

Marshall University Sustainability Department

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Edible Plant Parts

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OBJECTIVES

Students will investigate how plant form relates to structure through observation and dissection of an assortment of plants and vegetables. They will learn to locate and label the parts humans use for food (i.e. seeds, stem, leaf, fruit, root, flower). Students will be able to classify plant foods as fruit, vegetable, tuber, or roots.

LESSON PARAMETERS

1. Key Terms - form, function, stem, roots, tubers, leaves, seeds, flowers
2. Group Size - groups of 3 to 5 students; applicable for a class ranging from 3 to 30 students
3. Grade Levels - 5th- 9th
4. Duration - one 45 minute session
5. Setting - outdoors
6. Disciplines - Science, Biology, Art, Environmental Education
7. Learning Techniques -
 - a. Discussion
 - b. Hands-On
 - c. Group-based Collaboration
 - d. Interdisciplinary
 - e. Activity-based
 - f. Real-world application
 - g. Critical Thinking
 - h. Expeditions
 - i. Nature-based



GREEN CONNECTIONS

- **Connections to Home and Community** - Students will be able to take home a plant of their own to grow and eventually eat. This may inspire students to further their gardening into their backyard, neighborhood, or community.
- **Sustainable Perspectives** -
 - Gardening
 - Sustainable habitats
 - Sustainable food sources

LESSON SUMMARY

Students will be taken to the Marshall University Student Garden where they will discuss the discussion questions together. Then students will receive a handout with a table including form, function, and edibility of plants. They should also receive colored pencils, if available. Individually, or in small groups, students will examine various plants of their own choice from the garden. Depending on the plants available, student may need to observe the plant without damaging it, or they may pick the plant and dissect it. They will identify (to the best of their ability) and draw the different parts of the plants under the “form” column in their tables. Then, they will hypothesize the function of each plant part based on their observations and record the hypotheses in their tables. They will also determine whether each part is eaten by humans, or not.

Upon completion, students will compare answers with each other, then share results with the instructor. The instructor will then go through the form, functions, and edibility of such plants with a whole class demonstration in the garden. Students may discuss which hypotheses were supported or rejected by the demonstration. When hypotheses are rejected, students need to record the correct forms, functions, and edibilities. They will also be given handouts for them to match plants that we eat and plant parts.

To close the lesson, students will return to the classroom and choose from a selection of plant parts that they can easily grow on their own such as green onion roots, avocado pits, lettuce, celery, potatoes, or bean sprouts (depending on availability). Each student will prepare their plants in cups of water or whatever is necessary for the selected plant. Students may research on the internet how to care for the plant they chose, if time allows, or receive directions from the instructor.

ACTIVATING STRATEGY

Students will be taken to the Marshall University student garden for this lesson. They will be challenged to answer the discussion questions aloud as a whole class discussion. Students should bounce their answers and ideas off of each other to activate prior knowledge and cognitively prepare them for the activity. This discussion will also give the instructor an opportunity to gauge students' prior knowledge.

LESSON DEVELOPMENT

<p>Exploration Lesson - Students must examine plant anatomy and hypothesize its function. Then they will determine which parts of the plants humans eat. This directly involves students with the materials and processes of investigation. Without receiving formal instruction yet, students will develop hypotheses about plant form and function based on observation.</p>	<p>Explanation Lesson - Once students have individually examined plant forms and hypothesized the corresponding functions and edibility, they will compare answers with peers. Then, the instructor will inform students of the correct form, function, and edibility of plant parts through demonstrations in the garden.</p>	<p>Application Lesson - Having gathered the proper terminology for plant parts, students will now grow their own edible plant parts. They will grow their own green onions by placing the roots of a few green onion plants in a jar/cup of water. They can take their green onions home to grow and eat in a few weeks!</p>
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LESSON ADDITIONS & CONTINGENCY

If bad weather, off season, or unable to visit campus or any working garden/farm, then bring in example plants/foods for students to identify the different parts of plants. If time allows, students may conduct individual research on other vegetable/plant scraps they can easily care for at home. If time still allows, students may watch a Nature Documentary: "What Plants Talk About" (<https://www.youtube.com/watch?v=CrrSAc-vjG4>).

DISCUSSION QUESTIONS

- How does plant structure relate to plant function?
- What parts of plants do we eat?
- Why do we eat these particular parts?
- How did people first learn to eat such parts?
- What are the seeds we eat?

MATERIALS

<p>Physical Materials</p> <ul style="list-style-type: none"> • Form and Function handout • Colored pencils (optional) • A variety of plants (ONLY if bad weather prevents outdoor learning) • Plant parts handout • Materials depending on choice of plants to grow (selected from below) 	<ul style="list-style-type: none"> • Instructions for growing their own plants <ul style="list-style-type: none"> ○ The Kitchen Experiment Garden: Growing Plants from Food Scraps (https://goo.gl/xp932e) ○ Kitchen Scraps You Can Regrow with Nothing But Water (http://lifehacker.com/kitchen-scraps-you-can-regrow-with-nothing-but-water-1531011995) ○ How to Grow Lettuce Indoors (https://extension.illinois.edu/gpe/case1/c1a.html)
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RATIONALES

- **Next Generation Science Standards**

- MS-LS1-4 - Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

- **21st Century Science Content Standards and Objectives for WV Schools**

- SC.O.PS.1.9 - synthesize concepts across various science disciplines to better understand the natural world (e.g., form and function, systems, or change over time).
- SC.O.PS.1.2 - formulate scientific explanations based on historical observations and experimental evidence, accounting for variability in experimental results.
- SC.O.PS.1.3 - conduct and/or design investigations that incorporate the skills and attitudes and/or values of scientific inquiry (e.g., established research protocol, accurate record keeping, replication of results and peer review, objectivity, openness, skepticism, fairness, or creativity and logic).
- SC.O.B.2.4 - relate the structure and function of individual body systems to the overall functioning of the organism.
- SC.O.6.2.03 - classify living organisms according to their structure and functions.
- SC.O.6.3.01- explore the relationship between the parts of a system to the whole system.
- SC.O.7.2.10- analyze the differences in the growth, development and reproduction in flowering and non-flowering plants.