

Let Us Learn about Lettuce



LEVEL: Grades 7-9

SUBJECTS: Science, Language Arts,
Power Point, Art, Oral Presentation

AZ ACADEMIC STANDARDS: SC07-S2C2,
SC08-S2C2, W-E3

MATERIALS

Lettuce in dish of ice water
Cover slip
Microscope
Microscope slide
Salt solution
Forceps

VOCABULARY

stomata, osmosis, turgid
(stiff), guard cells,
photosynthesis,
chloroplasts, epidermis.

SUPPORTING INFORMATION

Lettuce is a vegetable that goes back in time before recorded history. It is believed that the first lettuce came from a wild lettuce parent and cultivation probably took place in the Mediterranean area about 3,000 years ago. Lettuce in its early years did not look like the lettuce we have today in the tightly bunched varieties. Early lettuce probably had a long tall central stalk, with leaves coming out of that stalk. We know that Loose Leaf lettuce was served to Persian kings as early as 550 B.C. They called it Kahn. Greeks grew lettuce in their gardens as early as 500 B.C. Lettuce was used for special festivals, in funerals, and for special feasts.

During the festival feast, the Greeks grew lettuce and the herb fennel in green jars. These jars were placed throughout the house and used like flowers would be used today. This was a very popular custom when the Greeks held their annual festival, dedicated to Adonis, the boyfriend of the goddess Aphrodite. The day after the festival, the jars were thrown away. After a while, anything that didn't last very long was called an Adonis Garden. Roman soldiers traveled all over Europe and were known to bring lettuce seed with them and planted lettuce wherever they were. After 500 years after the Romans left England lettuce remained and thrived. Lettuce was then used as an herbal medicine. Medical information found from that time period shows that it was used to cure heartburn and headaches, and drinking lettuce juice would help calm down a person. Lettuce juice was also used to help you sleep. Lettuce shows up in France in the late 1300s. The name lettuce comes from the French word laitie. This means milky. The juice in a lettuce leaf has a milky look to it. We know that the French served four different types of lettuce in a salad. Pink and red rose petals, violet petals, mint leaves, and sage and orange calendula petals were added for color and flavor. They then put on a dressing like we do today using oil and vinegar. Other herbs and

BRIEF DESCRIPTION

Students learn about the history and use of lettuce. They will observe the stomata in a lettuce leaf using a microscope. What is the purpose of stomata in plants? How different varieties of lettuce leaves are shaped. How the different colors of leaves vary according to the variety of lettuce? Students will do research and give a power point presentation to their class on their favorite vegetable.

OBJECTIVES

The student will learn:

- The purpose of the stomata and what is its function in a plant.
- How to distinguish between the different varieties of lettuce.
- Draw the different leaf patterns lettuce varieties have.
- Prepare a power point presentation about your favorite vegetable.
- Present your presentation to the class.

ESTIMATED TEACHING TIME

- Three 45 minute sessions.
- Power Point written presentation prep time 2 hours.
- Presentation time 3 minutes per student.

SUPPORTING INFORMATION (cont'd)

spices could have been added to the salad.

Columbus was believed to bring lettuce seeds with him and the first plantings were in the West Indies in 1493. We know that early French, Dutch, Swedish, and English explorers took "lettuce" seeds along with them. In the early colonists days' lettuce was dried and used as a tea. Once again this was used to help one sleep or help an upset stomach. The tea was also used as a poultice for scorpion bites, and to help stop the itch of poison ivy. Today lettuce has many varieties. The crisphead of Iceberg lettuce to the Radicchio for its fancy leaves to perk up a salad is grown in Yuma, Arizona. Yuma grows three different varieties of Iceberg lettuce that are named after their local high schools, Yuma, Kofa and Cibola. Romaine, Butter, Bib, Red Leaf, Green Leaf, Radicchio, Escarole, Endive, Boston, and Purple Leaf lettuce are grown in Yuma County which is known as the Winter Capital King for growing lettuce. This lettuce is grown and picked and packaged right in the fields. Some lettuce will be brought into big packing plants that will wash, cut, and package the lettuce for pre-made salads. Today spinach is used in salads or by itself as a salad. Lettuce contains some vitamin A and some potassium. The darker the leaf the higher the vitamin content. Spinach has vitamin A, and C, calcium, iron, protein, phosphorus, and B vitamins. It is estimated that thirty pounds of lettuce is eaten per person each year. Most of the lettuce in the America's is grown in California and Arizona.

How Stomata Works in Leaves? In this lesson students will learn how to observe stomata under a microscope and observe the stomata opening and closing. Guard cells look like two sausages with the ends touching. They contain chloroplasts. Most plants take in air, water and minerals mixed through the stomata. Guard cells are the only cells in the epidermis (skin layer) that have chloroplast. Stomata provide a passage in the leaf for carbon dioxide from the atmosphere. Each stoma is surrounded by two guard cells that control the size of the opening. Water moves into and out of guard cells by osmosis. Light, water, and carbon dioxide all affect the opening and closing of stomata. Stomata usually are open during the day when photosynthesis is occurring.

Procedures:

Lesson I:

1. Remove a piece of an outer green leaf of the lettuce. Choose a leaf that is turgid (stiff) from absorbing water in the dish.
2. Bend the leaf back and use the forceps to strip off some of the transparent tissue covering the leaf. This is the epidermis.
3. Prepare a wet mount of a small section of this tissue.
4. Examine the preparation under low and then high power of the microscope. Draw and label the leaf section in your data table.
5. Note the location and spacing of the stomata. Count the number of stomata that are open.
6. Make a second preparation of the lettuce leaf epidermis. Place a few drops of salt solution on the leaf.
7. Examine the preparation under low and then high power of the microscope.

Draw and label the leaf section in your data table.

8. Note the location and spacing of the stomata. Count the number of stomata that are open.

Data and Observations

Water Mount

No. of stomata open (sample) 16 out of 17

Salt Solution Mount

No. of stomata open 13 out of 13

Analyze

1. Describe the guard cells around a stoma.
2. How many stomata did you see in each leaf preparation?
3. How were the guard cells different from the other cells of the leaf epidermis?
4. Why did the lettuce leaf become stiff in cold water? Conclude and Apply
5. Why were more stomata closed in the salt solution?
6. What is the function of stomata in a leaf?
7. What evidence did you see that shows guard cells engage in photosynthesis?

Lesson II:

Do all lettuce leaves have the same pattern? Have students choose and observe the different types of lettuce and draw patterns of leaves on paper to help identify different varieties of lettuce. What do these varieties have in common and how are they different.

Materials

1. Have a variety of lettuce to show students and talk about the different varieties of lettuce. Point out if the lettuce is grown in a head or loose leaf, meaning it has a center stalk that leaves grow around. Look at the different color of the leaves. Let them taste the leaves they choose to trace.

Procedure:

1. Choose three leaves from three different varieties of lettuce.
2. White paper

3. Pencil
4. Let student taste lettuce leaves.
5. Trace each leaf shape onto a separate piece of paper. Draw each vein pattern onto its leaf shape. Compare the pattern of your leaves. What are their similarities and differences? Can you identify the variety of lettuce by its' leaf pattern and color of leaf?
6. Have students' use a Venn diagram to make comparisons and contrast differences.
7. Students will compare Venn Diagrams and hang on bulletin board.

Lesson III:

1. Have students create an informative story about their favorite vegetable.
2. Teacher will give students an outline to be used to set up a Power Point presentation and model what a presentation might look like.
3. Power Point presentation: Give your students two, 1 hour periods to put their presentations together. Have students present to class orally. Rubric will be followed to put presentation together and to be graded.

Closer: A big salad will be made in class using their favorite vegetables and eaten in class.

RESOURCES

Farm Bureau Ag in the Classroom
Dole Company

CREDITS

Merrill Life Science Glencoe
Macmillan/McGraw-Hill
Gardening Wizardry for Kids.
L. Patricia Kite

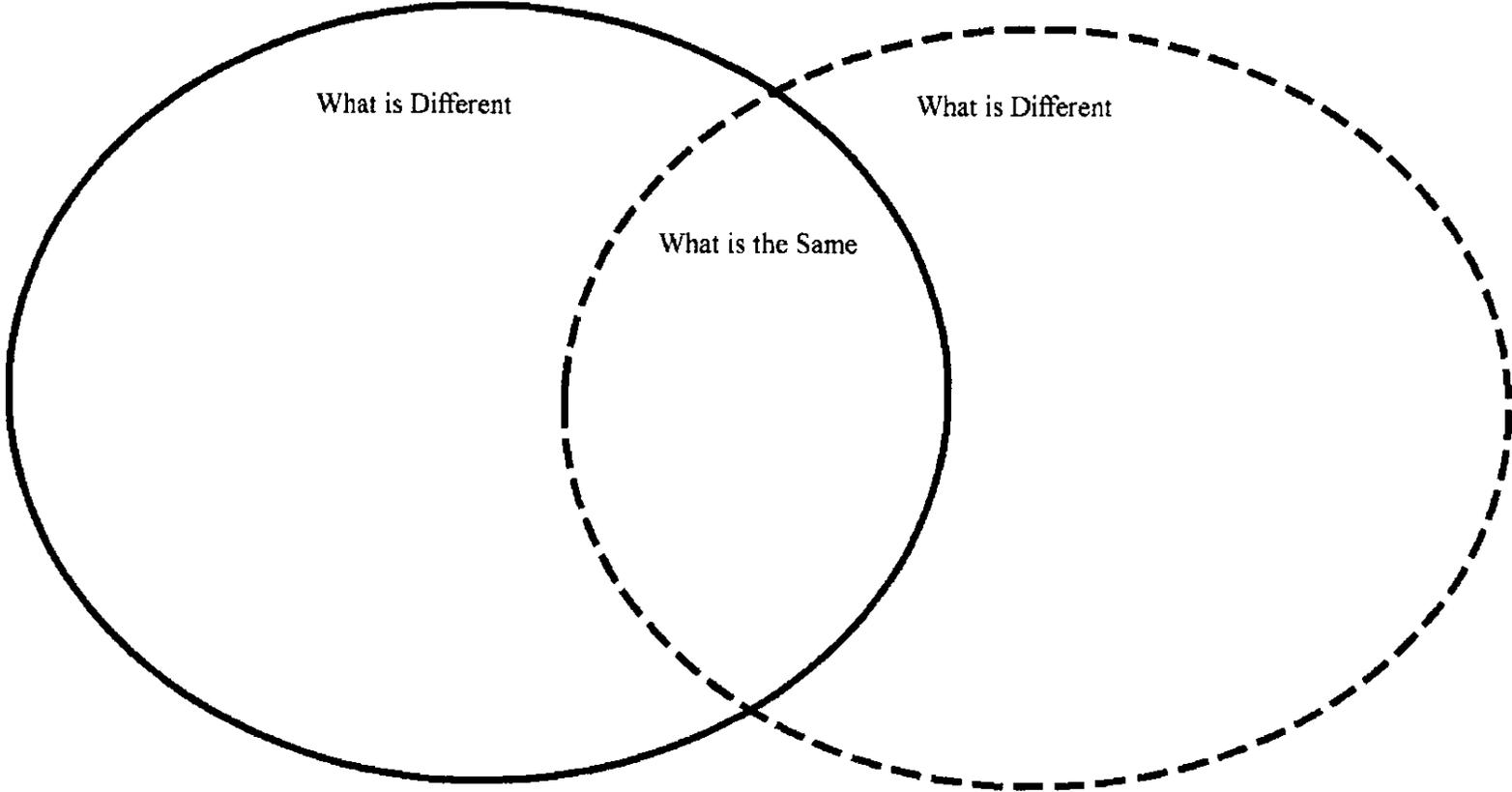
EDUCATORS' NOTES

CURRICULUM DESIGN

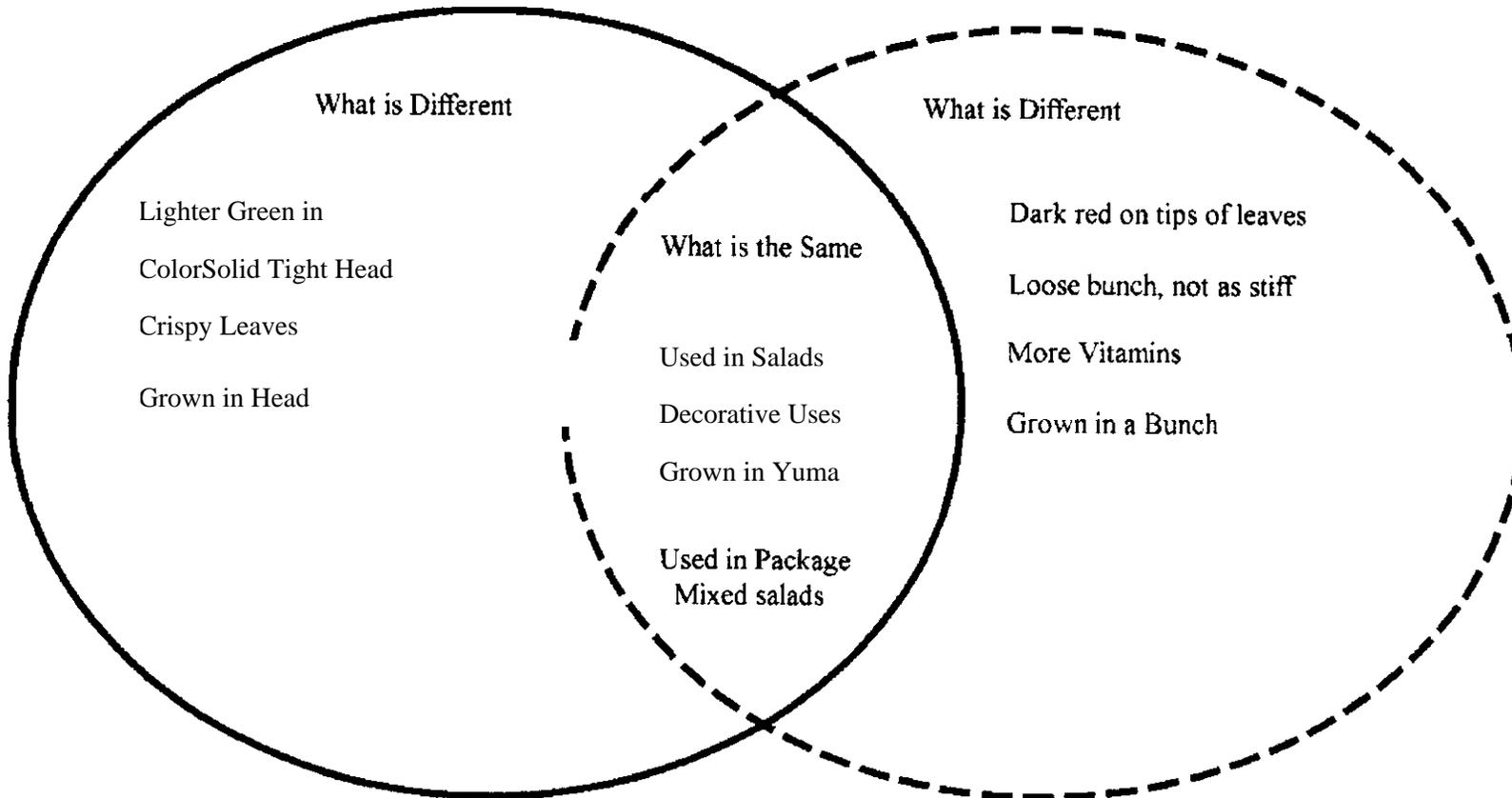
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HOW _____ COMPARES AND CONTRASTS WITH



HOW Iceberg Lettuce COMPARES AND CONTRASTS WITH Red Leaf Lettuce



Rubric	100-93 A	92- 85 B	84-77 C	76-70 D
Content	Clear evidence of complete and accurate information. Information is given clearly and concisely. No spelling errors 3 or more sources used.	Adequate evidence of accurate information. One to three spelling mistakes. Used only 3 sources.	Some evidence of accurate information. More than five misspelled words. Used 2 sources	No evidence of subject knowledge. More than eight words misspelled. Used just one resource.
Graphic/ Design	Goes along with content and ties in with content material. Used a graph correctly.	Goes along with content, but does not correspond with text. Used a graph, but not consistent with information	Some graphic design used but over powered context and could not read well. Misuse of graph.	Less than two pages of graphic design and no graph.
Creativity	Clear evidence of unique presentation qualities. Contains many examples of facts and ideas. Knows topic well.	Adequate of evidence of unique presentation qualities and offers some new insight into the topic. Carole Rush	Some evidence of unique presentation qualities but little original thought or inventiveness.	No evidence of any unique presentation quality or new thought.

An informative short story

- First choose a topic that you are interested in and want to share with some else-
- Choose a title
- Put title on first page and put in background of choice.

- Your second slide will contain information about the subject area you choose.
 - Use third person when presenting information about subject area.
- Use pictures from on line to accompany this page.

- Your third page should contain more information about the subject you choose to write about.
- History and information can be given at this time

- The fourth page should have a graph that you put together about the subject you are talking about.
- Picture or graphics can also accompany this page to add interest.

- Tell us more about the subject or table graph.
- Give comparisons or varieties

- Give a closing to your short story.
- You may now share your story with classmates giving a presentation and to your buddy in kindergarden