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# K-12 Partnership Lesson Plan

# Brook Wilke

# *All about Corn*

## Overview

Corn and soybeans cover 6% of the total land area in the United States and are grown on 15 times as much land as all fruits and vegetables combined. In this activity, students will take a walk out into a corn field to become more acquainted with this crop that is so common. Students will make calculations for the number of plants and ears of corn per acre and then estimate the total number of ears grown in the U.S. in 2002 based on USDA data. Students will be informed about the different types of corn available and that most of it is actually used for products other than human food. Finally, corn is a crop that requires high amounts of energy and nutrients to grow successfully, making it a crop that can potentially contribute to environmental pollution if managed poorly.

**Objectives**

At the conclusion of the lesson, students will be able to:

* Identify corn and soybeans as the major crops grown in the United States
* Conduct an investigation on a local scale to make predictions at a larger scale
* Identify corn plants as having only one ear per plant
* Estimate the number of ears of corn grown in the US in a given year
* Estimate the number of ears of corn per plant
* Understand that almost all of the corn grown in the United States is not eaten by humans, but is fed to animals or converted to useable products
* Identify corn as a highly productive crop, but also one that requires a lot of energy to grow

**Length of Lesson**

1.5 hours

**Grade Levels**

Upper elementary, middle school

**Standards covered (NGSS)**

Disciplinary Core Ideas:

* **MS-ESS3-4**: construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems

Cross Cutting Concepts:

* Scale, proportion, and quantity

Science and Engineering Practices

* Planning and carrying out investigations
* Analyzing and interpreting data
* Using mathematics and computational thinking

***Previous Michigan Standards Met:***

* **III.5.MS.6 (LEC 11):** describe ways in which humans alter the environment
* **III.5.MS.5 (LEC 12):** explain how humans use and benefit from plant and animal materials
* **I.1.MS.2 (C 8):**  design and conduct simple investigations
* **I.1.MS.1 (C 7):** generate scientific questions about the world, based on observation
* **I.1.MS.4 (C 10):** use measurement devices to provide consistency in an investigation
* **II.1.MS.1 (R 6):** evaluate the strengths and weaknesses of claims, arguments, or data

**Materials**

* Two 25-ft tape measures
* Clipboards with data sheets for every other student
* Corn field

**Background**

### *Strategy:* *inquiry cycles*: finding and explaining patterns in data (arguments from evidence); *inductive or field inquiry*: techniques-observations-patterns-explanations (TOPE)

###  *Observations, patterns, and explanations*

|  |  |  |
| --- | --- | --- |
|  Observations or experiences (examples, phenomena, data) | Patterns (laws, generalizations, graphs, tables, categories) | Explanations (models, theories) |
| Collect data about the number of corn plants and ears of corn per plant in a local corn field. | Using data from the USDA and assuming that the local corn field was average, use the data collected to figure out how many ears of corn are grown in the entire country. | A major portion of agriculture in the United States is field corn. |
| Application: Model-based Reasoning |
| Inquiry: Finding and Explaining Patterns in Experience |

###  *Introduction/Anticipatory Set*

Students will be asked to identify which crop is grown on the most acres in the United States. After taking suggestions, the teacher should share with the student’s statistics from the USDA. In 2002, corn and soybeans were grown on 141 million acres (68 million corn, 73 million soybeans) in the U.S., which is about the size of 141 million football fields. This amount of land is 15 times more than the amount of land used for all fruits and vegetables combined.

### Activities of the session

1. Students will make two hypotheses on a sheet of paper or journal:
* How many ears of corn are on an average corn plant?
* How many ears of corn were grown in the U.S. in 2002?
1. Students will be divided up into groups of two and give specific tasks including:
* Measuring out 17.5 feet in the corn field
* Counting the number of corn plants in 17.5 feet in the field
* Counting the number of ears on 10 different corn plants in the field
* Collecting data
1. Students will go out into the corn field with the teacher to collect data
2. Two groups of students will measure out 17.5 feet parallel to a corn row inside the field. When corn rows are planted 30 inches apart, 17.5 feet of one corn row equals 1/1000 of an acre.
3. Four groups will count the number of corn plants along the 17.5 feet measured out for four different corn rows. Two data recording groups will record, one for each tape measure.
4. The rest of the groups will focus on counting the number of ears per corn plant, counting 10 plants per student. This data is also recorded by the data recording groups.
5. Take the data back to class and perform the following calculations:
* Calculate the average number of plants per 17.5 feet of corn row using the four corn rows counted
* Multiply the average # of plants by 1,000 to get the total number of plants per acre
* Calculate the average number of ears per corn plant for all of the data collected. This answer should be close to 1.
* Multiply the number of plants per acre times the number of ears per plant.
* Multiply the number of ears per acre times the number 68,000,000 to give the total ears of corn grown in the U.S. in 2002.

**Conclusion**

Students will discuss how all of that corn is used, which includes mostly feed for animals, ethanol production, high fructose corn syrup, plastics, and other products identified by the teacher. Corn is used much more in other countries for human food than in the U.S.

The students should also learn that corn is a high yielding crop, but also requires a lot of energy to grow. Farmers are paid by the government to grow corn and soybeans because of their usefulness to make many different products.

Students should make sure that they write down the conclusions that were made from the project for a quiz.

**Extensions and Modifications**

* Call on students who do not seem to be participating. Ask the students who understand the math to help those that do not understand the equations.
* Students can examine harvested ears of corn, which might stimulate further questions about the corn grain and help them to see what field corn looks like compared to sweet corn.
* Students can be brought different products made from corn including food.
* The teacher can introduce the fact that fertilizers, pesticides and fossil fuels used to grow corn are polluting the environment. Discussion could be made regarding how to grow corn using practices that require less energy and chemical inputs.

**Assessment**

The teacher should give the students a five question open note oral quiz. These questions could be variable, but should incorporate the objectives of the lesson.

**Post-lesson Comments and Reflection**

*12.11.06*

This lesson worked very well. The students enjoyed being out in the field and working on the project. They also seemed to understand the math portions of the lesson too and we came up with a solid answer to how many ears of corn were grown in the U.S. in 2002 (1.768 trillion). The students also now know that a corn plant usually only has one ear of corn.