

Taste and Teach

March - Leafy Greens



Five **Fun Facts** About Spinach & Lettuce!

- Americans consume an average of 30 pounds of lettuce per person each year.
- There are three types of spinach varieties: Smooth Leaf, Savoy and Red Veined.
- Lettuce was recently grown, harvested and eaten aboard the International Space Station.
- Spinach typically takes 21-50 days to grow. Lettuce can take from 65 to 130 days to grow, depending on what time of year it is planted.
- There are three types of lettuce varieties: head, leaf and romaine.

Four **Fun Teaching Ideas!**

- Watch this video on romaine from the Produce Nerd: <https://www.youtube.com/watch?v=hhw8odLFCw4>
- Read the book, *Tops and Bottoms* by Janet Stevens, and use the ideas in the Ag-Bite activity to bring the book to life!
- Use the Fact and Activity Sheets and other research, to compare and contrast the nutritional value of lettuce and spinach.
- Have students create a salad recipe! Check out the word problems on the *Lettuce Introduce You* page from *What's Growin' On?*

Explore all the great spinach and lettuce resources in this section!



Commodity Fact Sheet

Lettuce

Information compiled by California Foundation for Agriculture in the Classroom

How Produced – Cool weather is important in lettuce production. Lettuce is a cool-season, annual crop. It grows best in moderate daytime temperatures (73° F) and cool nighttime temperatures (45° F). Lettuce grows well in loose, fertile, sandy-loam soils that are well-supplied with organic matter. Soil should be well-drained and moist, and have a slightly acidic pH of 6.0 to 6.5. Since lettuce seeds are so small, a well-tilled seedbed is essential - large clods will reduce germination. Lettuce is hand-harvested and takes place year-round, from April to October in the Salinas Valley, California and from November to March in Yuma, Arizona. Lettuce is one of the top three vegetables produced in the US, along with tomatoes and potatoes. Iceberg lettuce accounts for about 1/2 of the lettuce produced in the US, with the other 1/2 including romaine, butterhead and leaf lettuces. Growing, harvesting, and marketing of lettuce is mainly from large-scale growers with organic production gaining in popularity. World-wide, the US is the second largest lettuce producer (behind China), with most of the lettuce coming from California and Arizona.



History – Lettuce is one of the oldest known vegetables. There are Ancient Egyptian tomb drawings depicting lettuce dating back to about 2500 BC. The Egyptians believed it aided in sleep. Originally used for its seeds to produce oil, it then began to be grown for its leaves. Lettuce spread to the Greeks and Romans who gave it its name lactuca. In Rome, Emperor Caesar Augustus built a statue praising lettuce because he believed eating lettuce had cured him of an illness. It was introduced to North America by Christopher Columbus during his second voyage in 1494. Many varieties developed during the 16th through 18th centuries in Europe. Different forms became popular in different regions. Stem lettuce was most popular in the Mediterranean, Egypt, the Middle East, and China. In Northern Europe, butterhead was most popular. Lettuce varieties have changed over the years. The long, thick-stemmed variety of the past, has evolved into leafier, greener types. In recent times, salad bars have become popular (1970s), and salad mixes of pre-washed and packaged greens have become available (1990s).

Varieties – There are several types of lettuce, but the three most common are head, leaf, and romaine. Iceberg lettuce has been the most popular variety, indicated by the largest area harvested, most tonnage produced, and most revenue generated. A shift from iceberg to leaf lettuce being the most popular has occurred in the last ten years. Varieties differ in color, texture, and amount of nutrients.

Commodity Value – In 2017, lettuce was number six in California commodity values, generating sales of 2 billion dollars. Lettuce is in the top 20 of California exports, coming in at number 15 with \$315 million in sales. Canada takes in the highest amount of California grown lettuce exports at 89%. Imports of lettuce to California are limited to less than 5%, and come from Mexico and Canada.

Top Producing Counties – Monterey County is the top lettuce producing county, producing more than 60% of the crop and generating 1.32 billion dollars. The second highest producing county is Imperial at \$334 million, and third highest is Santa Barbara at \$90 million. Lettuce is easy to grow and yet sensitive to temperature – frost damages it, and heat causes the stem to grow quickly and

the plant to go to seed. Ideal conditions are mild weather, and moist, fertile soil explaining why the coastal counties do well in spring and summer months and Imperial County and Arizona do well in winter months.

Nutritional Value – Lettuce is low in calories, fat-free, cholesterol-free, and low in sodium. It has 11 calories per one cup. Lettuce contains dietary fiber along with omega fatty acids that promote good health. Lettuce also provides immune capability with the help of mineral contents like manganese, magnesium, potassium, iron, phosphorus, and calcium. Presence of these mineral compounds decreases harmful free radicals in the body and improves the body's immune system as well as protects from viral infections and related diseases. The iron content in lettuce contributes many beneficial properties for health. Iron is required for the formation of red blood cells and the transportation of oxygen to different parts of the body. These nutritional benefits of lettuce can help prevent anemia and aid in protecting the body from indigestive agents. Lettuce also breaks down heavy protein and carbohydrates helping the stomach function properly. Lettuce contains vitamin A (which helps protect the eye), vitamin C, thiamine and vitamin B6.

For additional information:

California Leafy Green Products
(916) 441-1240
Website: www.safeleafygreens.org
YouTube: [youtube.com/user/CALeafyGreens](https://www.youtube.com/user/CALeafyGreens)

Leafy Greens Council
(716) 517-0248
Website: www.leafy-greens.org



Lettuce Activity Sheet

ANCIENT EGYPT



- Tomb paintings depict lettuce
- Stems used instead of leaves
- Grown for seed and oil

2500 B.C.

CHINA



- Consumed as a cooked vegetable
- Lettuce traveled to Persia, Greece, Rome
- Stem lettuce variety native to the area

5TH CENTURY

WESTERN EUROPE



- Shorter-stemmed varieties developed
- Christopher Columbus brought lettuce to the New World

15TH CENTURY

AMERICA Modern Varieties Developed



Butterhead



Romaine



Crisphead



Loose Leaf

EARLY 1900s

WORLD



- Salad bar popularity
- Plant breeding for disease-resistance and more varieties

1970s

CALIFORNIA

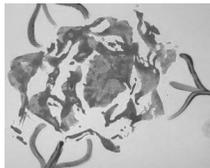


- 1/3 of California-grown lettuce is sold in ready-to-eat packaging
- Contributes 70% of total lettuce exports

TODAY

Lesson Ideas

- Research Ready-to-Eat bagged lettuce. Include when it started and its success. Compare its popularity to head lettuce.
- Make an artistic salad using leafy greens and other vegetables.
- Identify and illustrate different lettuce varieties.
- Research Lettuce Mosaic Virus and/or the Soil-Dwelling Springtail.
- Create a green smoothie recipe.
- Using the art principle of perspective, research and draw a lettuce or other agricultural field.
- Create artwork using lettuce head stamping (art, see below).



Fantastic Facts

1. Lettuce is a member of the sunflower family.
2. Over 90% of lettuce sold in the US is grown in California and Arizona.
3. California is the "salad bowl" of America, producing a year-round supply of lettuce, celery, broccoli, and cauliflower.
4. Americans consume 30 pounds of lettuce per person each year.
5. The first modern iceberg variety was created by TW Whitaker of the USDA and was named Great Lakes, although it was developed in California.
6. *Lactuca sativa* is the botanical name for common garden lettuce.
7. Drawings of lettuce are found on ancient Egyptian tombs.
8. Lettuce was recently grown, harvested, and eaten on board the International Space Station.

Lesson Plan: Growing Lettuce From a Stem

Introduction: Lettuce and other leafy greens can be grown from a cutting. Have your students design a science experiment to observe the phenomenon. Research and find out why it works.

Objective: Students will investigate what plants needs to grow.

California Standards: CC ELA: SL.3-12.4, WHST.6-12.7
NGSS:4-LS1-1, 5-LS1-1, MS-LS1, HS-LS1

Materials: Stems or cuttings from heads of lettuce, bowls, water, observation tools – notebook, pencil, thermometer, ruler.

Procedure:

1. Brainstorm what plants need to grow. Ask what would happen if we cut the stem of the lettuce off and put it in water? Have students make predictions. Students will work in groups of 3-4.
2. Bring in heads of lettuce for each group. Cut the stem off about 1 inch from the bottom. Save for the experiment. Use the lettuce for a class salad.

3. Place the cut stem in a bowl of water. Add about ½ to 1 inch of water.
4. Place the bowl in the window or under lights.
5. Draw a picture and record other measurements such as date, time, temp, size, lettuce type, etc.
6. Change the water in the bowl every other day and observe the cutting every day. Watch for new leaves and roots. Make observation notes.
7. After two weeks, you may plant your lettuce in a pot or outside. Continue to make observations.
8. Research why the plants were able to grow after being cut and only with sun and water. Consider other experiments you can conduct to improve lettuce growth.
9. Have groups present their results using evidence, data, and a model to support their findings.

Commodity Fact Sheet

Spinach

Information compiled by Fresh Express

How Produced – Before planting, the farmer will till and prepare the soil. Spinach can be grown on a variety of soil types but the best crops come from sandy loam soil, which is usually found along rivers. The sandy ground makes harvesting easier after rainfall because of good drainage. Drainage quality also affects the irrigation cycle. Since spinach is not a deep-rooted crop, it relies on frequent irrigations to maintain the proper soil moisture levels for ideal growth.

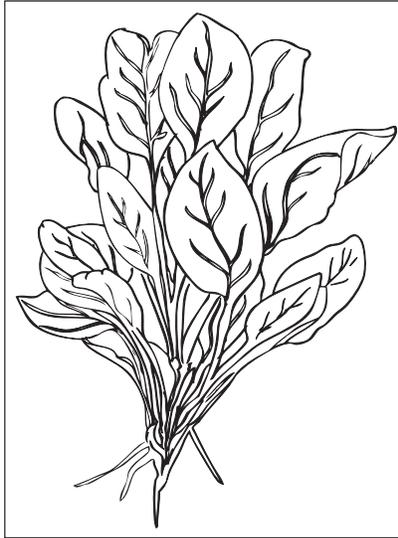
Approximately 90% of U.S. spinach is grown in California and Arizona. Spinach grows best during cool periods of the year. Almost 50% of spinach produced in California is grown in the Salinas Valley in Monterey County, where spinach is produced from February through November. Spinach is a quick-growing, cool-season vegetable that grows best at temperatures from 45°F to 75°F. The foggy and cool summers of the California central coast and the clear and cool winters of the Arizona desert provide ideal growing conditions for spinach.

Spinach is planted relatively shallow at about ½ to ¾ inch depth and at high seed densities of 21 to 48 seed lines per 80-inch beds. These high seed densities result in about 3.5 million plants per acre. Spinach can be harvested in the Salinas Valley 21 to 50 days after planting. Spinach is grown for fresh market (bunched or packaged) and for the processing (frozen) industry. Most of the spinach is mechanically harvested using a machine with a front cutter bar. After harvesting, spinach is typically cooled to 34°F at centralized cooling facilities before being transported to the processing plant. Spinach has a very high respiration rate and is therefore quite perishable. If kept at low temperatures, spinach can be stored for 14 to 18 days.

History – Spinach has been consumed for thousands of years. It is believed that spinach made its way into Indian and Asian cooking through Arab traders who carried it to Asia from the Middle East. In the 11th and 12th centuries, spinach became a popular vegetable in Spain, and from there it diffused to Germany, Italy, England, and France. It has been used in salads, soups, in baked dishes with cheese, yogurt, and in tortellini. In the early 19th century, American colonists introduced spinach to North America. At least three varieties were grown by 1806. With the development of canning and freezing, the popularity of spinach increased world-wide. The increase in spinach consumption in the U.S. has been due to the sale of freshly packaged teen and baby spinach.

Varieties – Types of spinach are classified as smooth leaf,

savoy, and red veined. California grows all three. Smooth leaf varieties have a mature leaf length of about six inches. Savoy spinach is very crinkly and has the same sized leaf as the smooth leaf variety. Red veined spinach has a smaller leaf, similar to the all-green baby leaf types, but adding attractive color and nutrients associated with the red color in the leaf veins. There are many varieties in each type of spinach. Popular varieties in California include Avenger, Bolero, Bossanova, Dolphin, Emilia, Falcon, Lazio, Palco, Unipak, and Whale. Varieties are constantly being developed and may replace these currently popular ones.



Commodity Value – The acreage of fresh market spinach in California has increased from 25,000 acres in 2009 to 44,200 acres in 2019. In 2018, the total crop volume for spinach (fresh market and processed) was 618 million pounds. California accounts for 71.5% of the nation's total spinach

production. Spinach ranks number 24 among all commodities grown in California.

Top Producing Counties – The top counties in 2018 for spinach production in California were Monterey (45.9%), Imperial (27%), San Benito (12%), Ventura (4.7%) and Santa Barbara (4.2%).

Nutritional Value – Fresh spinach is a good source of antioxidant vitamins like A and C and phenolic antioxidants like lutein, zeaxanthin, and beta-carotene. These compounds are scavengers against free radicals and play a healing role in aging and different diseases, including cancer, and promote normal eye-sight. Spinach is an excellent source of vitamin K, which is important for strengthening the bone mass. It also contains vitamin B6 and folates.

For additional information:

Chiquita Brands/Fresh Express

(831) 772-6057

Website: www.freshexpress.com

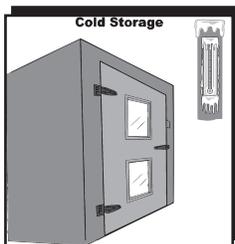


Spinach Activity Sheet



#1

Food safety specialists carefully examine field conditions, monitoring crop quality and food safety compliance prior to planting, and during production and harvest.



#2

Cold temperatures are critical to freshness. Growers cool down spinach within hours of harvesting and keep it chilled from the field to the store.

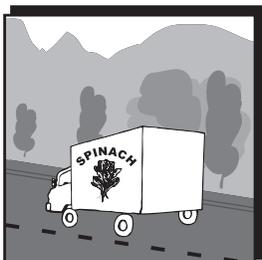


#3

From the field, spinach is transported to packaging facilities where it is thoroughly washed, rinsed, and gently dried. Often spinach is packaged in a breathable bag for long-lasting freshness.

#4

After packaging, spinach is transported swiftly and safely to retail locations across the country. Maintaining consistent cold temperatures is important so every refrigerated truck is monitored throughout its journey to ensure spinach stays cool, fresh, and delicious.



#5

Consumers enjoy eating spinach. Everyone knows that fresh spinach makes a delicious side dish, but it also makes a nutritious meal on its own.



Lesson Ideas

- Traceability systems inform consumers about where their food comes from and plays a significant role in minimizing food safety risks. Visit www.freshexpress.com/yoursaladstory to track the origins of fresh, packaged spinach.
- Locate on a Western U.S. map where spinach is predominantly grown. What are the climatic differences or similarities?
- Based on the total pounds of spinach produced in California in 2018, how many pounds would have been grown in Monterey County? How many tons is this?
- Illustrate the process of photosynthesis and explain the role chlorophyll plays in spinach growth.
- Compare and contrast the nutritional value of spinach to other leafy greens such as mizuna, iceberg lettuce, and arugula.
- Create a delicious recipe using spinach and provide a cooking demonstration for the class. Explain safe food preparation and give everyone in the audience a sample.

Fantastic Facts

- The three main spinach varieties are Smooth Leaf, Savoy, and Red Veined.
- It takes 21 to 50 days for a spinach plant to mature.
- After harvest, spinach is cooled to a temperature of 34 degrees F.
- Spinach is a significant source of vitamin A, vitamin C, vitamin B6, vitamin K, folate, beta-carotene, lutein, and zeaxanthin.
- The best spinach crops come from sandy loam soil, which has good drainage and makes harvesting easier.
- The Salinas Valley produces the most spinach in California.
- California grows 71.5% of the nation's total spinach.
- Spinach originated as a food crop in the Middle East.

Lesson Plan: Steamed or Raw?

Introduction: Spinach is packed with nutrients, easy to prepare and tasty too! In fact, spinach can be prepared many different ways. This activity will encourage students to add spinach to their diets.

Objective: Students will compare the visual appearance, taste, texture, and smell of fresh and steamed spinach.

California Standards: CC ELA: W.3-12.7; WHST.6-12.2, 7
NGSS: 5-PS1-2; MS-PS1-2

Materials: Raw and steamed spinach (prepared before or during class), paper plates, forks, napkins, observation journals, pencils.

Procedures:

- After students wash their hands, instruct them to use all their senses to observe the raw spinach. Keep in mind color, texture, smell, sound, and taste. Students may record observations in their journals.

- Repeat the observation activity above with steamed spinach.
- Research and compare the nutritional value of raw and steamed spinach. Discuss why the nutritional values differ and investigate the chemical processes involved in cooking spinach.
- Determine the differences in serving size for raw and steamed spinach.
one cup raw = __ cup steamed
- Ask students to explain which type of spinach they liked best and why. Discuss the balance between choosing the most nutritious product and personal taste preference.
- Optional: Give students the opportunity to compare the qualities and nutritional value of canned and frozen spinach too.

'Lettuce' Introduce You...

Lettuce, a leafy vegetable we use for salad, in sandwiches, and other dishes, is known to scientists by its scientific name of *Lactuca sativa*.

Lettuce has a long history in California. Lettuce began to be cultivated commercially in California in the 1930s. Today, lettuce is in California's Top-Ten most valuable agricultural commodities. California is the leading producer of lettuce in the United States, producing more than 73% of all lettuce grown in the United States. It grows year round in California. Monterey and Imperial counties are the top producers of lettuce.

There are three main kinds of lettuce: head, leaf, and romaine. Head lettuce is round and tight and shaped like a cabbage. Iceberg lettuce is a type of head lettuce. Leaf type is loose and leafy. Butter, Red and Green Leaf are types of leaf lettuce. Romaine is tall with slender leaves.

Activity

Identify each kind of lettuce; write your answer under each one.



Lettuce: How do you grow?

The lettuce you purchased at your local market is very fresh. There is a lot of planning and preparation before a lettuce crop is planted. First, the farmer prepares the field by using a laser to level the field, then **beds** are prepared to plant seeds. Sprinklers or drip irrigation are used to water the emerging plants and throughout their growing season. It is important to fertilize plants so that plants are healthy. **Integrated Pest Management (IPM)** is used to control pests and diseases that could harm plants. Lettuce is harvested carefully and quickly when it is ready to eat. Harvested lettuce is cooled and stored just above freezing to keep it fresh. Lettuce is then transported in a refrigerated truck to market.

'Lettuce' Keep you Healthy!

Lettuce may help maintain

- Vision
- Healthy immune system
- Cell growth

95% of lettuce is water!

Lettuce is high in Vitamin A

Activity

Circle key words in the paragraph above. Then draw a pictorial timeline of the eight steps of lettuce production. Write a caption for each picture using evidence from the paragraph above.

CA Standards: ELA CCSS: RI.3-4.1, 7, WA.3-5.2, 7, SL.3-5.2, RI.6-8.1, W.6-8.2, 7, SL.6-7.2, RST.6-8.1, 7, WHST.6-8.7; Math CCSS: 3-4.MD.2, 5.MD.1, 6.NS.1, 7.NS.2; NGSS: 3-LS.1.A, 4-LS.1.A, 5-LS.1-1, LS.1.C, MS-LS.1-1

Source: <http://learnaboutag.org/caspecialtycrops/agfiles.pdf>, <http://lanrcatalog.ucdavis.edu>, www.cdffia.ca.gov

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Today there are many options in purchasing lettuce. Lettuce can be purchased unwrapped or wrapped in cellophane, in bulk, or even in a bag as a prepared salad mix.

Activity

Create a salad recipe for two using California Lettuce. Use other "Top-Ten" California commodities as ingredients (walnuts, almonds, strawberries, tomatoes, grapes). Create and write your recipe. Be sure to record ingredients, measurements (in standard form like cups, teaspoons, etc) and instructions. Then, figure out the recipe for the entire class!

Salad for Two

Salad for the Class

Career Spotlight

What jobs are involved in producing lettuce? Choose a job related to lettuce production using evidence from the text or doing additional research. On a separate sheet of paper, draw a picture of yourself in a lettuce career spotlight, and write a paragraph about what you do.

STEM: How long do you grow?

Using a calendar, compute the answer:

When is Harvest? When lettuce is planted in the summer, it takes 65 to 80 days to grow. If it was planted on June 5, what would be the earliest day it could be harvested?

When to Plant? If lettuce is planted in late fall, it could take as long as 130 days to grow. If you want to harvest on January 12, when should you plant?



Turning Heads with Leafy Greens

Lettuce, a leafy vegetable we use for salad, in sandwiches, and other dishes, is known to scientists by its scientific name, *Lactuca Sativa*. There are four common types of lettuce: leaf (also called loose-leaf), romaine, crisphead, and butterhead. The nutritional value of lettuce

varies with the variety. Its most significant nutrients are vitamin A and potassium. The vitamin A comes from beta carotene, whose yellow-orange is hidden by green **chlorophyll** pigments. The darker green, the more beta carotene present. **Write a paragraph highlighting the nutritional value and health benefits of different lettuce varieties using online or printed resources.** Standards: CC ELA: W.3.8.2, W.3-

Spinach Endive
Watercress Chinese Cabbage
Mizuna Radicchio

Lettuce Rap!

"Lettuce is nutritious, lettuce is cool, if you don't like lettuce, you're really a fool." Have a class challenge of writing your own Specialty Crop Rap and perform it for the class!

Did you Know?
 Americans eat 25.8 pounds per person of lettuce each year.



Tech Check

Check out the link to see NASA Crew Members sample leafy greens on the space station and their experiments!

Make your own

Lettuce Wraps

Think beyond the salad bowl—lettuce can be used for a number of dishes, including lettuce wraps. Lettuce wraps are similar to tacos, but with lettuce instead of a tortilla. Make lettuce wraps at home or school using one of the featured lettuce varieties and at least three additional crops within this edition of *What's Growin' On?* Here are some combinations to get your wrap started:

Carrot, mushroom, onion, and edible flowers.

Pumpkin, walnuts, and orange

My wrap:



Get Growin'

Plant the seeds from different lettuce varieties to grow a salad bowl garden on students' desktops. Under ideal conditions, lettuce seeds will germinate in eight to 10 days. After seeds germinate, remove seedling to plant in a container or in the ground. Measure and graph the growth rate of each seed. Use QR code for detailed instructions. Standards: NGSS: 3-LS1-1, 4-LS1-1, 5-LS1-1 CC: Math: 3-4, MD: 4, 6.SP.4, 7.RP.2, 7.G.1



Lettuce Experiment

Create a Rainbow Phloem & Xylem Lab

Xylem and phloem are two tissues found in plants which transport substances that plants need to live. Xylem cells are responsible for transporting water and dissolved nutrients from the roots up the stem to the leaves. Phloem cells are responsible for transporting a sugary sap that is made in the leaves during **photosynthesis** to the rest of the plant. Conduct a class experiment to see how the xylem and phloem function in different varieties of lettuce. Start by collecting one variety of lettuce. Place one leaf in each cup of water colored with food dye. Carry out two investigations, change out the variety of lettuce (the variable) each time. Compare observations from the first and second investigations and discuss with the class the differences you found.

Standards: NGSS: MS-LS1-1, MS-LS-6

Lettuce Variety: _____	Lettuce Variety: _____
Observation	Observation
Day 1:	Day 1:
Day 3:	Day 3:
Day 5:	Day 5:



Tops or Bottoms

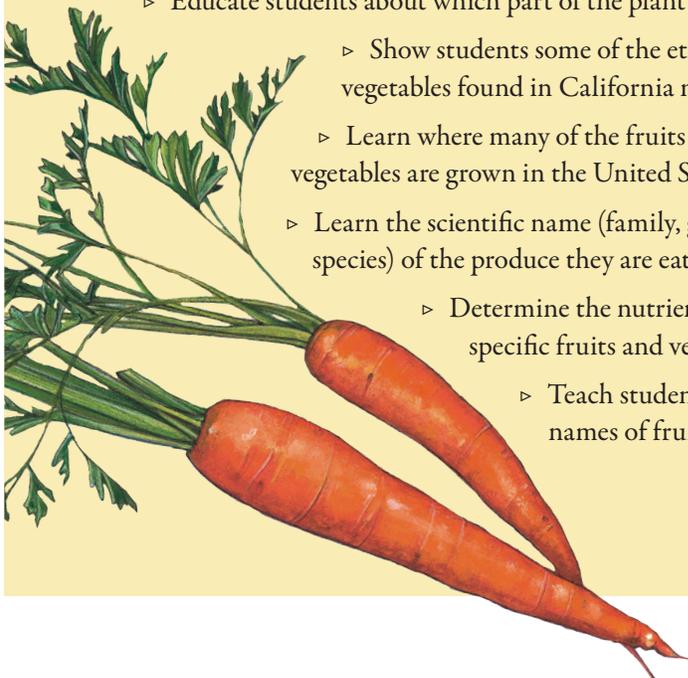
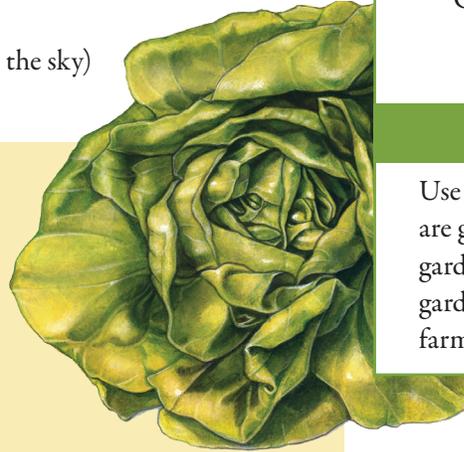
Encourage students to eat more fruits and vegetables by familiarizing them with the plant parts we eat.

Activity

1. Read the book “Tops and Bottoms” by Janet Stevens.
2. Have all of the fruits and vegetables from the book in a basket. Discuss the fruits and the vegetables with the students.
3. As you pull random fruits and vegetables from the basket or grocery bag have students make the following gestures based on how the fruit or vegetable grows:
 - grows underground (touch their toes)
 - grows in the middle (crouch)
 - grow on top of the soil (stand tall with hands to the sky)

Classroom Activities

- Divide a piece of paper into TOP, MIDDLE, and BOTTOM. Brainstorm fruits and vegetables for each category.
- Define these plant parts: stem, roots, fruits, flowers.
- Use California Department of Education’s Fresh Fruit and Vegetable Photo Cards to enhance the activity:
 - ▷ Distribute one card per student and instruct them to sort themselves based on plant part we eat, color, calories (highest to lowest), major producing states, or alphabetically.
 - ▷ Introduce students to some of the less well-known fruits and vegetables.
 - ▷ Educate students about which part of the plant is commonly eaten.
 - ▷ Show students some of the ethnic fruits and vegetables found in California markets.
 - ▷ Learn where many of the fruits and vegetables are grown in the United States.
 - ▷ Learn the scientific name (family, genus, species) of the produce they are eating.
 - ▷ Determine the nutrient analysis of specific fruits and vegetables.
 - ▷ Teach students the Spanish names of fruits and vegetables.



Materials

- Tops and Bottoms by Janet Stevens
- Grocery bag or basket
- Assortment of fruits and vegetables
- Photos of fruits and vegetables: Fresh Fruit and Vegetable Photo Cards, CDE.ca.gov (optional)

Tip

Use fruits and vegetables that are growing in the school garden, from students’ home gardens, or from a local farmers market.

California Standards

Kindergarten

ELA CC: SL.K.1, 2; RI.K.1, 4, 10
Physical Education Content: 1.1, 1.4, 1.8, 3.1 5.2, 5.4

Grade 1

ELA CC: RI.1.1, 4, 10; SL.1.1, 2
Physical Education Content: 2.2, 3.1, 5.1, 5.2, 5.6

Grade 2

ELA CC: RI.2.1, 4, 10; SL.2.1, 2
Physical Education Content: 1.2, 5.1, 5.2

Grade 3

ELA CC: RI.3.1, 4, 10; SL.3.1, 2



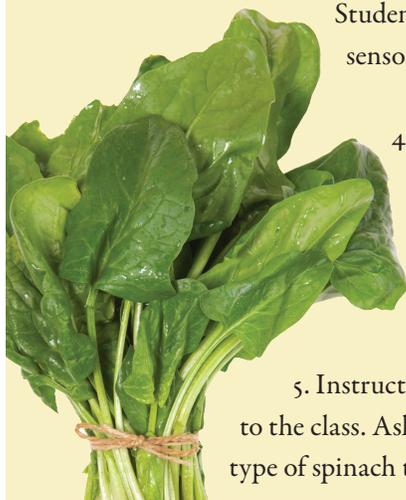
TASTING AND TESTING THE HARVEST

Frozen, Canned or Fresh?

Cook three different kinds of spinach. The fresh spinach should be well washed, drained and cooked. Give each student group an equal share of frozen, canned and fresh spinach.

1. Show students a package of frozen spinach, a can of spinach and a bunch of fresh spinach. Discuss the nutritional value of spinach. Explain that each group will design an experiment that will examine the visual appearance, taste, texture and smell of all three types of spinach.
2. Brainstorm with the class possible methods of observing and recording the different features of the spinach. Set clear objectives for the experiments, such as experimental design, time restraints and data organization. Allow students time to develop their plan.
3. Have students present their plan to you (and/or the class) for approval. Provide feedback for each group and allow students to revise their plan.

Students shall wash their hands, conduct their sensory experiments and record observations.



4. Ask students what conclusions they can make based on the information they gathered. Discuss with the class different ways to present the information. Students create graphs and charts to represent their findings.

5. Instruct groups to present their findings to the class. Ask students to explain which type of spinach they liked best and why.

Objective:

Students will design an experiment to compare the flavors and textures of spinach, interpreting their findings with charts and graphs.

California Standards

Grade 4: ELA CC: SL.4.4, 5
Math CC: 4.MD.4

Grade 6: ELA: SL.6.4,5
NGSS: MS-PS1-4

Grade 5: ELA CC: SL.5.4, 5
Math CC: 5.MD.2
NGSS: 5-PS1-2, 3, 4

Materials:

- 3 frozen packages of spinach
- 3 cans of spinach
- 3 bunches fresh spinach
- 3 medium-sized pots
- Hot plate
- Water
- Forks
- Plates
- Napkins

Vocabulary:

Encourage students to use these words when making observations.

Aftertaste: the persistence of a sensation of flavors when food is no longer present.

Mouthfeel: food's physical and chemical interaction in the mouth, used often in the testing and evaluating of foodstuffs.

Pungent: having a strong odor that stings the nose, especially in acidic or spicy substances.

Vibrant: of bright color.

This lesson has been adapted from California Department of Education curriculum by California Foundation for Agriculture in the Classroom.