Celebrating Corn and Latin American Cultures

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Title: Celebrating Corn and Latin American Cultures in School Gardens

Overview: Native to Mesoamerica, corn is a pivotal plant in many cultures throughout Latin America and an important crop worldwide. Not only is it a dietary staple, but it is also used to help make a host of other nonedible products we rely on too. In this lesson, students will learn about the cultural significance and history of growing corn and also explore the dramatic changes corn plants have experienced due to thousands of years of human cultivation and plant breeding efforts.

Grade Level/Range: Adaptable to grades K-5th

Objectives:
Students will:
- Discover the great diversity of corn-based products and corn's critical role in human civilization
- Consider the historical and cultural importance of corn
- Explore the role of corn in Latin American cuisines
- Learn about the impact of cultivation on corn

Time: 2+ hours

Materials
- A collection of edible and non-edible products with corn ingredients
- Script for *The Legend of Quetzalcoatl and Corn*
- Puppet printouts, scissors, and crayons; or play costumes and props
- Story organizer/character sheet
- Ingredients to make a corn-based recipe (optional)
- A selection of seeds from different kinds of corn (optional)

Background Information:
Corn is also called maize, a name derived from the Spanish word "maíz." The Mayans, some of the earliest people to cultivate corn, considered it a "gift of the gods." There are numerous categories of corn, some of the most common types include:

Sweet corn. Sweet corn is eaten fresh, either on or off the cob. It can be eaten raw but is usually cooked or grilled. Sweet corn is harvested while still immature, in what's called the "milk stage."

Dent corn. Named for the distinctive dimple in the top of each kernel as it dries, dent corn (also called field corn) is starchy and has a low sugar content. Much of the dent corn grown in the U.S. ends up in animal feed, but it's also used to make cornmeal, corn flour, corn syrup, corn chips, and tortillas.

Flint corn. Flint corn can be used for cornmeal, corn flour, hominy, polenta, and grits. It's also used as popcorn. The corn is allowed to dry until the outer shell is hard, but there's enough moisture inside the kernel that, when heated, it turns into steam, expands, and pops the kernel open.

Corn plants have a very unique way of producing their fruit and seed. As the corn grows taller, tassels form on the top of the plant. The tassels contain the male flower parts of the corn plant that make and release pollen. The female flowers form in clusters and look like small

ears of corn. They appear in the joints where the leaves meet the stem further down the stalk. Each silk represents the stigma of an individual flower and has the potential to make one seed/kernel on an ear. Corn is wind-pollinated, meaning that the tiny, lightweight pollen grains that develop on the tassels (the male flowers) are carried on the wind, hopefully landing on awaiting silks (the female flowers). If every silk is fertilized, the result will be an ear of corn completely filled with kernels; a missing kernel indicates that that silk wasn't fertilized.

Corn comes in many colors – kernels might be yellow, white, blue, purple, black, or multi-colored. Since each kernel is the product of a separate flower ovary, it has the potential to be genetically distinct from its neighboring kernels. Because seeds are the result of pollination and fertilization, that means that if your corn patch is cross-pollinated by a different variety of corn — say, your sweet corn is fertilized by pollen from a nearby farmer's flint corn — the flavor of your corn may disappoint. To ensure your variety pollinates itself, stagger planting times by about two weeks, or be sure different varieties of corn are separated by at least 250'.

Corn, as we know it today, has evolved from a grass plant called teosinte that grew in what is now Mexico. Teosinte looked nothing like our modern-day plants but instead had small ears with just five to 10 small, widely spaced kernels. When Aztecs and Mayans began growing the crop (between 6,000 and 10,000 years ago), they would select kernels from the best-growing plants that had the largest cobs and tastiest kernels to save and replant that next year. In addition to being grown in Central America, people in South America and North America also began growing the crop and selectively breeding their best and favorite plants. Thousands of years of cultivation by numerous peoples significantly impacted the genetic makeup of corn and resulted in a diversity of plumper and more nutritious ears of corn.

Due to its popularity as a food, corn has been and continues to be studied intensely by scientists and farmers. In the early 1900's plant breeding became more sophisticated, and hybrid corn that was produced through the controlled cross of distinct varieties of corn to produce hardier plants (due to hybrid vigor) became more common. As technology advanced, controlled pollination was joined by genetic modification which has led to specialized corn plants that have desirable qualities such as increased sweetness, longer shelf life, and resistance to pests and diseases. Over 75% of corn grown today has been genetically modified in some way.

An interesting fact about modern-day corn is that it is completely dependent on human cultivation. Since the kernels (seeds) adhere firmly to the cob, rather than loosening and scattering on their own, they will not reseed in the wild. If a cob lands on the ground and somehow escapes being consumed by pests or consumers, all of the seeds on that cob would be trying to germinate in a very small space and none of the plants would thrive.

Advance Preparation:
Collect an assortment of items containing/made with corn. Items may include:

- Fresh corn ears
- Canned corn
- Corn oil
- Cornstarch
- Candy or sodas made with corn syrup
- Corn cereal
- Corn tortillas
- Tortilla chips
- Toothpaste
- Soap
- Glue
- Wax paper

For more ideas, check out 27 Items You Did Not Know Where Made from Corn and Uses of Corn.

Laying the Groundwork:
Bring in an assortment of items containing corn and distribute them to students without explaining their connection. Ask them to work together to brainstorm what they think all of the items have in common. This can be tricky because ingredient labels may not list 'corn' but instead use the name of chemicals derived from corn.

Once they identify the items all contain corn, use the background information to share about some of the different types of corn and share additional examples of corn products we use daily. Make sure to point out products that you did not have samples for, including things like biofuel, animal feed, and fireworks.

Use the map on the USDA's Corn Explorer page to show all the places corn grows in the world. Which countries produce the most corn? Why do you think that is? How much corn is grown across the world?

Create a class list of some of the students' favorite corn-based products and/or recipes.

Exploration:

1. Corn was an essential of life for the indigenous people of Mexico, Central and South America as it was used for both food and shelter. Corn also played a central role in special ceremonies and traditions. To explain the origins of corn, the Aztecs shared a legend featuring one of their most famous gods, Quetzalcoatl. Read *The Legend of Quetzalcoatl and Corn* with your students, or view a story time video of the legend in both English and Spanish read by lesson co-authors Kimberly Deras and Ángels Martinez.
2.
    - Storytime video in English
    - Storytime video in Spanish

3. Use the legend to put on a play with your class. Here are a couple of ideas for creating the play depending on the time and developmental level of your students:

    For Younger Students (K-2):
    Color and cut out the puppets provided and place them on popsicle sticks. Divide students into groups so that all of the students in each group has one puppet representing one of the characters. Read the legend out loud again or view the storytime video again and let each group act out the story as you go using their puppets.

    For Older Students (3-6):
    Pass out a printed copy of the legend along with the story timeline, map and plotline. Divide students into groups (each group can have 6 to 12 students as one of the characters is the Aztec people which can represent multiple roles) and have each group fill out the worksheets and write a simple script for a play using the legend. Ask students to assign character roles and come up with prop and costume ideas. Have each group then practice and perform their play for the rest of the class. If students are hesitant to perform, you can choose to allow them to focus on creating backdrops, costumes, or directing.

4. After the play, ask students, Why do people share legends? Why do you think the Aztecs developed a legend around corn? How important do you think corn was for them? How important is corn for us today?

Making Connections:
Corn is an ingredient used in many different traditional Latin American dishes that are as diverse as the countries themselves. Not only used fresh as a vegetable, it is also widely used as a grain and ground to make cornmeal/corn flour and processed through nixtamalization to make masa flour. There are a host of exceptional local and regional recipes showcasing corn in many delicious ways. Here

If cooking activities are possible in your classroom, lead students in making recipes featuring corn. Here are a few simple recipes from FreshFarm FoodPrints that are good for making with kids:

- Corn & Bean Salad
- Cornbread
- Corn Tortillas

Tasting opportunities could also be conducted with the help of the community. You could invite community members or local restaurant owners to prepare (on or offsite, depending on space available) and share Latin American dishes, which may be easier than trying to prepare them in your classroom. Also, check in with your food services staff to see if/how they could support you.

If cooking activities are not practical, you can ask youth to research traditional Latin American dishes featuring corn and or bring recipe ideas from home and make a classroom recipe book.

Branching Out:
For Younger Students (K-4): Gather a variety of corn seeds and compare and contrast their appearance. Plant seeds in a garden bed or a 5-gallon bucket and track their growth. In addition to planting and observing individual seeds, try to find a dried ear of corn still on the cob. Plant the whole ear intact and have students watch what happens when young seedlings compete with each other for resources.

Heirloom corn seeds are available from a number of indigenous growers and seed savers such as The Alliance of Native Seedkeepers. Obtaining seeds from growers specializing in native and heirloom varieties provides support for their very important work.

Older Students (5-6): Introduce students to the principles of plant breeding whereby farmers save seeds of their favorite and best-growing plants to start the next year's crop and, over time, influence the genome of their cultivated plants. Explain that although these techniques are still used, technology has allowed scientists to make more direct changes to plant genes and alter plant species at a much faster rate. The corn plant has been a subject for many genetic engineering projects not only because it is such a popular and widely grown crop, but also because of being wind pollinated, it can be harder to breed through traditional controlled pollination methods. Additional background information is available in Plant Breeding 101.

To consider the role corn has played in history along with current challenges, they can also watch the TED-Ed video: The History of the World According to Corn by Chris A. Kniesly.

In the Garden:
Check out the Corn Growing Guide for instructions for growing corn plants in your school garden. Corn is a warm-season crop and will grow best in summer gardens.

If corn does not seem like a good fit for your garden due to environmental conditions, space available, or your school year calendar and timing, below you will find suggestions for a few crops important to Latin American/Latino/e/x culture that may better fit your growing season and conditions:

Beans - Beans are an important protein source in Latin American/Latino/e/x culture. Dry beans are harvested when the seeds are fully mature and hard, and the pods are dried out and brown. They are easy to save for future consumption, which makes them a staple year-round. Beans are high in protein but lack one important amino acid, methionine. Corn, on the other hand, is rich in methionine but lacks other amino acids. Combined, the two provide all the essential amino acids, making them a "complete" protein. Although this fact makes beans and corn ideal nutritional partners, their complementary textures and flavors have made them culinary staples in many dishes.

Squash - Squash is native to MesoAmerican regions and has been an important food source for thousands of years. There are many different varieties of squash, some that are best eaten fresh of the vine and others with harder shells that can be preserved for winter consumption. Squash blossoms can also be a tasty treat.

Cilantro - A distinctive herb whose leaves are added to many Latin American/Latino/e/x dishes, including salsas, soups, and meat-based recipes.

Connections to Standards:
This lesson could be adapted to meet the following Next Generation Science Standards:
K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.

Resources:
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The Legend of Quetzalcoatl and Corn

Introduction:

Quetzalcoatl is an important creator god in Mayan and Aztec cultures and continues to be a central part of stories and culture in many parts of Mesoamerica today. His name comes from the Nahuatl words quetzal, a bird with emerald-colored feathers, and coatl: meaning serpent. He can appear as a feathered serpent and is represented in many works of art this way. People believe that he created and cares for humans, controls the sun, rains, and winds, and gave humans science, agriculture, and learning, among many other things! One of the important things Quetzalcoatl gave humans is corn. Today, we will hear the legend of how Quetzalcoatl collected corn and gave it to humans.

Stories and legends shared for thousands of years can exist in different variations depending on the storyteller and the region the story is shared. The following legend is a version shared amongst the people of Southern Mexico where the legend is believed to have originated. People all across meso-america and the world eat corn. The Aztec people believed that Quetzalcoatl helped spread this crop through their fields. Quetzalcoatl was in charge of taking care of the people and keeping them fed. This is the story of how Quetzalcoatl befriended an ant, and with the help of the gods, helped the people grow this important food!

The Legend:

A long time ago, food began to become scarce on the face of the earth. The people looked as thin as worms, and their strength was failing. Quetzalcoatl, worried, decided to look for food on the plain. He searched and searched but only found dry grass and bare earth. He went up to the hills and down to the valleys, searched every corner, and found nothing but stones gnawed by the wind. How and where could he get food for the people? While he was reflecting, he looked at a red ant carrying a huge grain of corn on its back.

"Red ant, where did you find that grain," Quetzalcoatl asked.

"It's my secret, I can't share it with anyone," replied the ant.

"Not even with Quetzalcoatl?"

"Even if I told you, you couldn't reach the grains; The entrance is very narrow, and it will be of no use to you to know the secret," answered the ant.

"People will die of hunger. It is very important that you help me," Quetzalcoatl pleaded.

"Okay, because it's Quetzalcoatl who asks, I'll tell you: the grains are found on the Mountain of Sustenance," the ant said.

"Can you take me there," Quetzalcoatl asked the ant.

"If you can make yourself as small as an ant, I will take you," said the ant.

So Quetzalcoatl transformed himself into a tiny black ant and they set off. The road was winding: they went up and down hills, crossed with great effort over branches and between stones, and there was no water to drink. After a long time, they crossed a narrow and dark tunnel that led them to the Mountain of Sustenance. Quetzalcoatl took some of the corn found there and carried it all the way back down to the people. After feeding the corn to them, the people thanked Quetzalcoatl wholeheartedly.

Quetzalcoatl returned to the mountain of sustenance and wanted to bring even more corn with him. He tried to tie ropes around the mountain to carry it away, but the mountain was very heavy. He then asked the God of Lightning for help to break the mountain into pieces.

"Why should I destroy something so beautiful," asked the God of Lightning.

"To feed the people," said Quetzalcoatl.

Tremendous lightning bolts repeatedly struck the mountain until it broke into pieces. With the help of the ant, Quetzalcoatl made mounds of white corn, yellow corn, blue corn, and red corn. There was so much corn that he realized it would be impossible to transport all the piles. So Quetzalcoatl then called on the God of Rain to help him move the grains in all directions.

"For what reason should I disperse the corn?" asked the God of Rain.

"So that people can sow their grains and never lack food again," explained Quetzalcoatl.

And so it was that the God of Rain ordered a great storm to break out that made the heavens rumble and rain to fall in torrents. With the rain, rivers formed on the Mountain of Sustenance, and their waters dispersed the grains everywhere. Since then, people have grown corn that protects them from hunger.

La Leyenda de Quetzalcoatl y el Maíz

Introduction:

Quetzalcoatl es un dios creador importante en las culturas Mayas y Aztecas y aún continúa siendo una parte central de las historias y culturas Mesoamericanas en el presente. Su nombre proviene de la palabra Nahuatl quetzal, o pájaro de plumas de color esmeralda, y coatl, o serpiente. El puede aparecer como una serpiente emplumada y es representado en muchos trabajos de arte de esta manera. Las personas creen que él creó y cuida de los humanos, controla el sol, lluvia, viento, y dio a los humanos la ciencia, agricultura, ¡y hasta el aprendizaje por nombrar algunas cosas! Una de las cosas más importantes que Quetzalcoatl dio a los humanos fue el maíz. Hoy vamos a escuchar una leyenda de como Quetzalcoatl encontró el maíz y se lo dio a los humanos.

Las historias y leyendas compartidas por miles de años pueden existir en diferentes variaciones dependiendo de la persona que lo cuenta y la región de donde se comparte. La siguiente leyenda es una versión compartida entre las poblaciones de México del sur. Las personas de todo el mundo comen maíz. Los Aztecas creían que Quetzalcoatl ayudó a esparcir este vegetal a través de sus campos. Esta es la historia de cómo Quetzalcoatl conoció a una hormiga, y con la ayuda de los dioses, permitió que los humanos cultivarán este fruto tan importante.

La Leyenda:

Hace mucho mucho tiempo, la comida se volvió escarza en la faz de la tierra. Las personas estaban tan delgadas como gusanos, y sus fuerzas desaparecen. Quetzalcoatl, preocupado, decidió ir a buscar alimento en las llanuras. Buscó y buscó pero solo encontró pastos secos y tierra muerta. Subió a las montañas, bajó a los valles, buscó en cada rincón, y encontró nada más que piedras desgastadas por el viento. ¿Cómo y en dónde podría encontrar alimento para las personas? Mientras pensaba, Quetzalcoatl miró a una hormiga roja cargando un gran grano de maíz en su espalda.

"Hormiga roja, ¿dónde encontraste ese grano?", preguntó Quetzalcoatl.

"Es mi secreto, no puedo compartirlo con nadie", respondió la hormiga.

"Ni siquiera con Quetzalcoatl?", dijo Quetzalcoatl

"Aún si te dijera, no podrías alcanzar los granos; La entrada es muy pequeña, y no te será útil saber el secreto", respondió la hormiga"

"Las personas van a morir de hambre. Es muy importante que me ayudes", le rogó Quetzalcoatl.

"Esta bien, solo porque es Quetzalcoatl el que me lo pide. Te lo diré: los granos se encuentran en la Montaña del Sustento", contó finalmente la hormiga.
"¿Me podrías llevar allá?", le preguntó Quetzalcoatl.

"Hazte tan pequeño como una hormiga y te llevaré" dijo la hormiga.

Quetzalcoatl se transformó en una hormiga pequeña y salieron de viaje. El camino era sinuoso; Subieron y bajaron las montañas, cruzaron con gran esfuerzo sobre ramas y piedras, y no había agua para tomar. Después de mucho tiempo, se cruzaron con un túnel oscuro, largo y angosto que los llevaría a la Montaña del Sustento. Quetzalcoatl se llevó un poco de maíz que encontró allí y lo cargó de vuelta hasta donde los humanos se encontraban. Después de haberlo compartido, los humanos le dieron las gracias a Quetzalcoatl con todo su corazón.

Quetzalcoatl volvió a la Montaña del Sustento y quería llevar todavía más maíz. Él intentó atar cuerdas alrededor de la montaña para sacarla del camino, pero la montaña era demasiado pesada. Entonces, Quetzalcoatl le preguntó al Dios del Trueno a que le ayudara a romper la montaña en millones de piezas pequeñitas.

"¿Por qué destruir algo tan hermoso?, preguntó el Dios del Trueno.

"Para poder alimentar a las personas", dijo Quetzalcoatl.

Un trueno tremendo golpeó repetitivamente a la montaña hasta que se rompió en muchas piezas pequeñas. Con la ayuda de la hormiga, Quetzalcoatl creó montañas de maíz amarillo, blanco, azul, y rojo. Había tanto maíz que se dió cuenta que sería imposible llevar el maíz que encontró en su espalda hasta donde se encontraban los humanos. Quetzalcoatl llamó al Dios de la Lluvia para ayudarle a mover los granos en todas las direcciones.

"¿Por qué razón he de dispersar el maíz?, preguntó el Dios de la Lluvia.

"Para que las personas puedan plantar los granos y nunca les haga falta el alimento", explicó Quetzalcoatl.

Y así se dió como el Dios de la Lluvia ordenó que una gran tormenta comenzara la cual hizo que los cielos se sacudieran y cayera una lluvia torrencial. Con la lluvia, ríos se formaron en la Montaña del Sustento, y sus olas dispersaron los granos en todas partes.

Desde entonces, los humanos han cultivado el maíz el cual los protege del hambre.