Minnesota Agriculture in the Classroom
AgMag Exploring Minnesota Agriculture with Today's Youth
Teacher Guide
Volume 29, Issue 2 2014/2015

Why Ag in the Classroom?

Agriculture means survival. Over time, fewer and fewer people have close contact with farming and the total agricultural sector. They're not aware of their own and society's total dependence on agriculture. Our citizens must be agriculturally literate in order to make responsible decisions affecting this giant lifeline.

Teaching students to be agriculturally literate brings their learning to life! Helping students understand the farm-to-table connection is important in our consumer-driven society. That is what the student Minnesota AgMag Series is all about.

Integration Ideas

Social Studies

- Use the information from Minnesota Agriculture: Big Changes in the 1900s (page 7) as the start to creating a historical timeline that illustrates the role of agriculture in Minnesota History.
- Focus on a Minnesota crop such as corn or soybeans and have students research how production techniques have changed throughout history. Examples include: machinery and equipment, research and development of new genetics, herbicides and pesticides, soil and water improvement and conservation techniques.

English Language Arts

- Ask students to identify key ideas and details and build their vocabulary through the AgMag's informational text.
- Use agriculture as an inspiration for creative writing activities and group discussions. Ideas: Stories from the points of view of plants or animals that depend on humans; predictions for agriculture in 2050 (or future years); letters to children in other countries with descriptions about agriculture here and questions about agriculture there.

Science and Math

- Identify the STEM involved in producing corn and soybeans in Minnesota (pages 4-5) and using the components of the soybean seeds and corn kernels in the products we use every day.
- Utilize and expand the graph and chart on page 8.

Glossary

Some words in your AgMag may be unfamiliar to your students. These words often appear in bold type or in italics. Many are defined in the articles. Words you might wish to pre-teach are **consumers, interdependent** (cover); **raw materials, natural and renewable resources, agriculture cycle, livestock** (pages 2-3); **cash crops, combine, biofuel, ethanol, biodegrade** (pages 4-5); **beef cattle, dairy cattle** (page 6), **diversified farming, hybrid seeds, commercial fertilizers, crop protection chemicals** (page 7), **populous, less developed countries, developed countries, genetics** (page 8).

MINNESOTA AGRICULTURE IN THE CLASSROOM

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www.mda.state.mn.us/maitc

New! ***Food for Thought: Connecting Geography with Agriculture*** (Includes 18 standards-based K-12 lessons, 44 maps and handy student desk map)

New! ***Biofuels as Renewable Energy: Exploring the Present and Future*** (New DVD with six stories is a great addition to your science curriculum)

Both resources are FREE!
Order online at **www.mda.state.mn.us**

Minnesota K–12 Academic Standards

Subject	Standard Code	Benchmark
Social Studies	4.2.3.3.1	Describe the productivity of a resource and describe ways to increase it.
Social Studies	6.2.4.5.1	Describe the movement of goods and services, resources and money through markets in a market-based economy.
Social Studies	6.3.4.10.1	Describe how land was used during different time periods in Minnesota history; explain how and why land use has changed over time.
Social Studies	6.4.4.23.2	Identify the major Minnesota political figures, ideas and industries that have shaped or continue to shape Minnesota and the United States today.
Science	5.4.1.1.1	Describe how plants and animal structures and their functions provide an advantage for survival in a given natural system.
Math	5.2.1.1	Create and use rulers, tables, spreadsheets and graphs to describe patterns of change and solve problems.
English Language Arts	6.5.1.1	Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

Enhance and extend your AgMag with interactive activities. Google AgMag Interactive to learn more!

Visit us at **www.mda.state.mn.us/maitc**
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Discussion Prompters

Cover (Social Studies)

1. What makes "Agriculture, the Land, and You" a good title for this page? (*Each of the products mentioned in the article and many shown in the photos started out with a connection to the land, the soil. They end up being used by people.*)
2. What connections to agriculture do you see in these photos? (*Food, clothing, products in grocery store, sports equipment, combine, newspaper and notebook paper.*)

Student Pages 2 and 3 (Social Studies, Economics, Science)

1. How many things in your classroom came from agriculture?
2. What have you eaten or worn today that came from an animal? A tree or plant? The soil? Which came from beef or dairy cattle? From pigs? Corn or soybeans?
3. Why do we say agriculture depends on natural and renewable resources? (*The agricultural products that are produced, processed and distributed all are dependent on soil, sun, air and water in some way. Animals and plants are considered renewable resources*.)
4. What foods do NOT come from plants and animals? (*Mushrooms and yeast are fungi, not plants.*)

Student Pages 4 and 5 (Science, Social Studies, Economics)

1. Crops and livestock are the foundation of Minnesota agriculture. How is our ability to grow so much corn and soybeans connected to Minnesota's thriving livestock industry? *(Corn and soybean crops provide the basic ingredients of livestock feed. Locally grown food is more convenient and economical for livestock operations. Farmers who grow soybeans and corn have a ready market for their crops.)*
2. How does making ethanol and biofuels from corn and soybeans help ease pressure on the environment? *(Unlike petroleum, which has to be mined from the earth, corn and soybeans are renewable resources.)*
3. Soybean and corn farmers in southern Minnesota are usually able to plant and harvest their crops sooner than farmers in northern Minnesota. Why? *(Southern Minnesota is closer to the equator, so weather is warmer.)*

Popcorn box

Student Page 6 (Social Studies, Science)

1. An essential part of every livestock farmer's work is making sure all the animals are well cared for. What does good animal care include? *(Each animal must be kept safe and healthy according to its own needs. This includes nutritious food, fresh water at all times, clean shelter and sleeping spaces, kind treatment, good health monitoring with help from veterinarians when needed, protection against predators and weather extremes, space to move about, etc.)*
2. One hundred years ago, almost every farm in Minnesota had horses. Today, the largest concentration of horses is in the Twin Cities metro area. What might explain this? *(Horses today are used for pleasure, recreation, competitions, etc., rather than for pulling wagons and farm equipment as they were in the past. The urban areas have more people owning horses for pleasure and recreational uses.)*

Student Page 7 (History, Social Studies)

1. What does the population trend since 1950—more people in cities—mean for agriculture? *(More farmland is taken out of production and developed for urban uses. There are more consumers than producers. Production must keep increasing in order to feed everyone. Transportation and distribution of food from farm to table are ever more important. Growing urban populations use more food, clothing, fuel, water and other resources than rural areas. Conserving land, water and energy resources and taking advantage of new technologies to increase food production are ever more important. Developing, marketing, advertising and selling new products becomes bigger business than ever.)*
2. After looking up and defining hybrid seeds, why do you think hybrids are so important in crop production? *(A hybrid is developed from crossbreeding and cross-pollination of two different plants to make a new and improved plant. For example, plant breeders develop hybrids that can resist drought, grow in harsher weather, produce greater yields, and so on. Hybrids also give us a variety of new products. One example is the Sweet Tango apple, a hybrid of Zestar and Honeycrisp apples.*) The University of Minnesota is a national leader in developing hybrid apples!

ANSWERS: AgMag

COVER: See Discussion Prompters above.

AGRICULTURE CYCLE, Pg. 2

1. Producing 2. Processing 3. Distributing
4. Marketing 5. Consuming

- Photos top to bottom: 1, 5, 2, 4, 3
- Products with more steps use more energy, especially in processing. Example: Fresh potatoes are picked, cleaned, graded, packaged and ready for consumers. Potato chips add slicing, baking or frying, seasoning and inspection to the cycle.
- Sun, air, water and soil are the resources from which all agricultural products develop.

GROUP LABELS ACTIVITY, Pg. 5

(Top to bottom, left to right)

- Industrial Products
- Meal and Flour Products
- Oil Products
- Other Soybean and Corn Foods

Many soybean and corn products cross over from one category to another when we try to group them. For example, bakery products use flour and oils. Industrial products use oil and meal.

Questions:

- Read labels to know if food contains soy or corn.
- True—Soybean meal and cornmeal add valuable nutrients to our foods.

TALKING CORN, Pg. 8

What can you infer about where corn and soybeans are grown?
They are often grown in the same states.
These states are also large livestock regions.

WORLD POPULATION GRAPH, Pg. 8

The population growth will be much faster in less developed countries.

ANSWERS: Teacher Guide

SHOW WHAT YOU KNOW s

1. producing, processing, distributing, marketing, consuming
2. b 3. c 4. b 5. b 6. a 7. c 8. b 9. b

Go Figure!

Each soybean plant produces 15 to 25 pods. Each pod contains two or three beans.

- What is the highest number of soybeans one plant could produce?
- About 1,500 soybeans weigh one pound. If a bushel of beans weighs 60 pounds, how many beans are in a bushel?

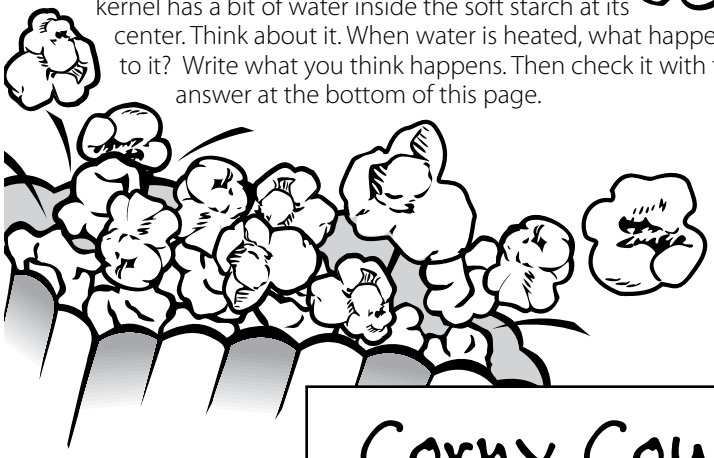
Corny Scramble

Unscramble the following list of food items that contain corn.

nroc seaklf c__ __ __ f__ a __ __ __
cei earcm __ c __ __ __ __ __ m
oads s __ __ __
nuteap ttreub __ e __ __ u __ __ u __ __ e __
upchket k __ __ __ h __ __
alads ingsserd s __ l __ __ d __ e __ __ __ __ g
ylelj __ e __ __ __
alamrowsslhm __ a __ s __ __ __ __ l __ __ s
meanrirga m __ __ g __ __ __ __ __
tcoa hicsp __ a __ o __ __ i __ __

Pop! Pop! Pop!

American Indians were already enjoying popcorn hundreds of years ago. Popcorn was probably made by accident when someone knocked some corn kernels into a fire. Can you imagine the surprise when the kernels exploded? But why does popcorn pop? Each kernel has a bit of water inside the soft starch at its center. Think about it. When water is heated, what happens to it? Write what you think happens. Then check it with the answer at the bottom of this page.



Strawberry Banana Tofu

Smoothie

Makes 4 servings (1/2 cup each)

In this recipe, which ingredient is the soy product packed with nutrients that builds strong muscles and good bones and teeth?

_____

Ingredients:

- 1 package of silken/soft tofu (10.5 oz.)
- 1 small ripe banana
- 1 cup frozen sweetened strawberries, slightly thawed and including juice

Directions:

Combine all ingredients in a blender or food processor and blend until smooth. Serve chilled.

Corny Counting!

Does a cob of corn have an even number of kernel rows, or an odd number? Make a prediction and then test it out. Get several ears of field corn and start counting! Compare results.

My Prediction: _____ **Actual:** _____

Use a ruler to help you estimate the total number of kernels on a cob. (How many kernels are in an inch?) After everyone makes a prediction, count the kernels for an official answer. How did the ruler help in estimating?

Why don't you tell secrets in corn fields?

Too many ears!

ANSWERS

Go Figure: 25 pods times 3 beans = 75 beans
There are about 90,000 beans in a bushel.

Corny Scramble: corn flakes, ice cream, soda, peanut butter, ketchup, salad dressing, jelly, marshmallows, margarine, taco chips

Pop! As the kernel is heated, the water inside gets hot, expanding and building pressure. The harder surface around the soft starchy center finally explodes. Popcorn!

Corny Counting: An ear of corn has an even number of kernel rows. Average number of kernels is 600-800 per ear.

Note to Teachers:

You are encouraged to send the Pretest and Post-test results to Minnesota Ag in the Classroom to help document student learning. Use the attached postage-paid evaluation card.

Name _____

Check one ☐ Pretest ☐ Post-test

Show what you know!

Take this short quiz before you read your AgMag, then again after reading the magazine. See the improvement!

1. Name five steps in an agriculture cycle.

a. _____ b. _____ c. _____ d. _____ e. _____

2. These are the source of food for every other living thing.

a. animals b. plants c. fungi

3. More than half the world's population depends on this plant for a daily meal.

a. wheat b. corn c. rice

4. How many people are living in the world today?

a. over three million b. about seven billion c. over twenty million

5. The Dust Bowl of the 1930s was caused by

a. floods and tornados.
b. drought and wind erosion of soil.
c. hot, humid weather.

6. Corn can be made into ethanol, which is a renewable

a. fuel. b. food for farm animals. c. plant fertilizer.

7. Henry Ford once built a car from

a. rubber. b. aluminum foil. c. soybeans.

8. The world's most populous countries are

a. Japan and Russia.
b. China and India.
c. Argentina and Brazil.

9. Minnesota has thousands of horses. The majority of them live

a. in the Red River Valley.
b. in the metropolitan Minneapolis-St Paul area.
c. in southwestern Minnesota.

Minnesota AgMag and Teacher Guide is a publication of Minnesota Agriculture in the Classroom. Minnesota Agriculture in the Classroom is a public/private partnership between the Minnesota Department of Agriculture and the Minnesota Agriculture in the Classroom Foundation. MAITC Program Staff: Al Withers and Sue Knott. The publication is developed and written by Jan Hoppe, B.S. and Jane Duden, B.S. Both are experienced educators and educational materials developers. Design, layout and production are by Northern Design Group.