

Grade Level: 5

Title: Advancements in Agriculture (Mar. - May)

Purpose:

The purpose of this lesson is to explore how technological advances have improved agriculture production.

Subject Area(s) Addressed:

Social Studies

Common Core/Essential Standards:

Social Studies:

5.G.1.3 Exemplify how technological advances (communication, transportation and agriculture) have allowed people to overcome geographic limitations.

Vocabulary:

advancement
agriculture
cross pollination
inventions
technology

Materials Needed:

Journal
Internet access

Teaching Strategy:

Part 1:

Ask students to draw a circle map (<http://www.eisd.net/domain/599>) in their notebooks. In the center of the circle map, have students write the word “technology.” Give them two minutes to brainstorm everything they know about technology. Most will write words or phrases related to digital devices or games. Next, put up the word “biotechnology.” Ask students what they think the word means. Allow a few minutes for students to discuss. Then, define the word for the students. According to

<http://www.wordcentral.com/cgi-bin/student?book=Student&va=biotechnology>, biotechnology is the manipulation (as by changing genetic material) of living things to produce useful products (as crops resistant to disease). Instruct students to watch the following video:

<http://www.youtube.com/watch?v=UIFaLTUqi1Q>.

This video showcases the NC Strawberry Project which was begun to create a better strawberry for North Carolina. After watching the video, have students discuss the following points:

1. What was the goal of the NC Strawberry Project?
2. What processes are being used to create the new berry?
3. Where is this taking place?
4. What role do scientists play in this project?
5. Why were chefs involved?

Have students write a summary of what they learned about biotechnology and the NC Strawberry Project.

*** This lesson is intended to *briefly* introduce the idea of *biotechnology*. Use teacher judgment as to how much further to have students explore the concept.

Part 2:

Ask students how they think technology has affected the farming process. Look specifically at how farming is moving from "hands-on" to high-tech machinery. The two videos below show the process of planting, harvesting, and packaging strawberries. Have students watch these videos to compare and contrast two different farm operations. Look specifically at how much strawberry handling is still done by hand. Record the similarities and differences in the two operations.

Planting - Shipping (Australia) <http://www.youtube.com/watch?v=LPP6INGU1AI>
Harvesting (Naturipe) <http://www.youtube.com/watch?v=9KDuvn6BY6c>

(Here are two additional videos that show harvest at two of NC's larger farms:

<http://www.youtube.com/watch?v=-R2m0xmxnac>
<http://www.youtube.com/watch?v=Hgub0tSLOCw>

The second set of videos below shows experimental robotic technology in the strawberry farm. After watching the videos, have students discuss what they think might be the advantages and disadvantages of using this type of technology for harvesting strawberries. Have them record their thoughts in their journal, then discuss as a group.

<http://www.youtube.com/watch?v=RCBQqEGp8Go> (39 seconds)
<http://www.youtube.com/watch?v=nTtwOCXbO60> (17 seconds)
<http://www.youtube.com/watch?v=nm3WS5y3kCk> (6+ minutes)

This video shows some non-robotic equipment developed to assist human harvest:

<http://www.youtube.com/watch?v=8i9lz4VQ6jc>

Extension Activities:

Do a Strawberry DNA extraction. Information available at www.ceprap.ucdavis.edu/index.php?option=com_content&view=article&id=56&Itemid=138

Challenge students to design a better harvesting method for strawberries based on the disadvantages and downsides to what they viewed in the videos.

Background Information:

Part 1:

This excellent video shows NCSU strawberry breeder Jeremy Pattison involving high school students in his strawberry research

<http://plantsforhumanhealth.ncsu.edu/2012/10/05/agriculture-brings-science-and-math-alive-in-north-carolina-2/>

Modern plant breeding uses both traditional methods and molecular genetics. In traditional breeding, the breeder makes controlled crosses between plants with different characteristics, grows out the seed that result, observes the plants that grow, and selects the ones that have the desired characteristic. Molecular breeding identifies which genes carry specific traits and allows breeders to more quickly select desirable characteristics (or avoid undesirable ones). As part of this process, scientists have been mapping the strawberry genome. This sophisticated laboratory process can make the process of developing new varieties much quicker. Neither of these techniques create what are known as “genetically modified organisms” or GMOs, and there are no GMO strawberries.

Mechanized harvesting and sorting is already widely used for blueberries and for blackberries and raspberries used for processing. Varieties are bred specifically for this form of harvesting, and growers manage the spacing, trellising, and pruning of their plants with mechanical harvesting in mind. See video at

<http://www.youtube.com/watch?v=2Ki4n357DO0>

Sorting and packing of these berries is also all mechanized, and very sophisticated computer guided imaging is used to identify and remove those that are under-ripe, damaged, or off-color. See

http://www.youtube.com/watch?v=rhI_N4fCAA

Strawberries present a greater challenge: the fruit is much more delicate than blueberries and their growth habit makes mechanical harvesting difficult. (The harvesters damage the fruit, and raspberries and blackberries intended for fresh market (not processing) cannot be picked mechanically.)

Assessment:

Part 1:

Written summary

Part 2:

Journal entry

North Carolina Strawberry Association – www.ncstrawberry.com

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