



FLORIDA CAULIFLOWER



DEAR TEACHER

This month's Harvest of the Month is cauliflower! The lesson plans, worksheets and activities provided were developed to guide your classroom's understanding of the origins and nutritional benefits of coveted cauliflower. We hope you are able to utilize all of the materials and be sure to encourage your students to try cauliflower at home.

CLASSROOM RECIPE

CRÈME DUBARRY (CAULIFLOWER SOUP)



Serves 50

INGREDIENTS:

- 2 ounces margarine
- 2 cups yellow onions, diced
- 18 $\frac{3}{4}$ pounds cauliflower heads, diced small
- 1 gallon low-sodium chicken stock
- 1 gallon low-fat milk
- 1 tablespoon salt
- 1 tablespoon pepper

PREPARATION:

1. Heat the margarine in a stock pot or steam kettle; add the onion and saute until the onion is translucent.
2. Add the cauliflower, stock and milk, bring to a boil and then simmer for 10-15 minutes, or until cauliflower is tender. Remove from heat and allow to cool slightly.
3. Add the salt and pepper; mix well.
4. Blend the soup using an immersion blender (if needed use a regular blender and blend in batches).
5. Optional: Add 1/2 tablespoon of ground cayenne pepper and 1/4 tablespoon of ground nutmeg to soup when blending.

WANT TO START A GARDEN FROM SEEDS?

If you are looking for seeds to start a classroom garden, you can reach out to your local Institute of Food and Agricultural Sciences (IFAS) office to obtain seeds for Harvest of the Month gardening activities.

Cauliflower Florida Food Fare

<http://sarasota.ifas.ufl.edu/FCS/FlaFoodFare/Cauliflower.pdf>

Cauliflower Nutritional Benefits

<http://snap.nal.usda.gov/nutrition-through-seasons/seasonal-produce/cauliflower>

Florida Farm to School:
FarmToSchoolFL.com

National Farm to School Network:
www.FarmToSchool.org



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FLORIDA CAULIFLOWER FACT SHEET

DID YOU KNOW?

- Cauliflower is primarily grown in West Central Florida.
- Cauliflower became an important crop in the United States in 1925.
- Cauliflower grows in similar weather conditions as broccoli and cabbage, but does not handle colder weather as well as these crops.
- Cauliflower is a fat free and cholesterol free vegetable.
- “Jacket Leaves” are the green leaves surrounding the head of a cauliflower. They protect it from too much sun as it grows so that the flower stays white.
- Cauliflower, a cruciferous vegetable, is a member of the cabbage family.
- When you eat a head of cauliflower, you are actually eating a flower.
- We usually eat white cauliflower, but this vegetable can also be green or purple!
- Wash cauliflower immediately before you are preparing to eat it.



GROWING CAULIFLOWER

- Cauliflower's growing season in Florida is from October to April with an abundant supply in March.
- Cauliflower should be planted 18-24 inches apart and must have substantial soil moisture to grow.
- It is easier to grow cauliflower from a transplant than to grow it from seeds.

NUTRITION DATA

NUTRITION FACTS			
Serving size: 1 cup			
Servings: 1			
Amount Per Serving			
Calories	25	Calories from Fat	0
% Daily Value*			
Total Fat 0g			
Saturated Fat 0g			0%
Trans Fat 0g			
Cholesterol 0mg			0%
Sodium 30mg			8%
Total Carbohydrate 5g			4%
Dietary Fiber 2g			8%
Sugars 2g			
Protein 4g			
Vitamin A	0%	Vitamin C	64%
Calcium	2%	Iron	2%
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.			

LESSON PLANS

CONTENT AREAS: Lessons are most applicable for science and environmental science courses but the content includes standards from social studies, art, language arts and *especially* math.

STANDARDS: SC.6.N.1.5, SC.6.N.1.3, SC.7.N.1.5, SC.7.L.17.2, SC.7.L.17.3, SC.8.N.1.5, LAFS.6.SL.1.2, LAFS.6.SL.1.3, LAFS.6.SL.2.4, LAFS.68.RST.1.1, LAFS.68.RST.1.2, LAFS.68.WHST.2.6, LAFS.68.WHST.3.7, MAFS.7.SP.2.4, VA.68.C.2.1, VA.68.C.2.2, VA.68.C.2.3, SS.7.C.2.12, SS.7.C.2.13, and SS.7.C.2.14

OBJECTIVES: Students will analyze the history, cultivation and nutritional content of cauliflower, read and comprehend different varieties of cauliflower and complete experiments on the influence of different senses in understanding taste and flavor using different colored cauliflowers.

MATERIALS:

- Introduction: Cauliflower history and benefits article.
- Guide Activity 1: Cauliflower color article and comprehension questions.
- Guided Activity 2: Three different colored varieties of cauliflower, tomatoes, potatoes or peppers. Plates, napkins, glasses for water and a microwave for cooking (if needed).

INTRODUCTION:

Post the following “warm-up” problem to begin the discussion on cauliflower:

“Cauliflower is one variety of the plant species known by the scientific name *Brassica oleracea*. Other species of the *Brassica* family include broccoli, cabbage, kale, collard greens, Brussels sprouts, kohlrabi, savoy and kai-lan. What percentage of the group *Brassica oleracea* is comprised of cauliflower?” Answer: $119 = 0.111$ or 11.1 %

Give students five minutes to answer the warm-up and then review as a class. Next, students will independently read “*Cauliflower History and Benefits*.” Discuss the history, cultivation and benefits of cauliflower. Ask students to do additional research about the cauliflower cultivation and share their findings with the class.

GUIDED ACTIVITY:

Activity 1: Pass out the reading and comprehension questions titled “*Cauliflower Color Article with Questions*.” Students will need approximately one hour to complete the comprehension questions. Students can read in partners, independently or in small groups.

Extension: Follow-up questions for deeper understanding may include: “What is the difference between genetic engineering and selective breeding?” Have students research foods that have been altered through genetic engineering and selective breeding and detail issues, both positive and negative, of both practices.

Activity 2: Teacher will review the five senses using the background information found on the “Which of Your Senses Most Dominates Your Sense of Flavor?” worksheet. Students will complete the “taste lab” using different colored varieties of fruits and vegetables to determine which sense plays the greatest role in deciphering flavor and taste.

Extension: Repeat the experiment using other varieties of fruits and vegetables (example, yellow, green and red peppers). Multiple food trials will help to strengthen students’ conclusions on question four. Review as a class when all students have completed the activity.

INDEPENDENT ACTIVITY: Students will create a poster that advertises which of the five senses is paramount in determining flavor and taste. Each advertisement should include a picture, slogan and relevant information that supports WHY the sense is so important in determining flavor and taste.

BACKGROUND INFORMATION

Cauliflower has recently seen a surge in popularity. No longer is it seen as an over-boiled vegetable and only edible when covered in cheese. People are finding out what a versatile, delicious vegetable cauliflower can be. Professional chefs to at-home cooks are making a healthier version of mashed potatoes with cauliflower and are roasting this cruciferous vegetable with a variety of ethnic spices.

Cauliflower is a member of the Brassica family and is native to Western Europe and the northern Mediterranean. However, it is believed to have originated in Asia Minor. In Florida, cauliflower is available from October through April. Cauliflower grows well in phosphatic clay and should be harvested as soon as it is mature.

Eating just one serving of cauliflower provides you with over half of your recommended daily value of vitamin C. Other nutrients in cauliflower include vitamin K, vitamin B6 and potassium. Cauliflower is also a good source of fiber

For more information, visit these sources:

- <http://gardeningsolutions.ifas.ufl.edu/plants/edibles/vegetables/cauliflower.html>
- <http://www.whfoods.com/genpage.php/genpage.php?tname=foodspice&dbid=%2013>
- www.sciencedirect.com/science/article/pii/S0960982295000728
David R. Smyth, "Flower Development: Origin of the cauliflower"
Current Biology, volume 5, Issue 4, April 1995, Pages 361-363
- <https://experiencelife.com/article/cauliflower-power-2/>
- www.cauliflowerrecipes.co.uk/the-history-of-cauliflower/
- <http://articles.mercola.com/sites/articles/archive/2014/02/22/cauliflower-health-benefits.aspx>

ADDITIONAL READING

- "Cauliflower: The Ultimate Recipe Guide", book by Jonathan Doue
- *Genetically Modified Moth Passes Greenhouse Testing with Flying Colors*, Discover Magazine
Article by Christie Wilcox: <https://www.discovermagazine.com/planet-earth/genetically-modified-moth-passes-greenhouse-testing-with-flying-colors>



THE ORANGE, PURPLE, AND GREEN CAULIFLOWERS THAT SCIENTISTS CLAIM COULD BE HEALTHIER FOR YOU

By David Derbyshire

Cauliflower cheese will never be the same again. Scientists have developed amazing variants of vegetable where the traditional white florets have been changed to a garish orange, purple and green. The “rainbow cauliflowers” are said to taste the same as the normal varieties, but add a splash of color to the dinner table. Some scientists have even claimed that they are healthier for you.

Andrew Coker, a spokesman for the plant company Syngenta, which is developing the plants in Europe, stressed that the colorful cauliflowers were not the result of genetic engineering, but came after decades of traditional selective breeding.

Although it's not the first time that orange and green cauliflowers have been seen in Britain, their creators say they will be the first to be commercially available in supermarkets and markets. They retain their color even after cooking. “The pictures may look garish, but they really are this colorful,” said Mr. Coker.

“Consumers are looking for ever new experiences on their dinner plates and color features very large in their desire for different things.

These are the results of traditional selective breeding where different strains have been cross bred until these strains have been created. We are now trying to ensure that we have the consistency of color, taste and size before bringing them to the mass market, but you will find them in smaller outlets this year.”

In tests, the garish cauliflowers have proved a hit with shoppers. While traditionalists may balk at the unusual colors, it is not the first time that plant breeders have changed the appearance of vegetables.

Until the 17th century, most carrots eaten in Europe were white, yellow or purple. The orange pigment was added by Dutch plant breeders looking for a way to celebrate Holland's royal family. The last few years has seen the



introduction of purple carrots to supermarkets in Britain, along with yellow tomatoes and purple potatoes. In America, where color cauliflowers have been available for several years, they have been a big hit with foodies. The orange cauliflower has higher than normal levels of beta carotene, a form of vitamin A that encourages healthy skin.

The purple color comes from anthocyanin, which may help prevent heart disease by slowing blood clotting.

Tests of the orange cauliflowers in America found that they contained 25 times the concentrations of beta carotene than normal cauliflowers.

COMPREHENSION QUESTIONS

Directions: After reading the article entitled “The Orange, Purple and Green Cauliflowers That Scientists Claim Could be Healthier For You”, answer the following questions in complete sentences on your own paper.

1. What would be a suitable substitute word for the word “garish” AND explain why the word you chose would be the best substitute.
2. Who has expressed or shown an interest in colored cauliflower?
3. What other fruit and vegetables have been adapted from their more traditional colors?
4. Carrots originally came in multiple colors. What country changed the color of carrots to orange AND for what occasion?
5. How have botanists, scientists who study plants, succeeded in creating different colored varieties of cauliflower?
6. What are some of the health benefits of colored cauliflower compared to typical white cauliflower?
7. If a one cup of white cauliflower contains 8 micrograms of beta carotene, how much should the colored cauliflower contain according to the article?

WHICH OF YOUR SENSES MOST DOMINATES YOUR SENSE OF FLAVOR?

Goal:

In this lab, you will determine which of your senses-sight, smell or taste-most determines your ability to discern different tastes and flavors.

Background Information:

Although sight is not technically part of taste, it certainly influences perception. Interestingly, food and drink are identified predominantly by the senses of smell and sight, not taste. Food can be identified by sight alone-we don't have to eat a strawberry to know it is a strawberry, the same goes for smell in many cases.

To our brains, "taste" is actually a fusion of a food's taste, smell and touch into a single sensation. This combination of qualities takes place because during chewing or sipping, all sensory information originates from a common location: whatever it is we are snacking on. "Flavor" is a more accurate term for what we commonly refer to as taste. Therefore, smell not only influences, but is an integral part of flavor.

Pure taste sensations include sweet, sour, salty, bitter, savory and, debatably, fatty. Cells that recognize these flavors reside in taste buds located on the tongue and the roof of the mouth. When food and drink are placed in the mouth, taste cells are activated and we perceive a flavor. Concurrently, whatever we are eating or sipping invariably contacts and activates sensory cells, located side-by-side with the taste cells, that allow us to perceive qualities such as temperature, spiciness or creaminess. We perceive the act of touch as tasting because the contact "captures" the flavor sensation.

Smells also seem to come from the mouth, even though there are no cells present in the mouth responsible for detecting scents. Instead the sensation of a strawberry depends upon activation of smell cells located at the end of the nasal passage. The information gathered by these cells is relayed to the mouth via a process called olfactory referral.

Method:

To demonstrate this phenomenon for yourself, hold your nose and place a strawberry jelly bean in your mouth and chew. You should detect sweetness and a little sourness, along with the hard (and then soft) feeling of the candy. With your nose held, however, you will not notice the strawberry odor. When you let go, you allow the odor molecules to travel through the nasal cavity to the smell cells, and suddenly the jelly bean has a strawberry flavor.

Acquiring information related to scent through the back of the mouth is called retronasal olfaction-via the nostrils it is called orthonasal olfaction. Both methods influence flavor; aromas such as vanilla, for example, can cause something perceived as sweet to taste sweeter. Once an odor is experienced along with a flavor, the two become associated; thus, smell influences taste and taste influences smell.

Source: <http://www.scientificamerican.com/article/experts-how-does-sight-smell-affect-taste/>



TASTE LAB

Directions:

Working in groups, students will try fruit and/or vegetables of different colors and to try and determine which of their senses influences their sense of taste. All answer should be written in complete sentences on your own paper.

Materials Needed:

Three different colored varieties of cauliflower (white, orange and purple), or tomatoes, or potatoes. Plates, napkins, glasses for water and a microwave for cooking (if needed).

1. **With your eyes open, taste three different types of cauliflower and describe the taste of each one.**

White cauliflower:

Orange cauliflower:

Purple cauliflower:

2. **Now, with your eyes dosed or blindfolded, taste the three colors of cauliflower and describe whether or not you could distinguish the difference between each color or whether there was a difference at all. Describe in detail!**
3. **Next, remove the blindfold, but pinch your nose and taste the different cauliflower colors. Were you able to taste the cauliflower at all and could you taste a difference between the three colors?**
4. **Based on your experiences, which of the following senses had the greatest influence on your sense of taste and flavor: sight, taste and/or smell? Explain in detail.**

COMPREHENSION QUESTIONS - ANSWER KEY

1. Outlandish, gaudy, loud, showy, glittery, flashy and brash would all be suitable substitutes.
2. Shoppers and consumers looking for something different.
3. Tomatoes and potatoes.
4. The Dutch, to honor the Royal Family of Holland.
5. By selectively crossing different breeds of cauliflower until the desired colors were achieved.
6. Higher levels of vitamin A, beta carotene and anthocyanin.
7. Answer= $8 \text{ mcg} \times 25 = 200 \text{ mcg}$ of beta carotene

ADDITIONAL RESOURCES

Explore these WeatherSTEM lessons



weatherstem.com/resources



For more resources, please visit:

FarmToSchoolFL.com