Teosinte Case Study

Grade: 7

GPS:

S7L3. Students will recognize how biological traits are passed on to successive generations.
c. Recognize that selective breeding can produce plants or animals with desired traits.

S7L5. Students will examine the evolution of living organisms through inherited characteristics that promote survival of organisms and the survival of successive generations of their offspring.

Essential Question: How did artificial selection develop the world's food crops?

Teacher Note: This lesson does not take place in the garden, but does teach evolution through a garden/agriculture lens. In this lesson students learn how the wild grain teosinte was transformed into our modern version of corn, with an emphasis on artificial selection as opposed to natural selection, and how food crops co-evolved with civilization. For a learning activity students will create a newspaper page "Teosinte Today."
*** This lesson uses the term "artificial selection;" make sure to emphasize (or change word usage entirely if needed), that artificial selection is the same as selective breeding.

Resources: http://maize.uga.edu/index.php
http://learn.genetics.utah.edu/content/variation/corn/

http://newswatch.nationalgeographic.com/2009/03/23/corn_domesticated_8700_years_ago/

Interest Approach:

Post the following riddle on the board as students are coming into the classroom.

What do coca-cola, baby diapers, fireworks, bubble-gum, bio-diesel, and glue have in common?

Ask students for answers, if no one guesses, then tell them that they all have corn as an ingredient. Explain that corn and corn by-products are used in thousands of products. Make sure to differentiate between the field corn that is used to make these products, and the sweet corn that we eat. Tell students that the U.S grows 40% of the world's corn. Stress the importance of corn to our economy and food system (for better or for worse). In fact, pretty much everything in the grocery store except for fresh fruits and vegetables, contains corn. The documentary "King Corn" is available on youtube. Minute 3:03 to 4:30 is an informative and concise example of how much of our food contains corn products.

Lesson: Use the teosinte case study PowerPoint document as a framework to discuss how teosinte evolved in corn, and why that is artificial selection. The PowerPoint gives a couple of thinking prompts; make the PowerPoint engaging by using these, as well as making sure students draw and label the differences in corn and teosinte. Make sure students take good notes! Use video links to further student understanding.

Learning Activity: As a culminating activity, students will create a newspaper page (or blog page, facebook page, etc.) describing the transformation of teosinte into modern day corn.

Examples of newspaper names:

Teosinte Today, Corn Chronicles

Examples of article titles:

Corn's mysterious ancestry solved
New Genes are all the rage!
Secrets to a new you! Teosinte Transformation Before and After
How to pop in the new century!
Best in Business: Steps to becoming top in the global food market
Amazing Maize

Requirements

Format: (20 points)

- Title (5 points)
- 1-2 creative articles (5 points)
- Graph comparing teosinte and corn (5 points)
- 1 advertisement (5 points)

Information: (80 points)

- Definition of artificial selection (5 points)
- Explanation of how teosinte evolved into modern corn (20 points)

5 points	10 points	15 points	20 points
Explanation is unclear, and gives little or no evidence that corn evolved from teosinte through artificial selection	Explanation has some unclear points, and gives minimal evidence that corn evolved from teosinte through artificial selection	Explanation is mostly clear, and gives some evidence that teosinte evolved into corn through artificial selection	Explanation is clear, and gives sufficient evidence that teosinte evolved into corn through artificial selection

- Describe at least two genetic differences between corn and teosinte, and why native Americans selected for those genetic mutations (40 points)

10 points	10 points	30 points	20 points
0-1 genetic differences, and reasons those genetic mutations were beneficial are poorly described	0-1 genetic differences, as well as reasons why those genetic mutations were beneficial are somewhat described	1-2 genetic differences described, as well as reasons why those genetic mutations were beneficial for the most part are well described	2-3 genetic differences well described; student clearly explains why those genetic mutations were selected by Native Americans

- Explain why the transformation of teosinte into corn is artificial, and not natural selection (15 points)

Check for Understanding: Grade newspaper pages using rubric. If time permissible, have students present newspaper articles. Ask questions about how this relates to plants in the garden. Make sure students understand that those plants were developed through the same process of artificial selection.