



## Welcome to Ag@School!

Class sets of this magazine, aimed primarily at 4th grade level, are FREE to subscribing Washington teachers. Instructions for subscribing are on page 4. Back issues are available at [www.waic.net](http://www.waic.net).

This is the first of three issues for 2014-2015. Delivery of the next two issues will be in January and April.

Produced by Washington Ag in the Classroom, Ag@School is designed to help teachers meet student educational goals as well as develop agricultural literacy.

This issue is designed to help students understand:

- The economic importance and diversity of Washington agriculture
- The importance of agriculture to their lives
- Washington geography and climate and how these influence agriculture
- The benefits of dams and how locks enable river transportation
- Genetic engineering is an important tool in improving crops and ag products
- Pumpkins are great for much more than carving! Pumpkins provide 53% of our vitamin A, 20% of our vitamin C, and 564 mg. of potassium
- Wheat grown in Washington is mostly exported

Reproducible activities in the teacher guide expand on concepts covered in the magazine. Included in the guide are vocabulary activities and post tests.

### Why Agricultural Literacy?

Agriculture is society's lifeline and an integral part of our heritage. Unfortunately as our country moved from agrarian to urban, people lost contact with the main industry necessary for survival—food production. America's largest industry has dropped from public discourse except for the occasional media splash. Yet we all eat, and it is important that we have an understanding of where our food is produced and who we depend upon to deliver it to our tables.

Less than 2% of the US population is involved in agriculture production (farming) yet 24 million American jobs are dependent upon it. Agriculture is more than working the land and tending the animals. This huge industry—production, processing, transportation, and marketing—generates billions of dollars each year. Agriculture is vital to national security, a stable economy, and the US trade balance.

### 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 the Ballard Locks, you scan the picture with your phone or tablet, and it will play a short video demonstration of how the locks work.

While you read you will see pictures with the Aurasma logo on them. Those are the pictures that have a video attached. Scan it using the Aurasma app (it's free and

directions will be on page 5 of this teacher's guide for how to use it) 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 can simply click on the picture to show the videos 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 to this magazine and to agricultural information.

## Vocabulary Words

- Each issue will introduce several words or word combinations that may be unfamiliar to students. These will appear in bold type the first time they are used.
- Words in this issue include: Pacific Rim, precipitation, latitude, irrigation, locks, enzyme, gene, GMO, curds, and whey.

## GLE, EALR & CCSS Connections

### Science:

SYSC, APPA, APPG

### Math:

CCSS Math 4.MD.A.1

### Health & Fitness:

1.5.1 and 1.5.2 pages 3,7 TG page 6

### Social Studies:

EALR 2.2.1, 2.2.2, 2.4.1, and 3.1.2

### Reading:

CSS ELA RI.4.7, RI 4.1

### 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 - Agriculture—From Field to Table Background:

Washington is full of agriculture. It is everywhere! Yet, agriculture is different in each part of the state due to our diverse geography and climate. Agriculture is much more than farming. The industry includes producing raw products, transforming them into things people use, distributing them around the state, nation, and world, and marketing them to consumers. These steps employ thousands of people in hundreds of different jobs.

Discussion starters:

1. Discuss reading maps and finding towns on a map.

Go to the Tacoma Public Library website: [www.tpl.lib.wa.us/SiteMap.aspx](http://www.tpl.lib.wa.us/SiteMap.aspx) and click on Washington Place Names to research the history of how our cities and counties got their names.

2. Which of the crops or products around the edges of the cover have you seen growing? What crops and animals are raised where you live?

3. Have students draw the 117<sup>o</sup> Longitude line through Washington State (basically the eastern border with Idaho) and 124<sup>o</sup> Longitude line (basically the western edge where Columbia river enters Pacific Ocean)

### Answers to questions on the cover:

1. 5, 30
2. 2, 125
3. 195, 75
4. 195, 26, 395, 135
5. 82, 120
6. 90, 110
7. About 755
8. 9
9. 7

## Page 2 – Ag is Science & Technology

Agriculture is responsible for the food we eat. Food comes from farms; it doesn't just magically appear in grocery stores or restaurants. Farmers and ranchers depend on a wide variety of ag-related careers. Have students brainstorm jobs that are needed to bring food to their tables. Have them research related ag careers like agronomist, entomologist, mechanic, irrigation manager, satellite guidance technician, or food photographer.

### Think

If we had no farmers, how would your life be different? Would your parents have the same jobs as today? Would you have different chores? If we didn't have semi-trucks would your diet be the same? Would the foods you eat change with the seasons?

### What is a GMO?

Creating a GMO can be simplified into 5 steps:

1. Identify the gene that codes for the protein of interest e.g. insulin
2. Remove gene from the donor e.g. human cell
3. Insert gene into a host e.g. a bacterium
4. Grow the altered bacteria on a large scale to make the protein product
5. Isolate the protein

Genetic modification involves the mutation, insertion, or deletion of genes, but not all genetic modification is considered GE or GMO. Although by definition we do not have GE wheat, we do have a variety, named "Clearfield" that will tolerate the herbicide Imazamox (brand name Beyond).

Clearfield wheat is non-GMO, unlike Roundup-resistant corn and soy. This genetic variant was created by a process called chemical mutagenesis. Scientists exposed wheat seeds to the chemical, sodium azide, to induce mutations.

In addition to chemical mutagenesis, gamma and x-ray radiation are also used on seeds and plant embryos to induce mutations. This all falls under the umbrella of "traditional breeding methods" and "hybridization", and are considered non-GMO

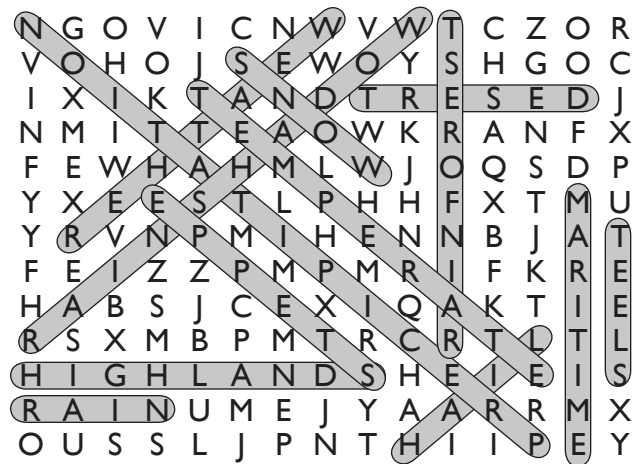
## Page 3 – Climate

### Discussion starters:

1. Why are different crops and animals raised in different regions of Washington? (They all have unique requirements for climate, rainfall, terrain, and soil to thrive)

2. What is meant by a "rain shadow"? (as clouds rise they lose moisture causing a dry region east of the Cascades) How does it affect the types of crops grown east of the Cascades? (With irrigation, anything can be grown, without irrigation farmers are limited to grain, grass seed, legumes, and some oil seed crops) Using the precipitation map, have students find rain shadow areas caused by the Olympic Mountains. Rain shadow video can be found at: <http://youtu.be/ez99nyfSHck>
3. Track the fruit growing areas in Washington. They follow the banks of major rivers and lakes and the Columbia Basin irrigation project. There is enough water in these areas to make "micro-climates" that are warmer in the winter and cooler in the summer.

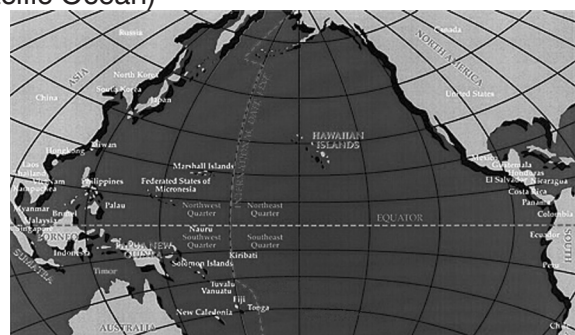
### Climate Word Search



## Page 4/5 – Grown in Washington

### Discussion starters:

1. What geographical features make WA such a diversified agricultural state? (Next to the Pacific Ocean; deep-water ports in Puget Sound; Columbia River for navigation, irrigation and power generation; Cascades split the state; volcanoes have provided the rich ash component of our soils; elevation goes from sea level to the top of Mt. Ranier)
2. Discuss individual growing regions and what factors make each an ideal place to grow specific crops or products (have students refer to the boxes on pages 4-5)
3. Why is a location on the Pacific Rim so important? (Closer to trading partners, especially around the Pacific Ocean)



## Page 6 – Rivers, Dams and Locks

Remind students that **technology involves changing the natural world to meet human needs or wants**. Our rivers are excellent examples of this. With our system of dams and locks, we provide water for irrigation, electricity production, recreation, cities and industry. We have flood control, transportation, and still provide for the needs of salmon. Discuss how engineers found solutions to many problems to better serve our citizens and our economy. This in turn has improved the quality and quantity of crops we can raise.

Ballard Lock video can be found at <http://youtu.be/CY-y4IxSE88>

### **Background:**

1. Rock Island dam was the first large dam on the Columbia (1933). Bonneville Dam was second, built in 1938 for electricity generation. Grand Coulee was authorized as one of the many projects to put men back to work after the depression and was built to supply irrigation water for the Columbia Basin Project, using the sale of electricity generated by the dam to pay for the construction of the dam and the irrigation delivery system. In 1948 the Snake and Columbia Rivers crested simultaneously and created a flood that wiped out a section of Portland. River-use planners turned their attention to flood control (as well as navigation and power generation) as the remaining dams were completed on the two rivers.
2. Deep water ports are those capable of handling a fully laden Panamax ship. That is a ship that is the maximum size that can still fit through the Panama Canal. As the Panama Canal undergoes its current expansion, the list of ports will change. It is also important that we dredge the Columbia River channel to keep the necessary depth clear for these huge ships to reach the largest Columbia ports. Other ports like Bellingham and Olympia are not equipped to handle Panamax ships. Bremerton is a large port for the US Navy.
3. Discuss the different ways people use and depend upon the Columbia and Snake Rivers (recreation, irrigation, water supply, power generation, flood control, wildlife habitat, transportation and commerce. Can the students think of more?)

### **Think & Discuss:**

Have students name three renewable energy sources. (hydro-electric power, wind power, and solar power). Why is hydroelectric energy the most reliable?



### **Discussion starters:**

Hydroelectric power is the most reliable because water behind the dams can be released through the generators at any time to supply electricity. If the sun is not shining or the wind is not blowing, solar and wind energy do not produce

electricity. In fact, hydroelectric power is called upon to deliver electricity when these other power sources wane.

Hydro-electric power is possible on the Snake-Columbia system because of the drop in altitude between the source of these rivers and the ocean. A large river like the Mississippi is unable to use hydro-electric generators because it is relatively flat along its' length.

Fossil fuels are sources of energy derived from plants and animals that lived long ago, such as coal, oil, and natural gas. They are carbon based and release carbon dioxide into the atmosphere when burned. Our clean, renewable hydropower keeps the Northwest's carbon footprint at half that of the rest of the nation. Removal of the Snake River dams would add 5.4 million tons of carbon dioxide to the atmosphere each year. Replacing the energy capacity lost by Snake River dam removal would take at least three nuclear power plants or six coal-fired or fourteen natural gas-fired plants.

It would also take an additional 120,000 rail cars or more than 700,000 semi-trucks annually to move the cargo that now travels by barge on the Snake-Columbia river system. That traffic would stress already overtaxed bridges and highways.

Sensible solutions have been found and implemented to benefit fish and yet protect the value of the Columbia-Snake River system to Northwest families and businesses. Additional hydropower generation would seem to be logical.

More info at:

[www.nwrivernpartners.org/issues-river-benefits](http://www.nwrivernpartners.org/issues-river-benefits)

## That's a Lot of Wheat

10,072,800,00# divided by 2000#/ton=  
5,036,400 tons



## Page 7 –Pumpkins

Pumpkins got their name from the Greek word “pepon” which means “large melon”.

### **Pumpkin Facts**

- Total U.S. pumpkin production in 2008 in major pumpkin producing states was valued at \$141 million.
- Total production of pumpkins by major pumpkin-producing states in 2008: 1.1 billion pounds
- Pumpkin flowers are edible.
- The largest pumpkin pie ever made was over five feet in diameter and weighed over 350 pounds. It used 80 pounds of cooked pumpkin, 36 pounds of sugar, 12 dozen eggs and took six hours to bake.
- Pumpkins are members of the vine crops family called cucurbits.
- Pumpkins originated in Central America.
- In early colonial times, pumpkins were used as an ingredient for the crust of pies, not the filling.
- Pumpkins were once recommended for removing freckles and curing snake bites.
- The largest pumpkin ever grown weighed 1,140 pounds.
- The Connecticut field variety is the traditional American pumpkin.
- Pumpkins are 90 percent water.
- Pumpkins are fruit.
- Eighty percent of the pumpkin supply in the United States is available in October.
- Colonists sliced off pumpkin tops; removed seeds and filled the insides with milk, spices and honey. This was baked in hot ashes and is the origin of pumpkin pie.



- Native Americans flattened strips of pumpkins, dried them and made mats.
- Native Americans called pumpkins “isqoutm squash.”
- Native Americans used pumpkin seeds for food and medicine.

You can find the pumpkin life cycle video at:

<http://youtu.be/38dxWLSfTnQ>

## Page 8 - Wheat

Wheat has consistently been in the top six ag products in Washington State. In 2011, Apples were the top value, followed by dairy products, wheat, potatoes, hay, and cattle & calves (beef). These top six accounted for 69% of the value of all ag commodities raised in 2011 in Washington.



## Writing Prompts

1. Create a narrative about making cheese. Who might have discovered that enzymes in a calf’s stomach would turn milk to curds?
2. Tell why weather and climate are important to farmers. For instance, which fruits can we raise in Washington, and which ones will not survive here?
3. What is your favorite food grown in Washington? Describe how it looks, smells, and tastes. What color and texture does it have?
4. Some people believe that the lock and dam system on the Snake and Columbia Rivers should be removed. Do you agree or disagree? Write to persuade a friend of your opinion. Give reasons to support your position.)
5. Poetry can be a great way to express ideas. Write a cinquain poem about a Washington commodity.

### CINQUAIN INSTRUCTIONS

- Line 1: a person, place, or thing (noun)  
 Line 2: two words that tell about the noun (adjectives)  
 Line 3: three -ing words that show action about the noun (verbs)  
 Line 4: one four-word phrase or sentence about the noun  
 Line 5: the noun again (or a word that means the same thing)

Pumpkins  
 Orange, round  
 growing, carving, painting  
 the candles are flickering  
 Jack-o-Lantern

## Learn More About Nutrition

Excellent materials are available at the dairy council website [www.eatsmart.org](http://www.eatsmart.org) Check it out: WA teachers can receive **\$20.00 FREE materials** each calendar year.

## Get the Facts

[www.nass.usda.gov/wa/](http://www.nass.usda.gov/wa/) - WA State agricultural statistics

## Become a Washivore

Check out the brand new website [www.washivore.org](http://www.washivore.org) for fun facts and profiles of Washington Ag products.

Visit the Washington Ag in the Classroom web site at:

<http://www.waic.net/>

## 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, agri-businesses and individuals, support the mission. Teachers may reproduce any pages for use.

Graphic design is by Mike Hendricks, Hendricks Design. Edited by Katy Cavanaugh and AhShalla Harris.

## Subscribe to Ag@School

Class sets of Ag@School are **FREE** to Washington teachers (one grade level per school).

To subscribe send an email from your **own** email address (do not use someone else’s mailbox) to [info@waic.net](mailto:info@waic.net). In the subject line type “Subscribe”. In the body of the message state the following:

- 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

You may also subscribe via postal mail by sending the above information to:  
 Washington Ag in the Classroom • P.O. Box 3638, Lacey, WA 98509-3638

**Subscriptions are not automatically renewed.** Following delivery of the Spring issue, subscribers will receive an email request to complete a survey and renew their subscription or unsubscribe.

Thank you in advance for your feedback. Sorry, subscriptions are not accepted by phone

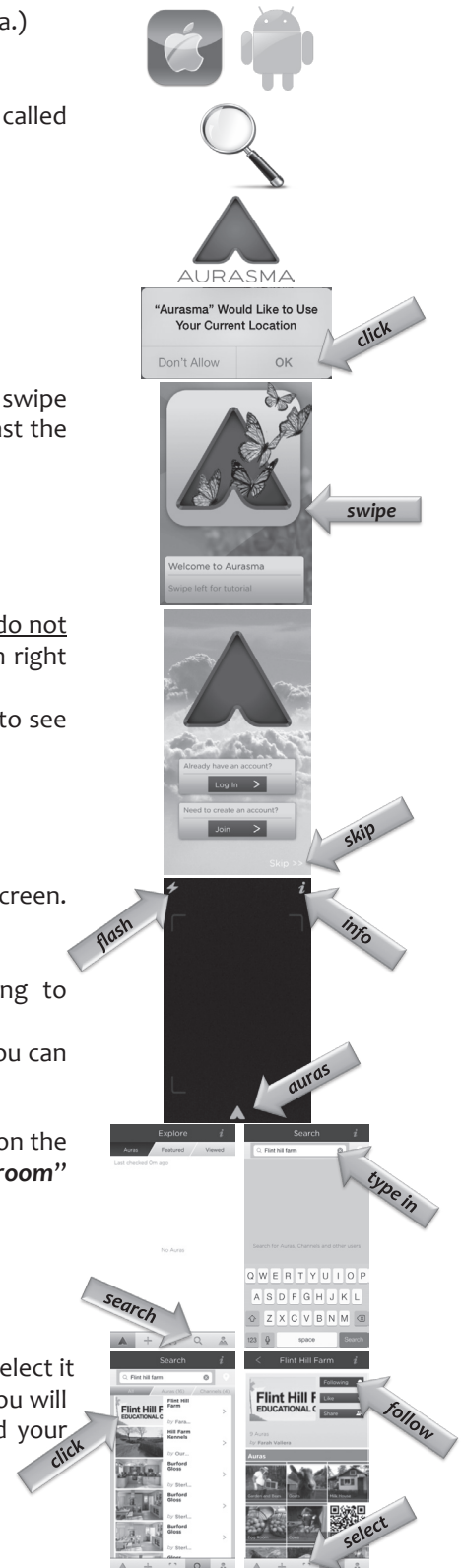
# AG@SCHOOL

## An Augmented Reality

### How to Participate:

- 1 You must have a smart phone or tablet with a data plan.\* (This app uses minimal data.)
- 2 From your “App Store” or “Google Play”, search for and download the app called **Aurasma**. (It is free, fun, and takes up little space on your device.)
- 3 Once Aurasma is downloaded (which only takes a few minutes), open the **icon**.
- 4 You will be asked to **share your location**. You should click “**OK**”. (You must also have your **Location Services** turned on in your phone’s settings.)
- 5 You will then see Aurasma’s **Welcome Screen**. You will be offered a tutorial if you swipe left, but you can quickly skip past these steps (and revisit them later) by swiping past the five tutorial screens.
- 6 Once you swipe to the left past the tutorial, you will get to the **Log In Screen**. You do not have to create an account for this experience – instead, click “**Skip**” in the bottom right hand corner. (They hide it because they want you to sign up, but you may want to sign up later to see what other things are in there!)
- 7 You will then see your camera is activated and only three icons are present on the screen. (Here, the image is black so you can better see the icons.)
  - a. The top left is the **flash** icon and can be used if it is dark where you are playing.
  - b. The top right is the **information** icon, which gives you information relating to everything on your screen at the time.
  - c. The bottom icon allows you to find **auras**, or the augmented reality programs you can use. You will click the **auras** icon.
- 8 The **Explore** auras tab will open. There are thousands! To find this classroom, click on the search icon on the bottom menu bar, and then type in “**Washington Ag in the Classroom**” into the search bar at the top. (It does not have to be capitalized for it to work.)
- 9 When you click search, **Washington Ag in the Classroom** should be your top result. Select it by clicking on the icon or name. Click “**Follow**” at the top right of the screen, and you will then be “Following” the aura. Select the **camera** icon at the bottom center and your camera will again be activated. You are now ready to play!

### What You Will See:



Name \_\_\_\_\_ Date \_\_\_\_\_

# Tell Me About It!

Choose one article from this issue of Ag@School

Title \_\_\_\_\_ Topic \_\_\_\_\_

Why did you choose this article? \_\_\_\_\_

List two interesting facts you learned.

1. \_\_\_\_\_

2. \_\_\_\_\_

# What's That Mean?

Choose two words that you want to share from this issue of Ag@School

Word: \_\_\_\_\_ Page Number: \_\_\_\_\_

Copy the sentence this word was used in. \_\_\_\_\_

Definition of the word: \_\_\_\_\_

Word: \_\_\_\_\_ Page Number: \_\_\_\_\_

Copy the sentence this word was used in. \_\_\_\_\_

Definition of the word: \_\_\_\_\_