



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 3. This is the second of three issues for 2012-2013.

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 GLEs and EALR's 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
- How Washington's location on the Pacific Rim relates to international trade
- Life on earth depends on plants, especially rice, wheat, corn and potatoes
- 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 the teacher 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. The land conservation benefits of high-yield agriculture are too important to be overlooked.

Vocabulary Words

Each issue introduces 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: technology, high-yield agriculture, staple food, tuber, rootstock, scion, Pacific Rim, export, import, integrated pest management, pesticides, pheromones, insectary and nutrient dense.

Cover

Ask students to describe the "Pacific Rim". It is a geographic area surrounding the edges of the Pacific Ocean. The Pacific Rim covers the western shores of North America and South America, Australia, eastern Asia and the islands of the Pacific. Much of the world's shipping goes through the Pacific region, especially between China and the United States.

The Oregon Trail & Cherries:

The story of the Pacific Northwest's cherry industry began in 1847 when pioneer nurseryman Henderson Lewelling arrived from Iowa with 700 tiny fruit trees in earth filled boxes. Have students discuss what Mr. Lewelling chose not to bring in his wagon so that he would have room for his trees.

GLE & EALR Connections

Science:

APPA, APPG, APPH pages 2,4,5,TG
LS1C TG LS1E page 8 LS2E/F p 4-5

Math:

4.1.1 4.2.D TG page 6

Health & Fitness

1.5.1 3.1.1 page 8

Social Studies:

4.1.2 page 2,6 2.2.2 page 1,3,TG 3.3.1 pages 1,3

Integrated Environmental & Sustainability

Std. 2 p 4-5

Reading:

The articles and activities throughout the magazine link to most reading standards. They can be used to build skills in outlining, vocabulary, comprehending important ideas, reading factual material, or reading to learn new information.

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.

Micro-grafting

The apical tips of new shoots are sliced off of both potatoes and grapes to produce virus-free plants. These lab tissue cultures offer a faster way to propagate plants

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 to translate that knowledge into new equipment and processes, and specialists that 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 industry 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

Page 3 – Washington and Trade

Discussion starters:

1. Discuss imports and exports. How are our lives changed by trade? Examine your classroom for things that were imported (look at clothing labels too). Find the countries on a globe. How does trade with other countries (and states) benefit both partners? (More than 95% of the world's population lives outside the US, but we have enormous resources. Trade is a way of meeting consumer needs and wants not satisfied domestically.)
2. Think of food products that we cannot grow in WA (bananas, coffee, oranges, spices). Why can't we grow these here? (climate, length of growing season, soil type). What about seasonal products (lettuce, grapes) that are grown here during summer but not in winter. How can they be offered in stores all year around? Where do they come from? Why are seasons reversed between the Northern and Southern hemispheres?

Pages 4/5 – Pesticides & IPM

The public perception of pesticides is often negative. Knowing what pesticides are, and how they are used in our daily lives is the first step in understanding. Students should complete the simple matching quiz on page 6 of the Teachers' Guide.

In addition to knowing how to classify the man-made chemicals that we use to manage pests, students should learn a little basic botany. All plants produce their own natural pesticides to protect themselves against insects, fungi, and other predators. When plants are stressed or damaged, like during an insect attack, they increase their natural pesticide levels many fold, occasionally to levels

that could become toxic to humans.

Most plant species in the world are not edible, many because of the toxins they produce. The process of domestication has gradually reduced the levels of these compounds over the millennia so that the plant foods we eat today are far less toxic than their wild relatives. Because many of these natural toxins evolved as a way to fight off predators, our modern food plants are much more susceptible to disease.

Farmers have assembled many tools to protect their plants. They employ "mechanical" means such as hoeing to remove weeds or picking or washing off insects. They rotate crops to break the cycles of disease and insect damage (because fungal spores, insects, nematodes, bacteria, etc. are often species-specific and pest populations in a field can be reduced by planting a different type of crop for a year or two). They are constantly searching for new varieties that have better resistance to pests and diseases, and will withstand adverse growing conditions. Farmers can use beneficial insects, bacteria, and fungi to control pests. Scientists are developing chemical pesticides that are very "target specific".

Integrated Pest Management uses all the tools above to manage fields and orchards. It is an excellent example for teaching integrated environmental and sustainability standards. IPM assists growers in remaining "sustainable" (meeting the needs of the present without compromising the ability of future generations to meet their needs, while ensuring long-term ecological, social, and economic health). The needs of the present include supplying wholesome food in a way that will keep growers economically viable. The needs of the future include environmental health of soil, water, and air.

Work done at the Yakima Agricultural Research Laboratory (YARL) uses the "systems thinking" approach to problem solving. The research (described on page 5 of the student magazine) to find ways to increase the population of parasitic wasps to attack common fruit pests is a great example. Teachers are encouraged to read the complete story at the suggested website to understand the complexity of the research into all the life cycles and habits of the insects involved. Other work at YARL can be found by browsing their website at: http://www.ars.usda.gov/main/site_main.htm?modecode=53-52-00-00

Page 6 Potatoes

For more information on potato production in Washington, refer to Ag@School, Vol. 12, Issue 1, page 7.

Irish immigrants were often the first settlers in Washington state. Leaving Ireland after the Great Irish Famine coincided with the California Gold Rush in 1848 and subsequent gold, silver, lead, and coal strikes in present day Washington, Idaho, and British Columbia between the 1850s and 1880s. Most Irish in Washington did not remain in the mines but moved into other occupations all across the state seeking economic opportunities. Many Irish farmed and ranched successfully in Washington.

Name the Big Four

Potatoes, wheat, corn, rice

Why does Idaho produce more potatoes than Washington if Washington has the highest yield/acre in the nation? There were 319,000 acres of potatoes planted in Idaho, and only 160,000 acres in Washington (2011).

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>

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).

Page 8 - Answers to Label Sleuth

Milk is the most nutrient dense, followed by fruit juice. Soda is empty calories. Fruit juice should also be limited as it concentrates the sugar and eliminates the fiber. Eating a piece of fruit would be wiser.

Trade Drives Washington



Airplanes, Apples, Beef, Cherries, Export, Hops, Import, Lentils, Pears, Potatoes, Shellfish, Software, Wheat

What Do Those Numbers Mean?

200# of 15-12-6 fertilizer would have 30# of N, 24# of P, and 12# of K. 10 acres would require 10 X 200 = 2000 # of fertilizer.

Teachers—Apply Now!

Attend the National Ag in the Classroom Conference in Minneapolis June 25-28, 2013. To apply for one of 40 scholarships to be awarded on a competitive application process, please visit www.agclassroom.org/conference2013

Applications must be submitted by **March 1, 2013**.

Teachers will be able to earn both continuing education and graduate credits for participating in NAITC Conference. **Submit your application information to Washington Ag in the Classroom for additional trip support.**

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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Thank you in advance for your feedback.



Export Trade



Agricultural Technology

(Post-Test) TELL WHAT YOU LEARNED!

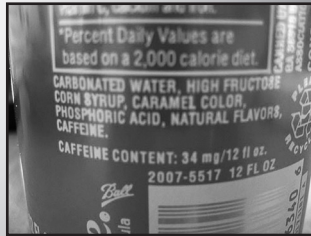
1. TELL THE READER HOW MICRO-GRAFTING COULD SPEED UP DEVELOPMENT OF A NEW CHERRY ORCHARD. WHAT TRAITS WOULD YOU WANT FOR THE ROOTSTOCK?
2. PERSUADE THE READER THAT EXPORT TRADE IS IMPORTANT TO WASHINGTON. GIVE REASONS TO SUPPORT YOUR POINT OF VIEW.
3. DESCRIBE THE FIVE SECTIONS OF MY WASHINGTON PLATE. 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.

THINK BEFORE YOU DRINK

Soda Has:

- *No nutritional value, but 150 empty calories (12 oz)*
- *Been linked to obesity, high blood pressure, heart disease, and diabetes*
- *Ingredients that cause bones to soften (osteoporosis) and decay teeth*

Live Healthy---Drink Water

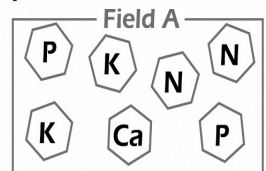


PLANTS NEED FOOD TOO!

Just as we need vitamins and minerals from our food 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 what crops you could plant in each field.

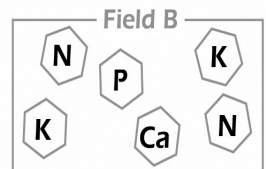
Key:
Ca = Calcium
N = Nitrogen
P = Phosphorus
K = Potassium



Crops I could plant:

Corn needs:

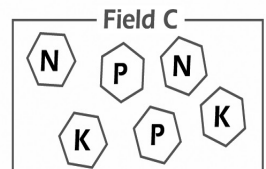
- 2 Ns
- 1 P
- 1 K



Crops I could plant:

Potatoes need:

- 2 Ps
- 2 Ns
- 1 Ca
- 2 Ks



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):

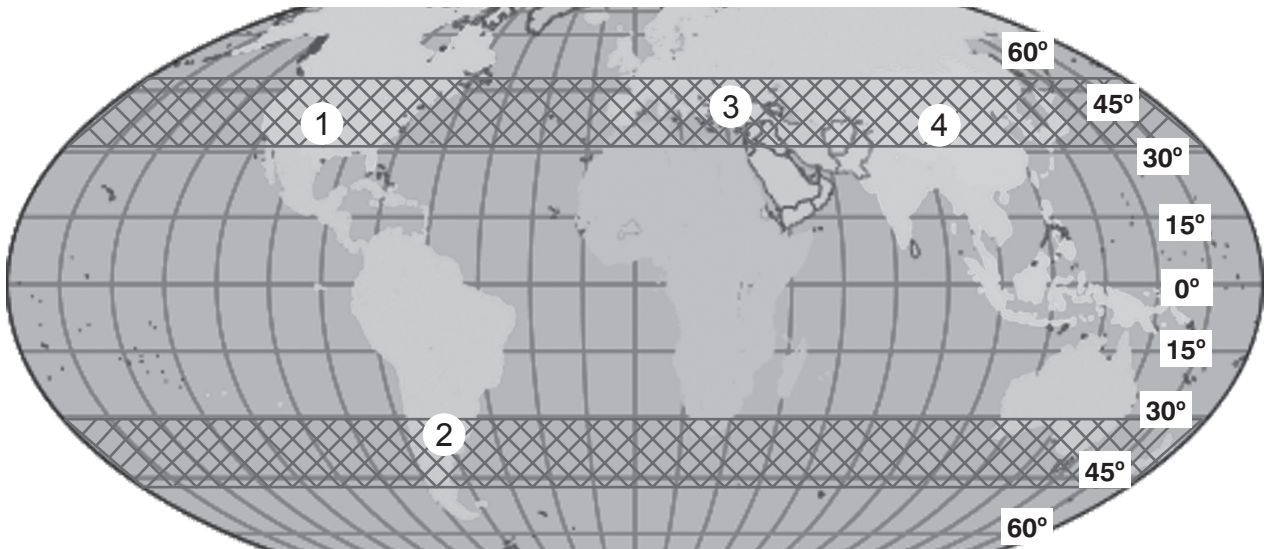
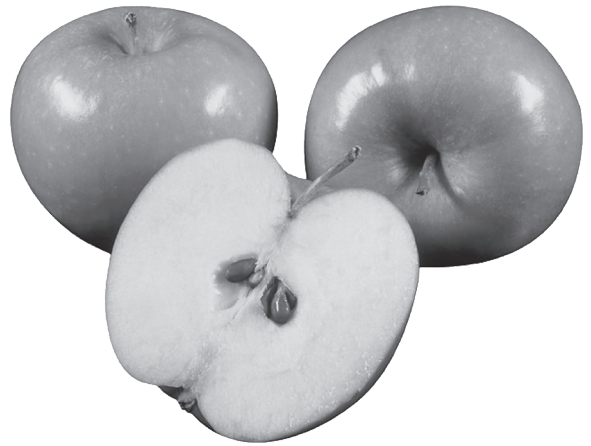
Three of these are land that does not grow food.

- 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



Greenbelts and Breadbaskets

In addition to the latest technology, US farmers have something else going for them... good land! The best land grows more food on less acres. That leaves more land for wildlife, parks and forests.

Look at the map above. There are two "greenbelts" that run around the earth midway between the equator and the poles where growing conditions are best. These include soil type, rainfall, temperature, frost-free days, daylight hours and length of growing season.

Within these two greenbelts are four regions that are perfect for growing cereal crops. These regions are called the "breadbaskets" of the world. They are the US, the Ukraine, the North China Plain, and the pampas of South America.

Fill in the 'breadbasket' that corresponds to that number on the map.

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



Available nitrogen (N)

Available phosphate (P_2O_5)

Available potash (K_2O)

All fertilizer labels have three bold numbers that represent the primary nutrients: (nitrogen(N), phosphorus(P) and potassium(K).

A bag of 15-12-6 fertilizer contains 15% nitrogen, 12 % phosphorus and 6% potassium (leaving 67% filler).

If you want to apply 30#of nitrogen/ acre, how many pounds of fertilizer do you apply on each acre? How much phosphorus and potassium will you also apply? If you have 10 acres to fertilize, how much fertilizer should you buy?

(Hint: Think in terms of 100#, because then the percentages are the same as actual pounds.) An acre is 43,560 square feet, about the size of a football field.

Trade Drives Washington

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

9 Washington Ag products

Products leaving

Products arriving

2 non-ag WA products

Draw a line to match the pesticide with the pest:

Fungicide

Insecticide

Herbicide

Algaecide

Germicide

Rodenticide

Chlorine in a swimming pool kills algae

Hospitals use this to kill germs

Mom uses this to control mold in the shower

Your dog wears a flea collar

Dad uses this to eliminate mice in the garage

A farmer uses this to reduce weeds in his crop

