

Cultivating Oklahoma's Future

Skills: Language Arts, Social Studies

Objective: Students will read and discuss information and vocabulary about some new developments in agriculture and develop storyboards on the future of agriculture in Oklahoma.

Background

To cultivate a field is to prepare it for a crop to be planted for future growth. The first ancient woman who planted seeds from gathered plants was cultivating a plot of ground for the future of her family and her community.

Preparing for the needs of the future has been the role of agriculture throughout history. Plans for a healthy and prosperous agriculture began before Oklahoma became a state. In Stillwater, the university that would become Oklahoma State University (OSU) began as a land grant university and agricultural research station in 1891. Its purpose was finding the best methods for farming the unique land that would become Oklahoma.

The people involved in Oklahoma agriculture today are cultivating our future with plans for feeding a growing population while protecting the resources that sustain us, improving our health, safeguarding our food supply, and keeping our farms and farm communities profitable.

PROTECTING OUR NATURAL RESOURCES

One of our greatest challenges for the future is protecting our natural resources while continuing to meet the food and fiber needs of a growing population. Agricultural practices in the past have sometimes threatened these resources, but the best farmers learn from their mistakes and adapt as needed. Farmers want to protect the land because the land is their livelihood. Precision agriculture is one of many techniques that help farmers in their conservation efforts. With precision agriculture, wireless technology and global positioning systems (GPS) help farmers determine exactly how much water, fertilizer, and pesticide is needed in very specific parts of their fields. This helps the farmer conserve water and avoid overuse of fertilizer and pesticides, which could harm soil and water.

IMPROVING OUR HEALTH

The health of Oklahomans is a major concern for the future, and Oklahoma farmers have the ability to make us healthier. Fresh fruits and vegetables contain antioxidants which scientists believe help prevent many diseases, yet most Oklahomans don't eat enough of these foods. Oklahoma farmers produce a variety of fruits and vegetables and sell them in a growing number of farmer's markets across the state.

P.A.S.S.

GRADE 6

Reading—1.1,2bc,3a;
3.1b,2a

Writing—1.1,2; 2.7

Social Studies—3.2

SWITCHING TO SWITCHGRASS

Switchgrass is a native Oklahoma grass that grows all over Oklahoma under a variety of environmental conditions. Scientists in Oklahoma and across the nation are exploring ways to convert switchgrass into biofuel.

Biofuel is any fuel made from an organic material.

Petroleum-based fuels heat up the atmosphere by releasing carbons into the air when they are burned. Biofuel releases carbon into the atmosphere, too, but they also remove large amounts of carbon from the air as they grow.

Most of the biofuels produced today are made from traditional crops such as corn and sugar cane. These crops require much more labor and upkeep to grow than switchgrass, so some researchers think switchgrass might be a more practical alternative.

Using switchgrass instead of traditional crops would also keep us from using food crops to fill up our gas tanks.

Oklahoma has thousands of acres of land not suited for producing cultivated crops but perfect for growing switchgrass.

Another way to improve the health of Oklahomans is to improve the foods we eat. Biotechnology is one method scientists are using to add nutritional value to some foods and reduce the harmful qualities of others. Biotechnology is the manipulation of living things to produce useful products. Humans have been using biotechnology to improve plants since ancient times. The same prehistoric woman who first planted seeds may have improved her crop a few years later by saving only the seeds of the best plants for the next year's planting. Today, scientists have the technology to work with the genes of plants to make such improvements as adding antioxidants to some vegetable oils, reducing harmful saturated fats in cooking oils, and reducing the allergenic properties of milk, wheat, and other products.

SAFEGUARDING OUR FOOD SUPPLY

From *E coli* outbreaks in produce to concerns about diseases in meat animals to fears that terrorists might find ways to contaminate our food supply, food safety is a huge concern for the future. At Oklahoma State University a new facility—the National Institute for Microbial Forensics and Food and Agricultural Biosecurity—will address many of these issues bringing together many different branches of science. The goal of scientists there is to quickly and accurately identify the source of any contamination in agricultural products or disease outbreaks.

KEEPING FARMERS PROFITABLE

People living in the US pay a smaller percentage of their incomes for food than anyone else in the world. That is good for the consumer but not always great for the farmer, especially farmers on small family farms. Farmers must make a profit to stay in business. The agricultural community is constantly at work finding ways to make farming more profitable for the small producers who want to stay on the land and preserve our rural heritage.

To make farming more profitable some Oklahoma farmers are exploring different ways to farm and different ways to market their products to consumers. Some grow fresh fruits and vegetables and sell directly to consumers at farmers' markets. Some grow beef that is completely grass-fed for consumers who prefer that to beef that is grain-fed. Innovative farmers take orders over the Internet. Some grow products that are organic for consumers who are willing to pay the extra cost. Some have converted to agritourism.

Another way to make small farming more profitable is to add value to commodities produced on the farm. For example, a farmer who grows wheat might make pizza dough and sell it for more than what he would get if he just sold the wheat. The Made in Oklahoma Coalition and OSU's Food and Agricultural Products Center help farmers develop and market products made from Oklahoma-grown

commodities in order to keep more dollars in the state.

In 1890, 40 percent of the US population lived on farms. One hundred years later, fewer than 2 percent of the US population is responsible for feeding us all. The demand for food and fiber will keep growing as some 70 million people are added to the world population each year. In Oklahoma the agricultural community will need young people like you in many new and different career areas to help cultivate an exciting future.

Activities

1. Read and discuss background and vocabulary.
 - Divide students into four groups.
 - Provide each group with one section of the background to read and discuss.
 - Students will write answers to the following questions in relation to the background and discuss their answers as a class or in groups:
 - What other things . . . ?
 - In what other ways . . . ?
 - Can you think of other instances where . . . ?
 - Hand out the vocabulary worksheet.
 - Students will work in groups and use their knowledge of Greek and Latin word parts and roots to determine the meanings of the words on the worksheet.
 - Students will use dictionaries to find the correct definitions of word parts and words.
2. In the background, cultivating a field serves as a metaphor for preparing for the future. Ask students what other metaphors might be used to represent the concept “preparing for the future.” What other concepts or ideas might be represented by cultivating a field?
3. Write the word “cultivate,” on the chalkboard.
 - Students will develop webs of words that come to mind in association with the word “cultivate.”
 - Write the words “future” and “agriculture” on the chalkboard, and have students follow the same procedure as above.
 - Students will use the hand graphic on the following page as a guide for developing storyboards on the topic “Agriculture: Cultivating Oklahoma’s Future.”

Vocabulary

adapt—to change so as to fit a new or specific use or situation

agriculture—the science or occupation of cultivating the soil, producing crops, and raising livestock

agritourism—the act of visiting a working farm or any agricultural, horticultural or agribusiness operation to enjoy, be educated or be involved in activities

antioxidant—a substance that opposes oxidation or prevents or makes difficult reactions made easier by oxygen

biofuel—fuel made from an organic material

biosecurity—policies and measures taken to protect from biological harm

biotechnology—the manipulation (as by changing genetic material) of living things to produce useful products (as crops resistant to disease)

carbon—a nonmetallic element found more or less pure in nature (as in diamond and graphite) or as a part of coal and petroleum and of the bodies of living things or obtained artificially

commodity—a product of agriculture or mining

conservation—planned management of a natural resource to prevent exploitation, pollution, destruction, or neglect

consumer—a person who buys and uses up goods

contaminate—to make impure or unfit for use by adding something harmful or unpleasant

convert—to change from one substance, form, use, or unit to another

cultivate—to prepare land for the raising of crops

***E. coli* (*Escherichia coli*)**—a bacterium in the shape of a short rod that sometimes causes an intestinal illness

fertilizer—a substance (as manure or a chemical) used to make soil produce larger or more plant life

forensic—belonging to, used in, or suitable to courts of law or to public discussion and debate

Continued on next page.

gene—a part of DNA or sometimes RNA that is usually located on a chromosome and that contains chemical information needed to make a particular protein (as an enzyme) controlling or influencing an inherited bodily trait or activity (as eye color, height, or metabolism) or that influences or controls the activity of another gene or genes

global positioning system (GPS)—a navigation system that uses satellite signals to find the location of a radio receiver on or above the earth's surface

innovative—characterized by a tendency to try something new

livelihood—means of support or subsistence

manipulation—the treatment or handling of something in a skillful manner

microbial—having to do with microorganisms

natural resources—materials (as soil and water) supplied by nature

organic—of, relating to, or derived from living organisms

pesticide—an agent used to destroy pests

precision agriculture—a management strategy that uses site-specific information to precisely and economically manage and optimize production inputs

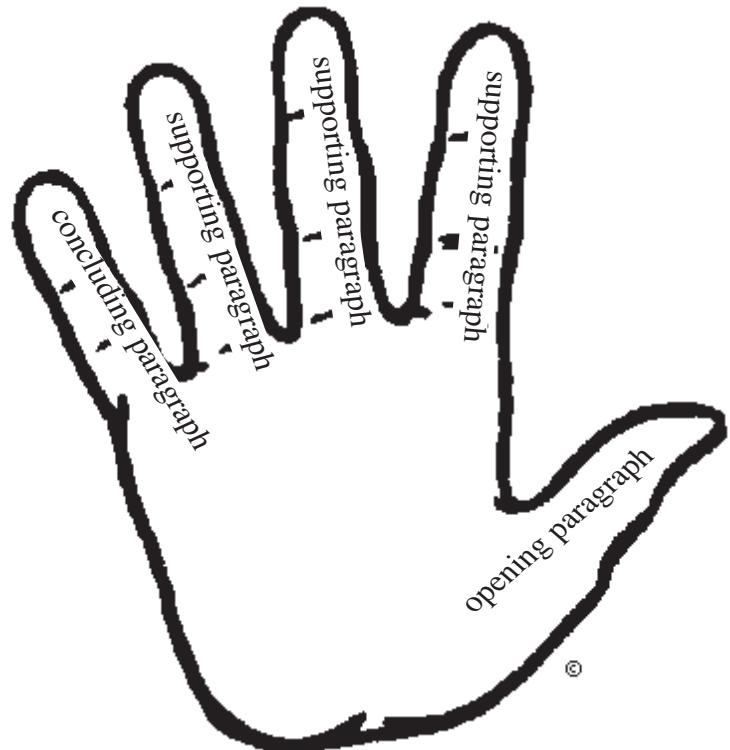
produce—agricultural products and especially fresh fruits and vegetables as distinguished from grain and other staple crops

natural resources—materials (as soil and water) supplied by nature

saturated fat—fat that consists of triglycerides containing only saturated fatty acids. Saturated fatty acids have no double bonds between the carbon atoms of the fatty acid chain; hence, they are fully saturated with hydrogen atoms.

technology—the use of science in solving problems

wireless—having no wire or wires



Extra Reading

Carless, Jennifer, *Renewable Energy: A Concise Guide to Green Alternatives*, Walker, 1993.

Ditchfield, Christin, *Water* (True Books: Natural Resources), Children's, 2003.

Gilpin, Daniel, *Food and Clothing* (History of Invention Set), Facts on File, 2004.

Peterson, Christine, *Alternative Energy*, Children's, 2004

Povey, Karen D., *Biofuels—Our Environment*, KidHaven, 2006.

Rendon, Marcie R., and Cheryl Walsh Bellville, *Farmer's Market: Families Working Together*, Carolrhoda, 2001

Silverman, Buffy, *Follow That Food: Distribution of Resources*, Raintree, 2006.

Stille, Darlene R., Soil, *Digging into Earth's Vital Resource*, Compass Point, 2005.

Vocabulary

vocabulary word	Greek or Latin word part(s)	meaning of word part	meaning of word
agriculture	ager, cultura	ager—land; cultura—cultivation	the science or occupation of cultivating the soil, producing crops, and raising livestock
agritourism			
antioxidant			
biofuel			
biosecurity			
biotechnology			
commodity			
conservation			
consumer			
contaminate			
innovative			
manipulate			
microbial			
produce			
technology			

Compare your definitions with those of other students.