

Name _____ Date _____ Hour _____

ACTIVITY 5.1

UNIT WORD SEARCH

acre
agronomy
biodiesel
canola
cellulose

corn belt
cotton
domesticated
drainage
ethanol

fiber
field
flax
grain
leavened

linters
oilseed
peanuts
rice
rye

sorghum
soybeans
water table
wheat
windrows

X A L F J R E D Q C D X R D W N D S Q S S T
Z C S D E B H A T L A T Z H H O E V Q G N W
G F E B E E F P B V G L X U E T T G L J A Q
M L I L U N E M U H G R O S A T A P H Q E G
M F I A L A E S J E K K A N T O C N H O B O
K N W N N U W V L S M A S I A C I F U I Y D
E J M U T O L B A T J G M B N C T O N L O R
O C T U R E A O U E I R C P Z R S R Z S S X
W S I D J T R H S G L O J H K O E F I E L D
U N N R R Q F S V E R N Q W Z A M F F E Y R
W I P E K W X W M N D O Q E C H O O B D G H
W D T B E W V W B G L M T R J N D R H D A U
D A B I O D I E S E L Y E G A N I A R D E L
W V I V Q V L E T H A N O L E C O B S E Y P
H F M Q R T Q L J Z O R Y N H L T Z N F R N

ACTIVITY 5.2

CROP PLOTTING

Student Materials

- Blank U.S. Map
- Markers or colored pencils
- Resources (library, Internet sites)

Review the unit for types of crops grown in the U.S. Make a list of crops included in the reading. Research the crops to determine regions of the country where the crop is grown. Plot the crops and their regions on a U.S. map.

Crop List

Questions

1. What crops are grown in your state? _____

2. Were you surprised by any of the findings? Why or why not? _____

3. What is one crop that is grown in the southeastern U.S.? _____

4. What is one crop that is grown in northern states? _____

5. What is one crop that is grown in Midwestern states? _____

ACTIVITY 5.3**CORN IN LEGEND OR MYTH****Student Materials**

Corn Myths and Legends
How Reliable Are Your Sources?
Resources

EXAMPLES: Library, Internet

Introduction

Corn is a grass, native to the Americas. The exact origin is unknown, but tiny ears of corn have been discovered at ancient village sites and in tombs of early Americans. Evidence of corn in central Mexico suggests it was used there as long as 7000 years ago, where it was domesticated from wild grass. Cultivated corn is known to have existed in what is now the southwestern US for at least 3000 years. In the United States, many of the various Native American tribes have traditionally grown corn—also known as maize—and used it for both food and utilitarian purposes. Eastern tribes shared their knowledge of corn production with early European settlers, an act which saved many from starvation.

Early American colonists dried corn and ground it as meal for flour. They used the ground corn in porridge, cake and bread. Fresh, or sweet corn, the kind we like to eat as corn on the cob, was not developed until the 1700s. Before then corn was only used in its dried form.

Along with wheat and rice, corn is one of the world's major grain crops. It is the largest grain crop grown in the US. About 9 percent of all the corn grown is used to produce food for humans. These foods include corn meal and other food products such as cooking oils, margarine, and corn syrups and sweeteners (fructose). Sixty four percent of all corn grown is used as feed for livestock.

Corn cobs have been used in the manufacturing of nylon fibers and as a source for producing degradable plastics. Ethanol, a renewable fuel made from corn, has shown the possibility of becoming a major renewable fuel for the world's automotive industry.

Corn can be produced in much of Oklahoma, but primary production is in the Panhandle area. In Oklahoma, corn is harvested for either grain or silage with most of the grain going to dairies, animal feeding operations, and poultry operations. In an average year, around 25 million bushels are grown for grain in Oklahoma, with a yield of 130 bushels per acre. One bushel of corn is equal to 56 pounds.

Corn is pollinated by wind and is typically planted in 30-inch rows. A single seed (or kernel) of corn may produce a plant which yields more than 600 kernels of corn per ear. On one acre of land, anywhere from 22,000 to 35,000 individual plants may be grown.

Hybrid corn is developed to produce from one to two ears per plant. Ears per plant is often determined by moisture availability. Through better soil conservation practices, fertilizer use, better seed quality, and water availability, corn yields have increased 125 percent since 1950.



Corn Myths and Legends

Name of Legend	Native American Culture	Place of Origin	Involvement of Humans and Animals	Religious Beliefs	Male-Female Roles
The Hermit, or the Gift of the Corn					
The Signs of Corn					
The Forgotten Ear of Corn					
How Corn Came to the Earth					
The Coming of Corn					
Corn and the Sauk and Mesquakie Indians					



ACTIVITY 5.4

THE HISTORY OF ETHANOL IN AMERICA

Student Materials

The History of Ethanol in America

Map of the US

Resources

Directions

1. Read *The History of Ethanol in America*.
2. Use online search engines or the library to locate parts of the U.S. where crops used in ethanol production are produced. Locate these areas on the US map.
3. Review *How to Write a Research Paper* and *How Reliable Are Your Sources?*
4. Working in groups of two to three students, research the historical periods mentioned in *The History of Ethanol in America*.
5. Write a one-page paper on one of the historical periods and issues related to that period.

Grains and Grasses Suitable For Biofuel Production

Forestry products	Wheat
Corn	Rice
Soybeans	Sorghum
Sugarcane	Sunflowers
Sugar beets	Potatoes
Barley	Switchgrass



The History of Ethanol in America

Ethanol is a clear, colorless chemical compound made from the sugars found in crops such as corn, sugar beets and sugar cane.

In the 1850s nearly 90 million gallons of ethanol were produced every year in the US. At that time it was used as a fuel for lamps. It could also be consumed as an alcoholic beverage. In 1862 the Union Congress put a \$2 per gallon excise tax on alcoholic beverages to help finance the Civil War. The tax made ethanol too expensive to use for lighting, so people started using kerosene and methanol instead.

In 1896, Henry Ford built his first automobile, the quadricycle, to run on pure ethanol. In 1906, the liquor tax was repealed, and Ford declared ethanol the fuel of the future. Ford designed his Model T to run on a mixture of gasoline and ethanol.

During World War I, ethanol use increased rapidly, not only as a fuel but in the manufacture of war materials also. The year 1919 brought Prohibition, and a denaturing process was developed which made ethanol poisonous and undrinkable. In the 1920s ethanol was replaced as a booster to gasoline by other products.

Prohibition ended in 1933, and ethanol production rose to 600 million gallons a year to meet the needs of World War II. After the war, production once again declined because there were no more government contracts. Farmers began exporting grain formerly used to make ethanol to help feed countries whose agriculture had been destroyed by the war. Large supplies of cheap foreign oil made gasoline less expensive than ethanol.

In the 1970s the US placed embargoes on gasoline supplies from foreign sources, and interest in ethanol as an alternative fuel rose again. Concerns about global warming and dependence on foreign oil have caused interest in ethanol as an alternative fuel source to grow in recent years. In 2006, 112 ethanol plants, mostly in the Midwest, produced about 5 billion gallons of ethanol.

Unlike gasoline, ethanol is biodegradable. It quickly breaks down into harmless substances if spilled. When small amounts of ethanol are added to gasoline, usually less than 10 percent, there are many advantages. Ethanol reduces the emissions of carbon monoxide and other toxic pollution. It keeps engines running smoothly without the need for lead or other chemical additives. Because ethanol is made from crops that absorb carbon dioxide and give off oxygen, it helps reduce the total volume of greenhouse gas emissions.

There are several ways to make ethanol from crops. One process uses yeast to ferment the sugars and starch in crops like corn, barley, wheat, rice, sorghum, sunflower, potatoes, sugar cane and sugar beets. Currently, most ethanol produced in the US is made from corn because corn is plentiful and cheap.



Since ethanol is created by fermenting sugar, sugar crops are the easiest ingredients to convert into ethanol. Brazil, the world's largest producer of ethanol, makes most of its ethanol from sugar cane. Many cars in Brazil are engineered to operate entirely on ethanol made from sugar cane.

A new experimental process breaks down cellulose in woody fibers to make "cellulosic ethanol." With this process ethanol can be produced from trees, grasses, and crop wastes. Trees and grasses require less energy for production than grains, since grains must be replanted every year.

Switchgrass, a grass that is native to Oklahoma, is of special interest to researchers for use in ethanol production. It has been chosen by the US Department of Energy as one of the main perennial crops for use in the production of ethanol. Switchgrass is a seeded, warm season grass native throughout North America.

Switchgrass converts and stores more solar energy per acre than any of the grain crops currently used to produce ethanol for fuel. It holds 66 percent more potential energy than corn. Switchgrass can be grown on marginal cropland and uses water and fertilizer efficiently. Since it is perennial, it comes back every year without replanting. At harvest, it would yield approximately 300-700 gallons per acre, compared to corn, at approximately 350 gallons per acre.

Background sources: Cleaner Energy Partnership; Energy Information Administration, US Department of Energy; USDA Agricultural Research Service



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ACTIVITY 5.5

HERE AND THERE

Student Materials

- Globe or world map
- Internet access
- Encyclopedia
- Almanac

Use a globe or world map to find a country with a climate similar to your state’s climate. Look at distance from the equator, elevation, and nearness to water to determine similarities. Write the name of the country below and conduct research to answer the questions that follow.

Country _____ Continent _____

1. What are three crops that grow in the country?

2. How are the crops grown in the country similar to or different from crops that grow in your area?

3. Why do you think the crops are similar or different?

ACTIVITY 5.6

PRODUCTS AND CROPS MATCHING

Student Materials

Various products made from crop sources

Your teacher will display ten products made from crop sources. List the crop that you believe the product was made from in the spaces below. After you have written down your responses, your teacher will discuss the correct answers.

Product	Crop
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____

Questions

- 11. Which of the products surprised you? Why? _____

- 12. Which of the products seemed obvious to you? Why? _____

- 13. Did the activity give you a different view on uses of crops? Explain. _____

Name _____ Date _____ Hour _____

ACTIVITY 5.7

How Much is Harvested?

Student Materials

Pen or pencil

Paper

Resources on harvest data

AgWeb <http://www.agweb.com/>

USDA National Agricultural Statistics Service <http://www.nass.usda.gov/>

Directions

Choose one crop that interests you, such as corn, wheat, or soybeans. Research the latest available data on harvesting for that specific crop.

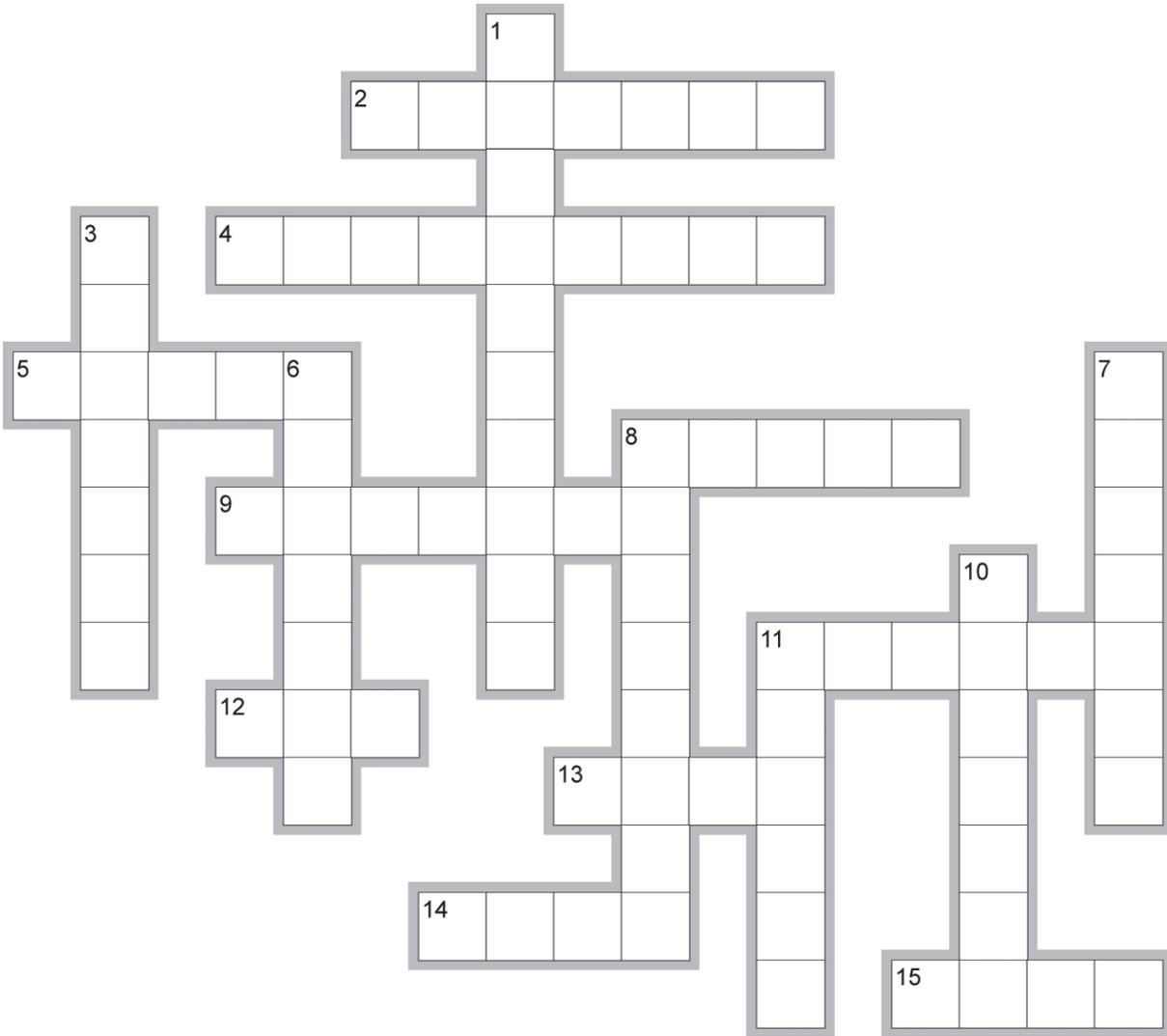
Write a brief report on your chosen crop following the guidelines listed below.

- Length should be 1 to 2 pages
- Include graphics and/or photos
- Provide numbers of harvest, either for a specific state, region, or the entire country
- Discuss factors that may have influenced the harvest
- Include a list of the resources used

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ACTIVITY 5.8

UNIT REVIEW CROSSWORD



EclipseCrossword.com

Across

2. native grass from Africa
4. alternative fuel from soybeans
5. another name for corn
8. type of wheat primarily used for pasta
9. grain harvester
11. dollar bill fabric
12. meat substitute
13. U.S. is largest producer of this crop
14. Asian side dish
15. seed that makes linen

Down

1. water where you need it
3. George Washington Carver is the _____ “father”
6. steals the best soil from a farmer
7. invented the cotton gin; last name
8. corn sugar
10. alcohol fuel blended with gasoline
11. cooking oil