

# Corn Series: Popcorn, Beans & Seeds

## Sustainability

Students discuss how the three sisters help one another to grow in the field, compare ancient and modern corn-processing techniques and discuss the resources required to process corn during Aztec times.

## Nourishment

Students eat tortillas they have made using both ancient and modern methods while talking about the role of food in Aztec society and their own lives.

## Life Skills

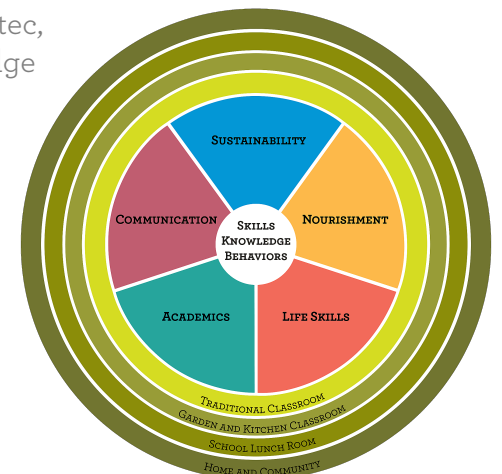
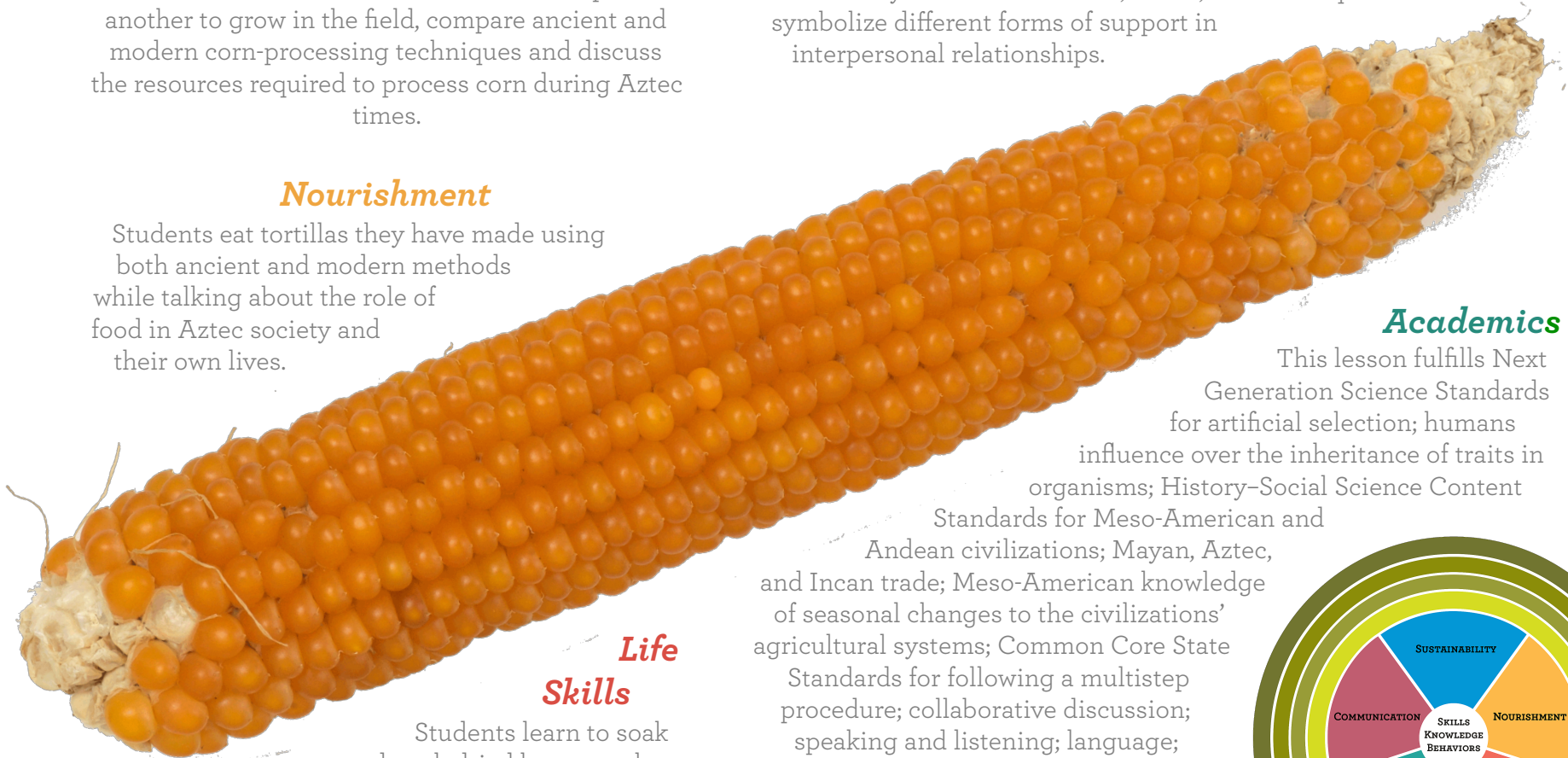
Students learn to soak and cook dried beans, make popcorn on the stovetop, break down squash and make roasted seeds.

## Communication

In the story of the three sisters, beans, corn and squash symbolize different forms of support in interpersonal relationships.

## Academics

This lesson fulfills Next Generation Science Standards for artificial selection; humans influence over the inheritance of traits in organisms; History-Social Science Content Standards for Meso-American and Andean civilizations; Mayan, Aztec, and Incan trade; Meso-American knowledge of seasonal changes to the civilizations' agricultural systems; Common Core State Standards for following a multistep procedure; collaborative discussion; speaking and listening; language; Health Education Content Standards for making healthy food choices; safe food handling and preparing nutritious food.



### The Corn Series: Popcorn, Beans & Seeds Abstract

#### Summary

In this 7th grade humanities lesson, students break-down winter squash, save and roast the seeds, hand-churn butter and pop two varieties of popcorn on the stove – one ancient and one modern. Students learn about the origins of corn, its nutritional and cultural importance in Aztec society, and compare ancient and modern corn processing techniques. They review knife safety skills, and reflect on their own cultural and personal relationships to food.

#### Objectives

After this lesson, students will be able to:

- Compare methods of processing corn for food and the roles of food production and processing in modern and Aztec lives
- Understand the origin of corn and describe the concept of plant domestication
- Understand the cultural importance of corn in Aztec society
- Prepare healthy and delicious foods from the three sisters

#### Assessments

During this lesson, students will:

- Describe food processing activities from previous lesson discuss the similarities and differences between modern and Aztec methods
- Describe the process of **teosinte's** domestication to corn
- Identify a food that is important in their own life and compare its significance to the role of corn in Aztec society
- Soak and cook dried beans, save and roast winter squash seeds, and make popcorn on the stovetop

**Communication** is strengthened by hearing the story of the three sisters (beans, corn and squash) and discussing how these plants symbolize different forms of support in interpersonal relationships. **Sustainability** is highlighted by considering how the three plant sisters help one another to grow in the field, comparing ancient and modern corn-processing techniques and discussing the resources required to process corn during Aztec times. **Nourishment** is acquired by talking about the role of food in Aztec society and our own lives, while eating tortillas students have made using both ancient and modern methods. **Life Skills** are developed as students learn to soak and cook dried beans, make popcorn on the stovetop, break down squash and make roasted seeds.

**Academics** fulfill Next Generation Science Standards for natural selection; biological evolution; History–Social Science Content Standards for Meso-American and Andean civilizations; Mayan, Aztec, and Incan economies and trade; Meso-American knowledge of seasonal changes to the civilizations’ agricultural systems; Common Core State Standards for following multistep procedures; collaborative discussion; listening and speaking; language; Health Education Content Standards for making healthy food choices; safe food handling and preparing nutritious food. See **Connections to Academic Standards** below for details.

**Edible Schoolyard** curriculum emphasizes developing community and personal stewardship, along with skills that will help students navigate different situations throughout their lives; selecting correct **knives** from the ESY Toolbox; executing an increasing variety of **techniques**; approaching lessons with **intention** by thinking through how the recipe relates to the kitchen; making connections between the diets of **historic cultures** and foods we eat today. See **Connections to Edible Schoolyard Standards** below for details.

This lesson follows the BEETLES Project’s **Learning Cycle** (Invitation-> Exploration -> Concept Invention -> Application -> Reflection) and uses their **Discussion Routines** (Think-Pair-Share, Whip-Around). All are highlighted in **Green\*** with an asterisk for easy identification. See the documents BEETLES\_Discussion\_Routines.pdf and BEETLES\_Learning\_Cycle.pdf included in **Resources** below for more information. Games and activities from other sources are also identified in **Green**, without an asterisk.

### **Connections to Academic Standards**

History–Social Science Content Standards for California Public Schools, Grade 7

- 7.7 Students compare and contrast the geographic, political, economic, religious, and social structures of the Meso-American and Andean civilizations.
  - 7.7.s Study the locations, landforms, and climates of Mexico, Central America, and South America and their effects on Mayan, Aztec, and Incan economies, trade, and development of urban societies.
  - 7.7.2 Study the roles of people in each society, including class structures, family life, war- fare, religious beliefs and practices, and slavery.
  - 7.7.5 Describe the Meso-American achievements in astronomy and mathematics, including the development of the calendar and the Meso-American knowledge of seasonal changes to the civilizations’ agricultural systems.

Next Generation Science Standards, Middle School

#### Disciplinary Core Ideas:

- LS4.B Natural Selection
  - In *artificial* selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring. (MS-LS4-5)

#### Crosscutting Concepts:

- Interdependence of Science, Engineering, and Technology
  - Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS4-5)

#### Performance Expectations:

- MS-LS4 Biological Evolution: Unity and Diversity
  - MS-LS4-5 Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. [Clarification Statement: Emphasis is on synthesizing information from reliable sources about the influence of humans on genetic outcomes in artificial selection (such as genetic modification, animal husbandry, gene therapy); and, on the impacts these technologies have on society as well as the technologies leading to these scientific discoveries.]

#### Common Core State Standards, English Language Arts and Literacy, Grade 7

- RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- SL.7.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 7 topics, texts, and issues*, building on others' ideas and expressing their own clearly.
  - SL.7.1.b Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.
  - SL.7.1.c Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.
  - SL.7.1.d Acknowledge new information expressed by others and, when warranted, modify their own views.
- SL.7.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grade 7 Language standards 1 and 3 on page 53 for specific expectations.)
- L7.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

- L.7.1.a Explain the function of phrases and clauses in general and their function in specific sentences.
- L.7.1.b Choose among simple, compound, complex, and compound-complex sentences to signal differing relationships among ideas.
- L.7.1.c Place phrases and clauses within a sentence, recognizing and correcting misplaced and dangling modifiers.\*
- L.7.3 Use knowledge of language and its conventions when writing, speaking, reading, or listening.
  - L.7.3.a Choose language that expresses ideas precisely and concisely, recognizing and eliminating wordiness and redundancy.\*
- L.7.6 Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Health Education Content Standards for California Public Schools, Grades 7&8,

- 1.8.N Identify ways to prepare food that are consistent with current research-based guidelines for a nutritionally balanced diet.
- 2.2.N Evaluate internal and external influences on food choices.
- 7.1.N Make healthy food choices in a variety of settings.
- 7.2.N Explain proper food handling safety when preparing meals and snacks.

### Connections to *Edible Schoolyard* Standards

Edible Schoolyard 3.0

In the Edible Schoolyard Program

- 1.0: Students work with each other and teachers to develop community and personal stewardship, along with skills that will help them navigate different situations throughout their lives.
- 1.1.1 - 1.3.12: This lesson fulfills all Edible Schoolyard Program standards, numbers 1.1.1 through 1.3.12. See *The Edible Schoolyard Berkeley Standards* for details.

In the Kitchen Classroom, 7<sup>th</sup> grade

- Tools 1.3: Select correct **knives** from the ESY Toolbox. Refine knife skills by using different cuts and sizes while demonstrating knife safety and care.
- Techniques 2.5. Execute an increasing variety of **techniques**, begin to choose the correct technique for each job, and discuss reasons to use different techniques.
- Concepts 3.8. Approach lessons with **intention** by thinking through how the recipe relates to the kitchen, garden, and wider environment as a whole.

- Concepts 3.11. Make connections between the diets of **historic cultures** and foods we eat today.

## The Corn Series: Popcorn, Beans & Seeds Lesson

### Materials

#### For the Chef Meeting

- K7-2 **Teosinte** Visual Aid
- Dried dent corn
- Dried **teosinte**
- Magnifying box

#### For the Knife Skills Demonstration

- K7-2 Knife Skills Review
- Cutting board
- Knife
- Damp cloth
- Vegetable or fruit

#### For the Question Board

- White board, Black board or wall space
- Post-it notes
- Pencils

### Ingredients

- Dried beans
- Assorted winter squash

#### For the Roasted Seeds

- Seeds from the inside of winter squash
- Pepitas
- Olive oil and salt

#### For the Popcorn Comparison

- Modern popcorn kernels
- Heirloom popcorn kernels
- Canola oil, salt
- Jar with whipping cream and dried beans for hand-churned butter

## **Tools**

### **For the Beans**

- Heavy-bottomed pot (or other container for soaking the beans)
- Strainer

### **For the Winter Squash**

- Mixing bowl (or other container for storing the diced squash)
- Vegetable peelers
- Bench scraper
- Chefs' knives
- Paring knives
- Cutting boards

### **For the Roasted Seeds**

- Sheet pan
- Parchment paper
- Mixing bowl
- Strainer
- Oven mitts

### **For the Popcorn Comparison**

- Two heavy bottomed pots (one cast iron and one Dutch or two of either type)
- Wooden spoon
- Oven mitts

## **Equipment**

- Stove



- Oven

### Timeline Overview

Total Duration: 105 minutes

#### Welcome:

1. *Invitation\** (5 minutes)

#### Chef Meeting:

2. *Concept Invention\** (10 minutes)

#### At the Table:

3. *Concept Invention\** (20 minutes)

4. *Application\** (65 minutes)

#### Closing Circle

5. *Reflection\** (5 minutes)

### Before you Begin

- Copy the **Teosinte** To Corn Visual Aid and distribute it to tables
- Create the Question Board and lay out post-it notes and pencils (see 6.b)
- Collect all the tools and ingredients, and distribute them to the tables

### Procedures

#### Welcome (5 minutes)

1. *Invitation\**:

- a. Welcome students to the kitchen and introduce remind them of the theme for the week: corn!
- b. Explain that this is the second of five lessons in The Corn Series.

#### At the Chef Meeting (10 minutes)

2. *Exploration\**:

Students review yesterday's lesson and imagine life as an Aztec.

- a. Ask Students to review the process of turning corn into tortillas.
  - i. Point out the additional steps needed for tortillas made from whole dried corn as opposed to Maseca (store bought dried corn flour).
  - ii. Review the process of nixtamalization.

- b. Invite students to go back in time to Aztec civilization and generate a revised order of steps for making corn tortillas, as a group. Steps might include:
  - i. Produce the corn crop.
  - ii. Source the limestone for nixtamalization.
  - iii. Carry water.
  - iv. Build a fire to boil the water.
  - v. Grind the corn with a metate,
- c. Ask them to compare the amount of time an Aztec person would spend on tasks related to preparing food with the amount of times they spend on this in their own lives.
- d. Explain that corn was central to the Aztec way of life, but that corn hasn't always been around.
  - i. It originated about 9,000 years ago in the Central Balsas River Valley in Southern Mexico, from a grass called **teosinte**.
- e. Ask students how many of them have a dog?
  - i. What does it mean to **domesticate** a dog?
  - ii. How does that process work?
  - iii. Have the class generate a definition of **domestication**.
- f. Ask students to discuss, using the definition of **domestication** they just described, how corn could have come from **teosinte**.
  - i. Pass around the **teosinte** kernels and corn kernels.
  - ii. Direct students' attention to the **Teosinte to Corn** visual.
  - iii. Prompt students to discuss with their neighbor:
    - 1) How does **teosinte** compare to corn?
  - iv. How do you think the process of **teosinte** developing into corn may have happened?
  - v. What does it mean to **domesticate** a plant?
- g. Bring students' attention back to the front of the room and generate an explanation from the group about how corn was **domesticated** from **teosinte**.
  - i. Encourage them to reference specific evidence to support their hypotheses. E
  - ii. Explain that the initial **domestication** process that produced maize required several hundred to a few thousand years of generations of farmers selecting for larger kernels, higher yields and easy to harvest crops.
- h. Corn was main sustenance and medicine for Aztec people (and people all over the Americas).
  - i. Ask students to define **staple crop** (may reference the Greens Over Grains lesson from sixth grade).
  - ii. Corn was also incredibly important culturally, it was known as the "Queen of Crops."

- 1) Maya origin stories describe people being created from corn.
  - 2) In Aztec society, sacrifices were performed every year at harvest when the corn was cut down as a way to honor a corn god.
- i. Ask students to reflect on connections between food and culture throughout the lesson.
    - i. Introduce the Question Board, and explain that students may write answers on the post-its whenever they have free time.
    - ii. The Question Board question is: Are there any foods in your life or your culture that are very important, that you have stories, rituals or traditions around?
    - iii. Explain that there will be time to share their answers at the Closing Circle.
  - j. Ask students to wash their hands and join their table group.

### At the Table

Students review knife skills, prepare the recipe, eat and clean up.

#### 3. *Concept Invention*\* (20 minutes)

- a. Check-in with the table groups and ask these or similar questions. (5 minutes)
  - i. Which of the three sisters is your favorite to eat? How do you like it prepared?
  - ii. What is your favorite **staple crop** or **staple grain**? How do you like it prepared?
- b. Review knife safety.
  - i. See Knife Safety Review in the Resources section.

#### 4. *Application*\* (65 minutes)

- a. Introduce the ingredients, review the recipes and assign jobs.
- b. Prepare the recipes.
- c. Set the table; eat; clean up.
- d. Ask students to answer the following using descriptive language:
  - i. What are differences in appearance, smell, flavor, texture and other qualities of the two popcorn varieties?
  - ii. Tell the story of the three sisters (three sisters grew together and helped each other: beans nourished the soil, squash protected, corn supported).
  - iii. Who are the three sisters in the story? (Corn, Beans, Squash)
  - iv. What can we learn about how they grow from the story?
  - v. Which of the three sisters do you most identify with?

### At the Closing Circle (10 minutes)

**5. Reflection\*:**

Students reflect on today's class time.

- a. Discuss the Question Board question and ask students to share any foods that they have stories, rituals, or traditions around.
- b. If there is time, ask students to share one thing they learned from today's lesson.

**Vocabulary**

Staple food

Teosinte

Domesticate

**Contributors**

All lessons at the Edible Schoolyard Berkeley are developed in collaboration with the teachers and staff of the Edible Schoolyard and Martin Luther King Jr. Middle School.

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**Resources**

K7-2\_Knife\_Reivew.pdf

K7-2\_Teosinte\_Visual\_Aid.pdf

BEETLES\_Learning\_Cycle.pdf (See lesson G6-0)

## The Domestication of Teosinte to Modern Corn



Top: 4 varieties of teosinte and 5 varieties of corn (left to right)  
Bottom: 5 varieties of teosinte

## The Domestication of Teosinte to Modern Corn



Top: 4 varieties of teosinte and 5 varieties of corn (left to right)  
Bottom: 5 varieties of teosinte

