

ABUNDANT CALIFORNIA

WINTER SQUASH: SINK OR FLOAT?

OVERVIEW

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GRADE LEVEL: 3-5



CENTER FOR ECOLITERACY



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CALIFORNIA FOOD
FOR CALIFORNIA KIDS®

WINTER SQUASH: SINK OR FLOAT?

LESSON OVERVIEW

Colorful winter squashes can brighten up cold-weather meals, and they are delicious in soups, desserts, and every course in between. But their name is a bit of a misnomer: They are actually a summer crop that is harvested in the fall and can be stored through winter, protected by their thick rind and dense flesh.

In this lesson, students sample several winter squash varieties, comparing their color, taste, and texture. They also conduct a sink/float test to compare the densities of winter squash and summer squash to assess their suitability for storing.

For this lesson, use the tasty winter squash varieties available during the fall and winter at local farmers markets and grocery stores. You may also use squash harvested from your school garden. Note that Halloween pumpkins are bred for carving, not eating, and tend to be watery and bland.

FOOD SYSTEM EMPHASIS

Storing

GRADE LEVEL

3-5

LENGTH

One to two 50-minute periods

LEARNING OBJECTIVES

Students will:

- Compare the tastes and textures of different winter squash varieties grown in California.
- Determine whether objects are more or less dense than water.
- Compare the densities of winter squashes to summer squash as one way to assess their suitability for storage.

STANDARDS CONNECTIONS

NEXT GENERATION SCIENCE STANDARDS

- 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Science and Engineering Practices

- Planning and Carrying Out Investigations – Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or to test a design solution.

COMMON CORE STATE STANDARDS – ENGLISH LANGUAGE ARTS

- RI.3.7. Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

VOCABULARY

- **Density** – the amount of matter in a given space
- **Flesh (or meat)** – the part of a fruit or vegetable that you eat
- **Fruit** – the part of a flowering plant that contains the seeds
- **Plant variety** – a group of plants within a species that have similar characteristics

- **Rind** – the tough outer layer of squashes and melons
- **Store** – (verb) to keep or put away something until it is needed
- **Tendrils** – a threadlike part of a climbing plant that wraps around other objects for support
- **Viability** – the ability to survive

MATERIALS

- Copies of “10 Interesting Facts about Winter Squashes” and “Squash Sink/Float Test” student handouts
- Copies of “Taste Test” and “Fruit and Vegetable Adjectives” student handouts from *Savoring California: A Comparative Tasting of California Fruits and Vegetables* (<http://www.ecoliteracy.org/sites/default/files/CEL-CA-Thursdays-Tasting-Lesson.pdf>)

For Taste Test

- Several different winter squash varieties (see Preparation)
- Digital camera and printer
- Resealable plastic bags
- Permanent marker
- Rimmed baking sheets or jelly roll pans
- Parchment paper
- Sharp knife
- Cutting board
- Vegetable peeler
- Olive oil or melted butter
- Salt

- Access to oven
- Toothpicks
- Napkins

For Sink/Float Test

- Three or more whole winter squashes and/or summer squashes (see Preparation)
- 1-inch cubes of winter squashes, one of each variety for each group
- Several summer squashes (such as zucchini or crookneck squash)
- Large clear plastic tub or other clear container
- Small, clear plastic container for each group
- Kitchen or postal scale

PREPARATION

- Purchase several different varieties of California-grown winter squashes, or use winter squashes from your school garden. (See Background for possible varieties.) Take pictures of the whole squashes before preparing them for both the taste test and the sink/float test, as described below.
- Plan to keep a couple of the winter squashes whole for the sink/float demonstration (Step 7 of the procedure).
- Make copies of the student handouts. For the “Fruit and Vegetable Adjectives” student handout, you may make one copy for each small group or table, or project it onto a screen for the whole class to see.

For Taste Test

- Print out the photos of the winter squashes to share with students.
- Lay out a piece of parchment paper on each baking sheet. Use a pencil to mark out two to six even rectangles on the paper, depending on the size of the

trays and how many squashes you have to test. Write the name of a variety in each of the rectangles.

- Wash the squash. Save a couple of whole squashes for Steps 1 and 7 of the procedure. Cut the remainder in halves and then quarters, and remove the seeds. Peel the pieces and then cut the flesh into 1-inch cubes.
- Set aside enough squash cubes for the sink/float test, keeping each variety in separate labeled, resealable bags.
- Toss the remaining cubes with a bit of melted butter or olive oil and salt, keeping each variety separate. Spread in single layers in the corresponding labeled areas of the baking sheets. Roast in a 400-degree oven for about 30 minutes, tossing occasionally, until just tender.
- Plan to use the roasted squash within an hour, or refrigerate until ready to use.
- Place the corresponding squash photo next to each section of the baking sheets. Provide toothpicks for picking up samples.
- Read over the *Savoring California: A Comparative Tasting of California Fruits and Vegetables* lesson (<http://www.ecoliteracy.org/sites/default/files/CEL-CA-Thursdays-Tasting-Lesson.pdf>).

For Sink/Float Test

- Have on hand a few whole winter squashes and summer squashes.
- Have available 1-inch cubes of different winter squash varieties. (These should be raw. See Preparation for taste test.)
- Similarly prepare 1-inch cubes of the summer squash.
- Fill the large container with water. For each student group, fill a small container with water.

SAFETY NOTES

Have students wash their hands thoroughly before conducting the taste test.

DIRECTIONS

- 1 Pass around the whole winter squashes and ask students whether they've seen or eaten any of these winter squashes before.
- 2 Direct students to read the "10 Interesting Facts about Winter Squashes" student handout. Ask them to summarize what they read. Invite students to share any additional facts they know about winter squashes, creating a class list on the board.
- 3 Show students the winter squash you have prepared for the taste test. Conduct a comparison tasting of the squashes, following the suggestions in the *Savoring California: A Comparative Tasting of California Fruits and Vegetables* lesson (<http://www.ecoliteracy.org/sites/default/files/CEL-CA-Thursdays-Tasting-Lesson.pdf>). Encourage students to use descriptive terms for the color, taste, and texture of the different winter squashes, with the "Fruit and Vegetable Adjectives" student handout as a guide.
- 4 Discuss how winter squashes are harvested in the fall and stored for the winter months. Ask what qualities might make these squashes suitable for storing. (Help connect students to the idea that the squashes' hard rind and dense flesh help keep them fresh for many months.) You may show students that a fingernail pressed against a summer squash will go easily into the rind, but will not go easily into the rind of a winter squash.
- 5 Ask them what the word *dense* means. Ask, "How can we know how dense something is?"
- 6 Point out that one way to determine the density of an object is through a sink/float test. Objects that are denser than water will sink, and those that are less dense than water will float.
- 7 Show students the whole squashes again, and ask which ones they think will sink and which will float. Invite individual students to put the squashes—one at a time—in the large container of water.
- 8 Discuss the results, asking questions such as:

- Did any of the results surprise you?
 - Which of the squashes is the heaviest? Which is the densest?
 - How is density different than weight?
 - How could we test which winter squash has the densest flesh?
- 9 Explain that students can further compare densities of different squashes by conducting a sink/float test of same-size cubes from the squashes.
- 10 Divide the class into small groups of students, and give each group a container of water and copies of the “Squash Sink/Float Test” student handout. Allow time for students to conduct the sink/float test on each of the squash varieties, following the instructions on the student handout.
- 11 Have groups share the results of their test. What conclusions can they draw about how well each squash variety would last in storage based on the evidence from the test? What other factors might affect how long winter squashes last?

EXTENDED LEARNING

- Use Harvest of the Month materials (see Resources) to explore other aspects of winter squashes.
- Save seeds from winter squashes and use the sink/float test to check for their viability. In general, seeds that sink are viable and ones that float are not viable. You may plant the viable ones in your garden in late spring.
- Invite students to list various ways that people save summer crops for the winter (storing, freezing, drying, pickling, canning, etc.). Create a class chart comparing the advantages and disadvantages of each method.
- Visit a local farm or farmers market to learn about other winter squash varieties grown in your area. (See Resources to locate a farmers market near you.)

RESOURCES

- *California Harvest of the Month: Winter Squash*. http://harvestofthemonth.cdph.ca.gov/documents/Fall/21712/Ed_News_Winter%20Squash.pdf
- *National Farmers Market Directory*. <https://www.ams.usda.gov/local-food-directories/farmersmarkets>.

ASSESSMENT

Use students' responses to the last two questions on the "Squash Sink/Float Test" student handout to assess their learning. For example, what do their responses show about their understanding of density? How complete and accurate were the conclusions they drew from the sink/float test?

BACKGROUND

Winter squash is a summer-grown crop that is harvested in the fall when fully ripe. Unlike summer squashes, such as zucchini and crookneck squash, winter squash varieties have a thick rind and dense flesh that enable them to be stored through the winter.

WHY DO SOME SQUASH FLOAT?

Density is the amount of matter in a given space, and it is a big part of why something floats or not. In denser objects, molecules are packed closer together than in less dense objects. Objects that are less dense than water will float. Objects that are denser than water will sink.

Many hollow objects, like empty bottles and tennis balls, will also float because the air in them is less dense than water. This is one reason that a large pumpkin can float, even though it is heavy. The hollow space inside it is filled with air, making the pumpkin as a whole less dense than water.

The shape of an object also affects whether it will float. When more of an object's surface is touching the water, the object is more buoyant. That's why broad, flat objects tend to float better than spherical or blocky objects.

Sink and float tests are sometimes used to assess produce quality. For example, mangoes that sink are denser—and thus riper—than mangoes that float, and seeds that sink are more likely to germinate than seeds that float.

THE HISTORY OF WINTER SQUASHES

Winter squashes are members of the Cucurbit family, which also includes gourds, cucumbers, and melons. While they are classified together, different members of the family have different origins: Winter and summer squashes are native to the Americas, cucumbers come from Eastern Asia, and melons are from North Africa or Western Asia.

Squashes are one of the oldest cultivated crops in the Western Hemisphere, and people have been growing them for 8,000 years or more. They were first grown just for their edible seeds, because the earliest varieties were very bitter and had little flesh.

The word *squash* comes from the Narragansett native peoples of North America: It derives from the word askutasquash, which means “eaten raw.” (Note that this is a different root than that of the verb “to squash” meaning to crush or destroy, which comes from the Latin word meaning “to shatter.”)

CALIFORNIA’S WINTER SQUASH CROP

California is the second-largest producer of winter squash in the country, after Florida. Each year California grows over \$230 million worth of winter squash. (Source: “California Winter Squash.” Produce Services of Los Angeles. <https://pslainc.com/blog/california-winter-squash/>). The top varieties include:

- **Acorn** – This compact, yellow-fleshed squash has a mildly sweet, nutty flavor
- **Butternut** – The smooth, orange-colored flesh of this squash blends and mashes well, and is a favorite for many
- **Carnival** – This yellow and green, multicolored squash has a buttery flavor that sweetens with age

- **Delicata** – Cylindrical and cream-colored with green stripes, this winter squash has a thinner rind than other winter squashes and is generally smaller
- **Pumpkin** – Carving pumpkins used for Halloween are not meant to be eaten; pie or sugar pumpkins are smaller, denser, sweeter, and more flavorful
- **Red Kabocha** – With a dark, orange-colored skin and a squat, rounded shape, this savory winter squash is often confused with a pie pumpkin
- **Spaghetti** – This large, hollow-cored squash is filled with stringy flesh that resembles pasta

HEALTH BENEFITS OF WINTER SQUASH

Winter squash is rich in vitamins A and C and beta-carotene. The darker the squash, the more beta-carotene and other nutrients it contains. Winter squash is also a good source of iron and riboflavin.

SELECTING AND STORING WINTER SQUASH

Choose a squash that feels heavy for its size. The stem should be dry and corky. Also avoid cracks in the rind and soft spots, which can lead to mold.

Store winter squashes in a cool, dry place for a month or more. You don't need to refrigerate whole squashes, but squashes that are cut open should be kept in the refrigerator for no more than 5 days.

1 FUN FACTS about winter squash



1. Winter squashes

actually grow in the **summer!** They get their name because they can be stored through the winter.

2. Winter squash is one of the oldest food crops. People have been growing winter squashes in Central America for over **8,000 years!**

3. Winter squashes take longer to grow than summer squashes and have **harder, thicker rinds and denser flesh.**

4. Winter squashes are **good for you!** They are excellent sources of vitamin A and vitamin C. They also contain lots of carotene (CARE-uh-teen), which makes their flesh orange.



5. A winter squash is really a fruit!

That's because it is the part of the plant that contains the seeds.

6. California

is the **second-largest grower of winter squashes** in the country, after Florida.



7. Winter squashes come in many different shapes, colors, and sizes.

Pumpkin, acorn squash, and butternut squash are just a few varieties.

8. Both summer and winter squashes belong to the Cucurbit (koo-KERB-it) or **gourd family.** Their cousins are cucumbers and melons.

9. Most winter squashes are **naturally sweet.** They are delicious plain or used in many dishes from soups to desserts.



10. People eat many **different parts** of squash plants: the flowers, fruit, dried seeds, and even young tendrils.



SQUASH SINK/FLOAT TEST

In this test, you will predict which squashes will sink in water and which will float.

Procedure

For each squash variety:

- 1 Record its name below.
- 2 Take a sample cube of flesh, weigh it, and record its weight.
- 3 Predict whether it will sink or float when placed in water, recording your prediction below and describing your reasons.
- 4 Place the cube in a container of water and record whether it sinks or floats.

Squash Variety	Weight	Do you think it will sink or float?	Why?	Did it sink or float?

- 5 What does this test tell you?
- 6 Which squash variety do you think would last the longest time in storage? Which would last the shortest? Why do you think so?



ABOUT THE CENTER FOR ECOLITERACY

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