge of different plant parts and their functions.
- Understand the role of salad greens as a part of a healthy diet.

### Related Competencies:

#### Introduction to Culinary Arts, 8249:

- Describe the sources and functions of nutrients.
- Demonstrate the principles and procedures of safe food handling.

#### Culinary Arts I, 8275:

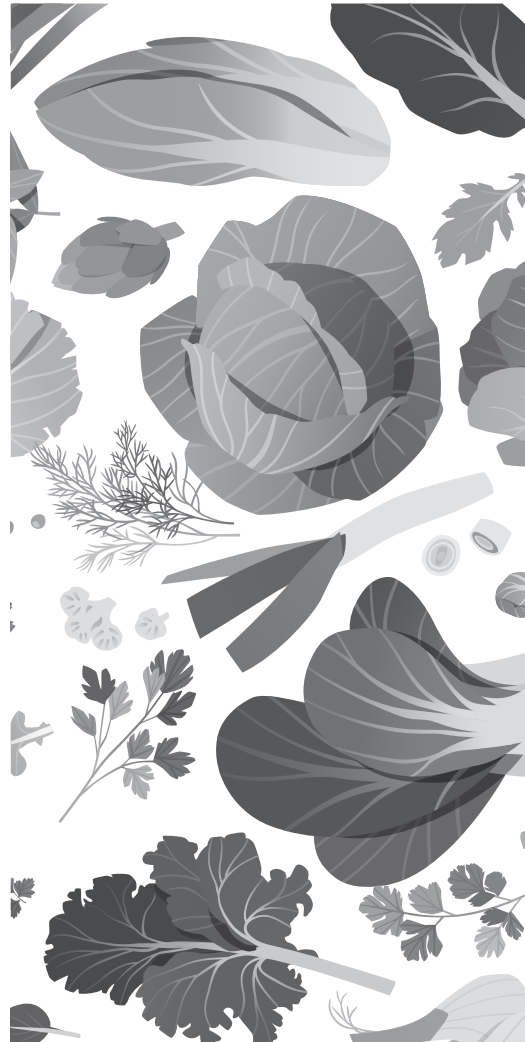
- Explain safe food handling, production, storage, and service procedures.
- Describe the nutritional components of food.
- Evaluate personal diets, using the recommended dietary allowances.
- Prepare cold salads.

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

- Explain the functions of major plant parts.
- Explain the process of photosynthesis and cellular respiration in plants.

#### Applied Agricultural Concepts 8072:

- Identify fruit and vegetable varieties.
- Describe techniques and procedures for the safe handling of food products.



### Materials:

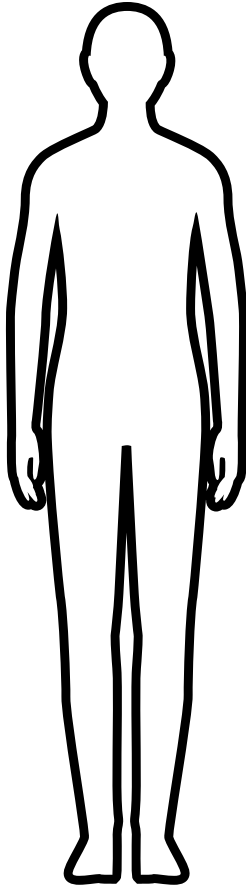
- Leaf Tasting Investigation Worksheets for each student
- Hand washing station
- Butcher paper or chalkboard
- Five edible leaf samples for each group, such as lettuce, kale, spinach, parsley, and Swiss chard

### Background

- Kale is considered to be closer to wild cabbage than most domesticated forms of vegetables. It is an excellent source of vitamin K, which controls inflammation in the body.
- Although paler in color than other leafy greens, cabbage is a great source of cancer-fighting compounds and vitamin C.
- Iceberg lettuce is mostly water, but it is the most popular leafy green in the United States. Americans eat about 17 pounds of it every year.
- Spinach was first cultivated and grown in modern day Iran. It was brought to the U.S. market in the early 1800's.
- The main function of a plant's leaves is to gather energy from the sun to carry out photosynthesis and make food for the plant. During photosynthesis, leaves use light energy to convert carbon dioxide and water into sugar.
- Many leaves of plants are edible and are grown for food. Edible leaves include cabbage, lettuce, grape leaves, parsley, spinach, mustard greens, and Swiss chard. These foods are a healthy addition to our diet. We are fortunate to have many different varieties of edible leaves grown by farmers in the United States. As a result, we have many healthy options when shopping for produce in our supermarkets or farmers markets.

# ENGAGEMENT ACTIVITY: Nutrient Finder

Circle the areas or draw arrows to identify parts of your body that benefit from the nutrients in leafy green vegetables and list the benefits (e.g., vitamin A assists with good vision).



NUTRIENT	FOOD ITEM CONTAINING NUTRIENT	ROLE IN BODY
Folate	Spinach, Chinese Cabbage, Leaf Lettuce	Helps tissues and cells grow (i.e hair and nails)
Potassium	Beet Greens, Spinach, Loose Leaf Lettuce, Chard, Parsley, Endive	Muscle function/contraction; (regulate heartbeat)
Vitamin A	Turnip Greens, Mustard Greens, Kale, Collard Greens, Chinese Cabbage, Leaf Lettuce, Romain Lettuce, Spinach	Support vision and immune health
Vitamin C	Kale, Cabbage, Collard Greens, Mustard Greens, Red Cabbage, Spinach	growth and repair of tissues supports immune health
Iron	Spinach, Chard, Collard Greens, Parsley	blood production; carries oxygen from lungs to body
Fiber	Spinach, Collard Greens, Parsley	Supports digestive health

In the space below, describe why it is important to eat fresh vegetables (like leafy, green vegetables) rather than just taking vitamins or only eating fortified foods.

# ACTIVITY ONE:

## Leaf Tasting Investigation

1. Discuss the functions of plant leaves with your class such as making food for the plant, decomposing and adding nutrients to the soil, and providing habitats for animals. The [Great Plant Escape](#), from Illinois Extension, highlights each plant part and goes into detail about its form and function.
2. Brainstorm edible leaves that people like to eat. Make a list on the board. Leafy greens are part of a healthy diet. Two cups of raw leafy greens is considered one cup from the vegetable group. This is to account for open space in the measuring cup when it is loosely filled. The average adult needs 2-3 cups of vegetables a day.
3. Students will wash their hands. The Center for Disease Control and Prevention (CDC) has information available to learn about [proper hand washing](#).
4. Using the Leaf Tasting Investigation Chart show your class one edible leaf and show them where it is listed on the chart.
5. Work with the class to identify each leaf. Substitutes may be made as available.
6. Demonstrate how you would like each group to record the color, texture, smell, taste, and length of each leaf in the chart. Use a ruler to measure the length of each leaf.
7. Ask students to brainstorm why this criteria may be important to know when preparing dishes like cold salads or in preservation.
8. Distribute a washed sample of the leaf to each group and guide them through the data collection. During this time, highlight the importance of safe food handling and storage.
9. When students have recorded data in their charts, instruct them to tear off a small piece of the leaf to taste.
10. Repeat these steps with the remaining four leaves and have students fill out the questions on the chart.



### Extension:

- Research guidance on proper cold storage from the [CDC](#)

## **Activity 1: Reflection Questions**

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

1. Which leaf did you like the most and why?
2. Which leaf surprised you? What surprised you most about that leaf?
3. What other leaves would you like to add to this experiment?

## **Activity 1: Application Questions**

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

1. Why do you think each of the leafy greens has different characteristics?
2. What part of these plants can you use to be able to increase the vitamin A in your diet?

# ACTIVITY TWO:

## Evaluating Nutritional Value

### Introduction:

Students will now compare their nutritional value by looking at their levels of vitamin A per serving. Vitamin A is important for maintaining good vision, fighting infection, supporting cell growth, and keeping skin healthy. Research has shown that consuming foods rich in vitamin A may even prevent some kinds of cancer.

1. Pass out the graphing worksheet.
2. Explain that now we will look at the vitamin A contents of five different leafy greens.
3. Have students fill in their chart to compare the vitamin A levels of the five leaves they tasted in part one. Students should use the chart template on the back page of their tasting chart.
4. Write these vitamin A percentage values on the board for all students to see (see table below).

Type of Leafy Green	Daily percent value of Vitamin A per serving (One serving of raw leafy greens is 2 cups)
Lettuce	53%
Kale	267%
Spinach	112%
Swiss Chard	88%

5. Go through one example with the class.
6. Work in groups to fill in the bar graphs for the remaining leaves.

### Materials:

- Ruler with centimeter markings

### Extension Activities:

- Bring in fresh and dried herbs. Discuss how they look and taste. Discuss the use of fresh vs. dried herbs (1 tsp. dried herbs = 1 tbsp. fresh herbs when cooking).
- Make an edible leaf salad that the whole class can enjoy at the end of the lesson. For homework, have students track how many servings of leafy greens their family eats in a week.
- Challenge students to develop unique recipes featuring leafy greens. Collaborate with the school cafeteria to create recipes that meet [USDA school nutrition guidelines](#).
- Spinach and other greens can be enjoyed cold. Discuss with the class other ways that leafy vegetables may be prepared.
- Use one of your samples to diagram the parts of a leaf, including the blade, veins, petiole, etc.
- Evaluate nutrition labels of some of your favorite snack foods. How do they compare to the leafy greens?

### References:

- Lesson Adaptation: Luscious Leaves - Shaney Emerson and Michelle Risso, California Foundation for Agriculture in the Classroom
- Additional Information: Georgia Agriculture Education Curriculum

### Companion Resources:

- Online Resource: [MyPlate for Teens](#)
- Activity: [Parts of a Leaf](#)



# Virginia Grown Lettuce: Taste Test



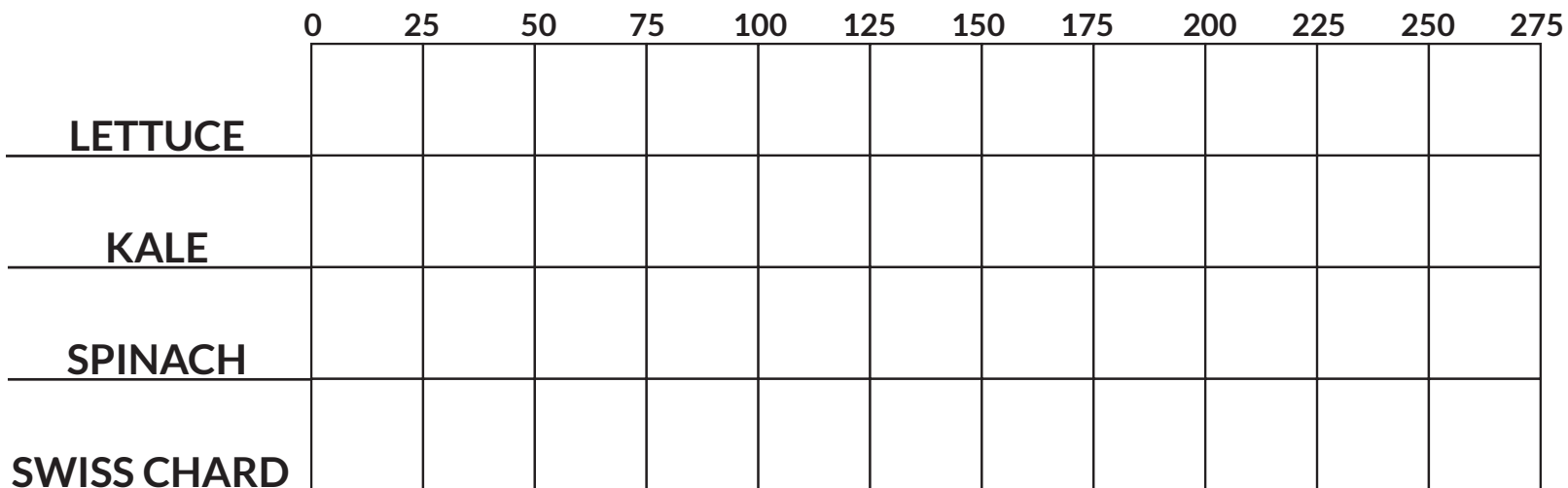
Your teacher has brought in some Virginia Lettuce for you to try. Take note of length, color, texture, smell, and taste of each leafy green in the space provided.

TYPE OF LEAFY GREEN	LENGTH (cm)	COLOR	TEXTURE	SMELL	TASTE
LETTUCE					
KALE					
SPINACH					
SWISS CHARD					

# Virginia Grown Lettuce: Graphing

Fill in the chart squares below to create a bar graph using the listed percentages next to this text. Compare the Vitamin A levels of the five leaves you tasted in the tasted. After completing the chart, use it to answer the questions.

Type of Leafy Green	Daily percent value of Vitamin A per serving (One serving of raw leafy greens is 2 cups)
Lettuce	53%
Kale	267%
Spinach	112%
Swiss Chard	88%



1. Which type of leafy green has the most Vitamin A? \_\_\_\_\_
2. How many cups is in one serving of Spinach? \_\_\_\_\_



## Activity 2: Reflection Questions

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

1. Which edible leaves are the best source for Vitamin A?
2. Which leaves have the least amount of Vitamin A?
3. Why is this important to know?

## Activity 2: Application Questions

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

1. Why is Vitamin A important to have in our diet?
2. What other sources of vitamins do leafy greens give us?

# LESSON TWO:

## Using Plants as Natural Dyes

### Objective:

Students will:

- Conduct a scientific investigation to validate a hypothesis using controls, independent, and dependent variables.
- Conduct an experiment identifying chemical and physical changes of the dependent variable.
- Identify practices of colonial life in the Mid-Atlantic region.
- Explore the dyeing qualities of different plant materials when they are mixed with hot water.

### Related Competencies:

#### Fashion Careers I, 8280:

- List the performance characteristics of textile fibers, yarns, and fabrics.
- Assess the effects of fiber, yarn, and fabric characteristics.
- Select the appropriate textile for implementation.
- Apply color theory to fashion design.

#### Fashion Careers II, 8281:

- Examine processes for producing fibers, yarns, and fabrics in textile products.
- Identify the effects of fiber, yarn, fabric characteristics, and finishes on design, construction, care, use, and maintenance of apparel and other products.
- Research specific trends in historical dress.

#### Applied Agricultural Concepts, 8072:

- Identify agricultural commodities.
- Examine the history of agriculture in Virginia, the United States, and globally.

### Materials:

- Vegetation samples for dyes (Red cabbage, carrot tops, beets, berries, birch leaves, parsley, mint, tea leaves)
- Water
- Vinegar
- Heat source such as a stove, hotplate, or microwave
- Hot water (½ cup water per dye sample)
- Heat-resistant containers
- Spoons or stir sticks
- White fabrics (1-2 samples per student) cotton fabric or roping, cotton balls, wool yarn, wool athletic socks
- Trays lined with paper toweling
- Knife, scissors, or other safe cutting instrument
- Hammer or mortar and pestle for grinding the samples into tiny bits
- Tweezers
- Rubber gloves

## Background Knowledge

Throughout history, humankind has used natural dyes to adorn clothing. In colonial times, the color of clothing signified class and noted occasions. Roots, nuts, and flowers are just a few common natural ways to produce colors. Early American colonists also used salt, vinegar, urine, and oak galls; which are the lumpy growths found on oak branches where insect larvae distort the normal growth. Native Americans used the ashes of burned juniper branches as well as wood ash, rusty water, and clay for dye colors.

A number of methods can be used to dye fabric from plants. Plants are generally grinded, added to water, and then boiled. Cloth, yarn, or wool is then added to the boiling water. Muslin, silk, cotton, and wool work best for natural dyes and lighter fabric dyes better than darker fabric. White or pastel colors work the best. Time and temperature play a factor in the intensity of color absorbed by the fabric. Metal pots themselves release metals into the dye baths, so copper, iron, and other pots would sometimes yield different colors in the dyed product. Some colors permanently affixed to the fabric while others needed a mordant. A mordant, such as vinegar and alum, are sometimes used to “fix” the dye color into a fabric. Then, fabrics are treated pre- and post-dye.

Using a variety of fabrics and plants, students can develop hypotheses regarding which fabrics take on color the best. In addition, students will have the opportunity to analyze which plant materials yield the most intense dye. It is best to use an old large pot as your dye vessel. Wear rubber gloves to handle dyed fabric since the dye can stain your hands. It is also important to note that some plant dyes may be toxic. Practice lab safety by wearing gloves throughout this experiment.

### References:

- [National Gardening Association](#)
- [Making Natural Dyes from Plants](#)
- [Kids Gardening: Exploring Plant Dyes](#)

### Companion Resources:

- Career Focus: [Plant Systems](#)
- Article: [Growing a 4x4 Salad Garden](#)
- Lesson: [Photosynthetic Flotation](#)
- From the Farm Connection: [Virtual Field Trip to Hydroponic Lettuce Farm](#)

### Extension:

- Increase the amount of time fabric is soaked in dye, water temperature, and amount of mordant.
- Use a copper pot for dyeing fabric. The copper causes a chemical reaction and influences the dye color.
- Attempt to remove stain from fabric. Discuss what seems to make some stains harder to remove, and how people may have learned which plants make good dyes throughout history.

# LESSON TWO ACTIVITY:

## Using Plants as Natural Dyes

### Activity Steps:

1. Create a hypothesis regarding dyeing medium and dye.  
"If (independent variable) then (dependent variable)."
2. Choose a plant material and grind or cut the material into small pieces.
3. Add plant material and ½ cup of hot water to a container.
4. Add fabric material to the container containing plant material and hot water.
5. Soak material for five minutes.
6. Remove material with tweezers and spread on paper towel to dry.
7. Repeat the process, adding 1 tablespoon of vinegar as a mordant.  
*A mordant is a substance that when combined with dye will help the color to adhere to the fabric.*
8. Once dry, test each fabric sample for resistance to running or the color washing out, also called colorfastness. This is done by adding water drops to the fabric and observing changes in the dyed fabric.
9. Additional trials may be conducted using various plant materials.
10. Record data using student created charts noting which plants were tested as dye to which fabrics, and whether a mordant was used.
11. Write a conclusion paragraph including whether the hypothesis was confirmed.

COLOR	NATURAL DYE MATERIALS
BLUE	Leaves: Red Cabbage Fruit: Elderberries Leaves & Stems: Tomato Plants
YELLOW	Leaves: Mint, Parsley, Birch, Onion Skin Flowers: Chamomile, Dandelion, Marigolds, Zinnias Other: Paprika
GREEN	Leaves: Carrots, Red Onion Flowers: Black-Eyed Susan Leaves & Stems: Spinach
ORANGE	Flowers: Dyer's Coreopsis Other: Turmeric
GOLD/ BRASS	Flowers: Sunflower Leaves & Stems: Cocklebur, Dock, Goldenrod Seeds: Sunflower
TAN/ BROWN	Leaves: Birch Nuts: Acorns Other: Coffee Grounds, Tea Bags
MAGENTA	Roots: Dandelion
PINK	Leaves: Red Cabbage, Strawberries, Cherries, Roses
PURPLE	Fruit: Wild Grapes, Mulberries, Beets, Blackberries
RED	Roots: Madder
BLACK	Black Walnut Hulls



## Lesson 2: Reflection Questions

After completing the Lesson and Activities, please answer the questions below by writing your response.

1. What conclusion did you draw?
2. What surprised you the most?
3. What other test would you like to perform?

## Lesson 2: Application Questions

After completing the Lesson and Activities, please answer the questions below by writing your response.

1. Why is understanding dye and natural dyes important?
2. What are some pieces that you see that have or could have natural dyes in them?
3. What properties are important?