



Welcome to Ag@School!

Class sets of this magazine, aimed primarily at the 4th grade level, are FREE to subscribing Washington teachers. Instructions for subscribing are on page 3.

Produced by Washington Ag in the Classroom, Ag@School is designed to help teachers meet student educational goals as well as develop agricultural literacy. The teacher guide connects information to specific standards that will help your students meet state requirements.

This issue is designed to help students understand:

- High-yield agriculture has allowed us to feed the world without bringing more land into production
- Washington's location on the Pacific Rim is advantageous for international trade which fuels our state's economy
- Technology is using scientific knowledge to find a better way of doing a job
- Taking responsibility for food choices improves health and well-being

Reproducible activities in the teacher guide expand on concepts covered in the magazine. Included in the guide are instructions for a visual activity (The Earth as an Apple), vocabulary activities, answers to questions in the magazine, and post tests.

The Earth as an Apple

Environmental benefits of high-yield agriculture

Agriculture's relationship to the economy and our standard of living is important. But, equally important is the environmental impact of modern agriculture. Food production impacts the global environment more than any other human activity.

World population, land-use, food demand and how extensively high-yield agriculture methods are embraced will determine what happens in the future to the remaining wild lands on the planet.



We suggest that teachers do the "Earth as an Apple" (page 5 in this guide) prior to handing out this issue. Please read the background information prior to presenting the activity.

Augmented Reality

– A new feature for Ag@School

Augmented reality (AR) is a live direct or indirect view of a physical, real-world environment whose elements are augmented (or supplemented) by computer-generated sensory input such as sound, video, graphics or GPS data. (Wikipedia)

Ag@School has added this feature using the Aurasma platform. In this issue, and future issues, you will be able to scan a photo that will lead you to a video. That video will hopefully enhance understanding of a concept. For example, there will be a picture of a dairy cow, you scan the picture with your phone or tablet, and it will play a short video about milk's journey.

While you read you will see pictures with the Aurasma logo on them.  Those are the pictures that have a video attached. Scan  using the Aurasma app (it's free and directions will be on page 5 of the first teacher guide or online) and enjoy the video.

You can also look online at <http://www.agclassroom.org/wa/> under publications for the online version of this

magazine. With the online version you simply click on the picture to show the video to the class.

We hope you enjoy this new feature, it's a work in progress but we think that it will be a great way to make connections with this magazine and with agricultural information.

Grant Opportunity

The Washington Ag in the Classroom organization is pleased to offer a grant (up to \$500) to groups or individuals sponsoring programs or projects that promote agricultural literacy. The proposed project must be targeted to young people from 5-18 years of age and should enhance student knowledge of a contribution made by agriculture. The funds will be available to any school-aged students, teachers, and others in the community who are involved with agriculture.

Visit our website,
<http://www.agclassroom.org/wa>
for more information and to apply.

Washington Standards

Science:

EALR 3 – APPA, APPG, AND APPH
EALR 4 – ES1A

Math:

4.1.1 4.2.D TG page 6

Social Studies:

EALR 2.1, 2.2, 2.4, 3.3, and 4.1

Health and Fitness:

EALR 1.5

Reading:

CCSS RI.4.4, and RI.4.7

Writing:

The post test is designed to help prepare students to write. The prompts include the four modes of writing: expository, narrative, descriptive and persuasive.

Cover

Corn is truly an amazing crop, one that the world depends upon. For good background information, teachers may want to review the video at: www.youtube.com/watch?v=LGJ6D3KNJ9E

While students may think of corn on the cob or popcorn (both separate types of corn plants that account for only 1% of the acres grown), the real story is about grain corn. It is basically inedible without processing. We can eat corn flakes, cornmeal muffins, or corn tortillas, but we actually consume more corn via the meat, milk, and eggs that are produced using corn as animal feed. Corn has hundreds of uses for by-products, including corn syrup for sweetener and corn to produce ethanol.

Discussion Starters

1. What does it mean to be an agrarian society? Have students discuss the changing US population demographics listed across the top of the cover. There are very few people living and working on farms today, so we have shifted from being agrarian to being urban.

2. What is "high-yield agriculture"? Farmers grow more food on each acre by using technology. They choose improved seeds and plants, add plant food (fertilizer) to the soil, manage pests, and use better equipment and techniques to increase production on fewer acres.

Farm it Maybe video:

<https://www.youtube.com/watch?v=e3kwdue5XS0>

Technology is the Key

There are five outstanding technological developments in the last 60 years that have led US agriculture to its current production levels:

1) Mechanized equipment (tractors and combines rather than horses and mules); 2) widespread use of man-made fertilizers; 3) chemical pesticides; 4) computers and Global Positioning technology; and 5) advances in genetics of crops and animals either through cross breeding or biotechnology.

Scientists – Engineers – Specialists:

Farmers depend upon scientists of all sorts to do research adding to our knowledge of the world around us, engineers translate that knowledge into new equipment and processes, and specialists assist farmers with problems in the field. These men and women do not necessarily have farm backgrounds, nor do they live on farms. They are employed by universities and other industries and are a huge part of the success of American agriculture.

Watch for clues in this issue of Ag@School identifying a few of the dozens of science-based careers beyond that of farmer or rancher. Get more information at:

www.ars.usda.gov/is/kids/scientists/scientistsframe2.htm

Hybrid Corn

Hybrid corn is a strain produced by fertilizing one variety of corn plant with the pollen from another. The result, if the technique is carried out properly, is a strain that combines desirable features of both parents and is far superior to either one. Hybrid corn produces up to 30 percent more corn for each acre. The ears are consistently larger and better formed than those produced by ordinary methods. Stalks and roots are stronger, allowing the plant to resist being toppled by the wind. Hybrid strains have been developed to produce plants adapted to such conditions as drought, dampness, or cold.

Much painstaking work must be done to produce an ear of hybrid corn. For this reason most farmers buy hybrid seeds from specialized growers. Kernels from the ears of double-cross hybrid plants cannot be saved for seed. The reason is that the offspring of these plants do not resemble the parents. Each season's supply of hybrid seed must be produced by crossing the original parent strains.

<http://www.ncga.com/upload/files/documents/pdf/WOC%202013.pdf>

<http://videos.howstuffworks.com/discovery/31274-corn-corn-crop-video.htm>

Page 2 - Word Fill In

years, feed, horses, minutes, seed, earth, pipe, circle

Page 3 - Livestock

Idioms - An **idiom** is a word or phrase which means something different from its literal meaning.

Examples of Animal idioms.

A bull in a china shop

A cash cow

Have a cow

Hit the bulls-eye

Holy cow

As fat as a pig

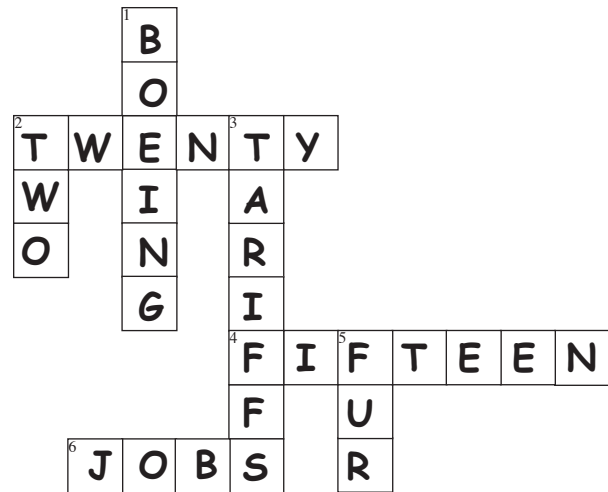
Eat high on/off the hog

Go hog-wild

Go whole hog

Page 4/5 - Washington and Trade.

Crossword Solution



Page 6 - Hens to Home

"Eggs"-actly So

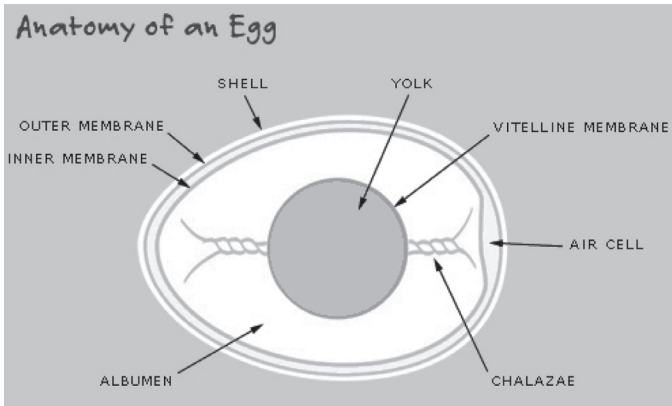
1. All egg shells are white. The color is only on the shell's outer surface. If you crack open a brown egg, you'll see the inside of the shell is white. Color comes from natural pigments in the bird's bloodstream. They are deposited on the eggshell in the chicken's oviduct. The color of an egg's shell is determined by the genetics of the hen; it has nothing to do with what the hen eats. If you want to predict the amount of pigment from a given hen, the place to look is her "earlobes". A hen's earlobes are a patch of skin on the side of the face; the redder or darker the earlobe, the darker brown the egg.

2. There is no nutritional difference between brown eggs and white eggs. However, unlike the shell, the yolk color is very much influenced by the hen's diet. The darker yellow color comes from carotenoids, which are natural compounds found in plants. The best known carotenoid is beta-carotene. Hens eating green vegetation or diets containing ingredients like marigold petals will have dark orange yolks. The yolk represents about 1/3 of an egg's weight, it contains all the vitamins, all the fat, almost all of the calories, and about half the protein.

3. The air cell gets larger as the egg is stored longer.

4. The chalazae holds the yolk in the center of the egg. The thicker it is, the fresher the egg.

<http://www.exploratorium.edu/cooking/eggs/eggcomposition.html>



Egg Production video:

<https://www.youtube.com/watch?v=RUN4mlfC4o0>

Page 7 - Dairy Life

Answer Key: 1856, 72, 3, 100, 350, 3, 99, 25, 400

Milk's Journey video: <http://youtu.be/wiyI7JXlptg>

Page 8 Staying Healthy

Choices - Choices

The obesity rate in American children has tripled over the past 30 years, and their expected lifespan is now less than their parents! Go to:

<http://www.choosemyplate.gov/healthy-eating-tips/ten-tips.html>

My Plate Video:

https://www.youtube.com/watch?v=Ebm04EO91_U



The Ten Tips Nutrition Education pages are perfect for posting on a refrigerator. They are a starting point to get students and families moving toward a healthy diet (also available in Spanish).

Plants Need Food Too! Answers TG page 4

Field A: Corn, Potatoes, Wheat

Field B: Corn

Field C: Corn, Wheat

A Cornerstone of Washington's Economy

Answer Key – 1) 10 2) Any five of these; apples, wheat, milk, potatoes, hay, cattle/calves, cherries/nursery greenhouse, grapes, and pears. 3) 2012 from the Census of Agriculture 4) Answers will vary 5) Answers will vary

Visit
www.waic.net

FOR LINKS TO:

- Lessons • Activities • Information
- Student Websites • and more!

Washington Ag in the Classroom
is your launch pad for information and
activities about all fields of agriculture!

Publication and Credits

Ag@School is a publication of Washington Agriculture in the Classroom, a non-profit entity created in 1981 to encourage and help teachers increase agricultural literacy in their students. Both public and private groups including the WA Dept. of Agriculture, WSU, commodity commissions, farm organizations, agribusinesses and individuals, support the mission. Teachers may reproduce any pages for use.

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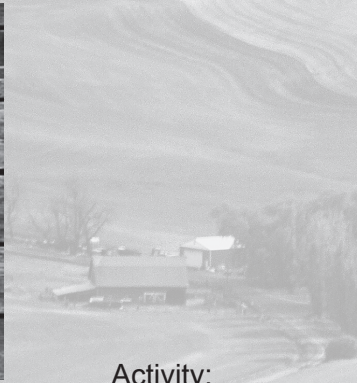
- Your name, grade you teach, and number of students in your class
- Your school's full name (no abbreviations please)
- School mailing address (for postal delivery)
- The county in which your school is located
- School phone number including area code



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Thank you in advance for your feedback.



Activity:

<http://www.myamericanfarm.org/activities/HarvestImageMatch.pdf>

(Post-Test) TELL WHAT YOU LEARNED!

1. How has technology changed or improved production for farmers? Give two examples. Which innovation do you think is the most valuable? Why?
2. Persuade the reader that export trade is important to Washington. Give reasons to support your point of view.
3. Describe the five sections of My Washington Plate. Why is it important to eat according to this plan?
4. Choose a job that agriculture depends upon and explain why science is an important subject to include in studies for that career.

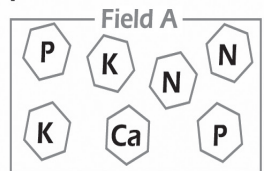


PLANTS NEED FOOD TOO!

Just as we need vitamins and minerals from our bodies to grow, plants need nutrients from the soil to grow. Nitrogen, phosphorus, potassium and calcium are some of the nutrients that food crops need. About 50 years ago scientists learned how to test soil to see what was missing. Farmers could then apply the missing nutrients in fertilizer. This increased yields.

Using the key decide which crops you could plant in each field.

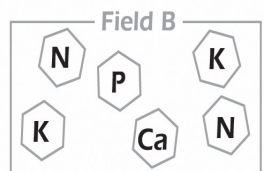
Key:
Ca = Calcium
N = Nitrogen
P = Phosphorus
K = Potassium



Crops I could plant:

Corn needs:

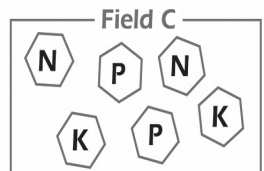
- 2 N's
- 1 P
- 1 K



Crops I could plant:

Potatoes need:

- 2 P's
- 2 N's
- 1 Ca
- 2 K's



Crops I could plant:

Wheat needs:

- 1 N
- 1K
- 1-1/2 P

FEEDING PEOPLE – THE BIG FOUR

List foods you've seen or eaten this week.
 Which of them - plain or processed - came from
THE BIG FOUR?

RICE

WHEAT

CORN

POTATOES

Earth as an Apple

MATERIALS REQUIRED: Large apple and paring knife

OVERVIEW: Cut an apple into smaller and smaller fractions to visually demonstrate how the earth's surface is used. All the people on earth, nearly 7 billion, live on 1/8th of the surface. Only 1/32 of the surface is now used for growing food.

OBJECTIVE: Understanding why high-yield agriculture (growing more on less land) is necessary to avoid plowing more land to feed a growing population demanding better food.

Explain that the apple represents the earth

Cut apple into four quarters:

- Three of those represent the oceans. Set those 3 quarters aside
- Remaining quarter represents total land area of planet.

Cut the land quarter into two pieces:

- One piece (1/8) is inhospitable to people. People can't live there. It includes polar regions, deserts, swamps, and very high or rocky mountains. Set it aside.
- Remaining 1/8 is land where all the people live, nearly 7 billion.

Cut the 1/8 where people live into four pieces (4/32nds):

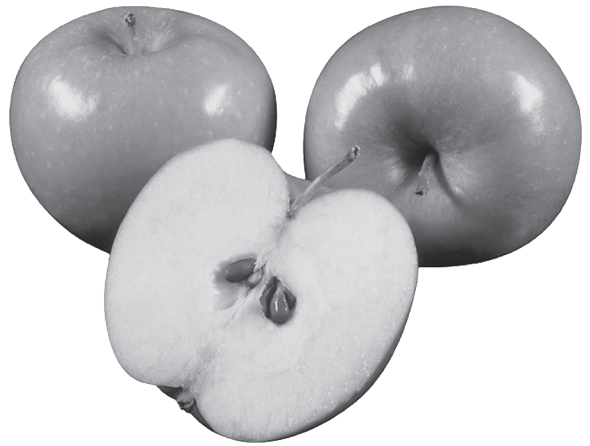
Three of these are land that does not grow food.

- Land that is too wet, too dry, too cold, too steep, or the soil is too poor.
- Land covered by cities, shopping centers, freeways, and all the things we have built on the earth.
- Land now used for other things parks, rainforest, wildlife habitat, wetlands and recreation areas.

Set those 3 sections aside.

Carefully peel the last 1/32 slice:

- This tiny bit of peeling represents the topsoil, the thin skin of the earth's crust upon which man depends.
- Less than 5 feet thick, it is a very fixed amount of food-producing land



Perpetual Farm Project

The Perpetual Farm - Growing Sustainable agriculture in Washington

Can we farm forever? Come explore this question and more! <http://www.agforestry.org/perpetual-farm>

Also available online: a Teacher's Guide, aligned to the Common Core State Standards for English Language Arts and Literacy in History, Social Studies, Science and Technical subjects for grades 9 through 12. Help teach the next generation about critical thinking, the future of agriculture and sustainability.

AGRICULTURE - A Cornerstone of Washington's Economy

Market Value of Crops and Livestock and Number of Farms by County from 2012 Census of Agriculture, USDA

TOP 10 COMMODITIES: (MILLIONS OF DOLLARS)

KEY ECONOMIC FACTS ON WASHINGTON AGRICULTURE

- 37,249 farms
- 300 commodities grown
- \$49 billion overall value of food and agriculture industry
- \$9.89 billion market value of crops and livestock
- 13% of Washington's economy
- 160,000 employed in agriculture and food industry
- Ranks No. 1 in U.S. production in 10 commodities
- \$15.1 billion in food and agriculture products exported through Washington ports in 2013, third largest total in U.S.



APPLES	-\$2,251
WHEAT	-\$1,180
MILK	-\$1,160
POTATOES	-\$700
HAY	-\$679
CATTLE/ CALVES	-\$624
CHERRIES	-\$499
NURSERY/ GREENHOUSE	-\$305
GRAPES	-\$236
PEARS	-\$206

LEGEND
Top 10 counties in market value are light gray
Leading commodities listed for each county
Source: U.S. Dept of Agriculture 2012 Census of Agriculture
USDA National Agricultural Statistics Service, Olympia
www.nass.usda.gov/wa (360) 709-2400



AGR PUB 103-126 (R/7/14) • agr.wa.gov • (360) 902-1976

1. How many commodities is Washington State ranked #1? _____

2. Please list half of the top ten commodities in Washington State.

1. _____
2. _____
3. _____
4. _____
5. _____

3. What year, and from where, was this information collected? _____

4. How many farms are in your county that you live in, and what commodities are produced there?

5. Write your own question about this map and ask a partner? _____
