

Why Agriculture?

Teaching about agriculture in is an ideal way for students to learn and provides real-life connections to science, math, and social studies concepts. Agriculture is a topic that students can easily connect to because they encounter it often. Who doesn't enjoy talking about food? Nearly everything we eat, wear, use -- even the fuel that powers the cars and buses they ride in -- comes from plants and animals grown on farms. Agriculture provides perfect real-world connections to STEM and makes learning relevant to students.

Helping students understand the farm-to-table connection is important in our consumer-driven society. Teaching students to be agriculturally literate connects their learning to everyday life. That is what the *Ag Today* series is all about.

About Ag Today

Ag Today is a great supplement to your science, social studies, and language arts curriculum. Each issue is chock-full of discussion topics, new vocabulary, and other materials that you can easily integrate into lessons. Major highlights of each issue include:

Theme: **Agriculture is Everywhere**

- Overview of Agriculture
- Major agriculture crops and livestock
- Agriculture products
- Agricultural careers

Theme: **Food, Health & Lifestyle**

- Carbohydrates, proteins, fats, minerals, vitamins, and water
- USDA My Plate
- Safe food handling

Theme: **Agriculture and the Environment**

- Natural resource management
- Agriculture in global ecosystems

Theme: **Culture, Society, Economy & Geography**

- Agriculture and the development of civilizations
- Geography determines what things will grow
- Religion and customs dictate culture
- Global trade and economics

Theme: **Plants & Animals for Food, Fiber & Energy**

- Domestication of plants and animals
- What plants and animals need to grow
- Biotechnology

Theme: **Science, Technology, Engineering & Math**

- Science and technology to increase food production
- Safe, healthy, abundant food
- Sustainable systems for a growing population

Integration Ideas

A few ideas to make the most of *Ag Today* in your classroom!

Science

- As a class, create a model comparing plowing (bare soil), cover crops and no-till. Visit <http://ow.ly/SnXLs> for instructions.
- Ask students to interview farmers or conduct research about soil and water conservation practices on their farm. Write a paragraph describing specifically what the conservation practice does (cause) and what effect the practice is having.
- Create a model of a watershed using a crumpled piece of paper and washable markers. Ask students to identify the best places for agriculture, recreation, industry, and housing in the watershed and explain their reasoning. Visit <http://ow.ly/So1As> for instructions.

Social Studies

- Create a timeline using the photos on page 6. Add more photos to show tillage tools used by the Native Americans in the 1700s and by farmers in the 1980s.

Language Arts

- Ask students to list reasons and evidence to support the statement, "Technology helps farmers protect the environment."
- Ask students to annotate or make "thinking tracks" in the margins as they read *Ag Today* jotting down thoughts and questions. Then discuss their thinking tracks in small groups.

Alignment with Standards and Lexile

Subject	Code	Lexile Measure = 810L
		Essential Concept and Skill
Science	4-LS1-1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
Science	4-ESS2-1	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
Science	4-ESS3-1	Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
Science	5-PS3-1	Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.
Social Studies	History: 3D	The student understands the interactions among all these groups throughout the history of his or her state.
Social Studies	History: 2A	The history of students' own local community and how communities in North America varied long ago.
Social Studies	NCSS: PPE3	Learners will develop their spatial views and perspectives of the world, and to understand the relationships between people, places, and environments. Learners examine where people, places, and resources are located, why they are there, and why this matters; they explore the effects of the environment on human activities, and the impact of these activities on the environment.

Glossary

Some words in *Ag Today* may be unfamiliar to your students. These words often appear in bold type. Many are defined in the articles. Words you might wish to review with your students after reading the magazine are: **ecosystem**, **climate**, **pasture** (pg. 1), **watershed** (pg. 2), **global positioning system**, **soil maps** (pg. 3), **water erosion**, **wind erosion**, **nitrogen**, **cover crops**, **no-till**, **microorganisms**, **terraces**, **contour farming**, **buffer zones**, **bioreactor** (pgs. 4-5), **cultivated**, **conservation tillage** (pg. 6), **aquaculture** (pg. 7).

Discussion Prompters

Cover (Our Invaluable Natural Resources)

1. Can you describe what an ecosystem is? How does climate affect what crops can be grown? (*Desserts have different plants and animals than forests or grasslands. Living things are adapted to their environment.*)
2. Sun, Soil, Water and Air and four important natural resources. Can you name others? (*Other natural resources might include forests, prairie, wildlife, etc.*)

Student Page 2 (Water, Water)

1. What happens if a plant doesn't have enough water? (*Nutrients can't be transported through from the roots to the leaves. The plant can wilt and die.*)
2. What are some products that soybeans are used to make? (*crayons, newspaper ink, shampoo, paint, plastics, biodiesel, chocolate, vegetable oil, etc.*)
3. Can you name a watershed in your area? (*Answers will vary. Any creek, river, lake, or other body of water will have its own watershed and be part of a larger watershed.*)

Student Page 3 (Farming Goes Digital)

1. How does GPS help farmers know where they are? (*GPS uses satellites to triangulate a position on the Earth*)
2. How can using GPS help farmers? (*Maps of fields tell farmers where to apply fertilizer, and spray crop protectants. GPS can help drive tractors automatically.*)

Student Pages 4 and 5 (Farmers care about water and soil)

1. What are two of the biggest problems that farmers face with soil? (*water erosion and wind erosion*)
2. Nitrogen is essential to plant growth. Excess nitrogen can run off of fields. Why is that problematic? (*Excess nitrates in water can cause algal blooms and change habitat for other species. Excess nitrogen (nitrates) in drinking water can be harmful to humans.*)
3. What types of crops are typically planted as cover crops? (*Farmers want to use fast growing plants that establish easily. Often times rye, radishes, or clover are used.*)
4. Can you describe a terrace? (*It is a manmade landform that separates to areas of different elevation. By reducing the slope of a hillside with a terrace a farmer can reduce the speed water runs off*)
5. How do bioreactors work? (*Wood chips are buried under ground at the edge of a field. Bacteria that live in the wood chips convert nitrates that run off the field in water into harmless nitrogen released into the air.*)

Student Page 6 (Change Over Time)

1. What is the biggest change in farming over the past 200 years? (*Mechanization allows for farmers to be more efficient and plant larger fields in less time.*)
2. Plows were designed to turn soil over. How is plowing soil different from tilling soil? (*Most farmers use minimal tillage or no-till practices. Instead of breaking up the soil and turning it over, these conservation tillage practices plant seeds without breaking up the soil and extensively disturbing it.*)
3. One of the early pioneers of the plow was a blacksmith named John Deere. How has the John Deere company evolved over the past 150+ years? (*They produce a wide range of farm implements including tractors, planters, and more. All of their machinery is high tech and is designed to make farming easy and efficient.*)

Student Page 7 (Farming Fish)

1. What are some benefits from farming fish? (*reduce pressure on wild populations, accelerate growth, raise fish inland, help restock wild populations*)
2. What species are farmed in the U.S.? (*shrimp, catfish, tilapia, barramundi, bluegill, trout*)
3. What does an aquaculture technician do? (*feeds fish, takes water samples, and keeps equipment running*)

Student Page 8 (Looking to the future...)

1. How can farmers reduce the amount of soil run off? (*plant cover crops, use no-till, use terraces, etc.*)
2. Are cover crops worth the extra expense? (*each farmer has to decide if they can afford to plant cover crops*)
3. Can grazing rotations help improve plants? (*in many cases rotational grazing systems to improve plant health*)
4. Will seed technology allow for less pesticides? (*for corn with the Bt gene, farmers don't need to spray insecticides because the gene protects the plant from the corn borer rootworm*)
5. Can manure act as a fertilizer? (*Yes! After manure is added to a field farmers should measure the nitrogen in the soil to determine how much more nitrogen should be added*)
6. How can farmers keep water in the rivers clean? (*Farmers can plant buffer strips or cover crops, use bioreactors and terraces*)

Show what you know - Key

1. Watershed
2. Soil, weather, and topography can affect what types of organisms live in a specific ecosystem
3. Animals/humans = oxygen, plants = carbon dioxide
4. Crayons, newspaper, ink, shampoo, paint, plastics, etc.
5. Designs tools (equipment, computer software, etc.) to help farmers.
6. 178
7. False
8. Planting seeds directly into unbroken soil (not tilling or plowing)
9. C. Tuna
10. Global Positioning System

Name: _____

Check one: Pretest

Post-test

Show what you know!

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

1.

What is the area of land that water drains off of and into a lake or stream called?

2.

Explain in your own words what makes one ecosystem different from another.

3.

What gas in the atmosphere do humans breathe in? _____ Which gas do plants take in? _____

4.

Name two products made from soybeans? _____ and

5.

Explain what an agriculture engineer does in their job.

6.

In 1837 a blacksmith named John Deere made a plow out of steel. How many years ago was that if it is 2017 now? Show your thinking process.

7.

Having too much nitrogen in lakes and rivers is really not harmful to humans. Circle one:
True False

8.

In your own words describe no-till farming.

9.

Aquaculture is fish and shellfish farming. Which of the following are not raised in the U.S.?

A. Pike B. Shrimp C. Tuna

10.

What does the acronym GPS stand for? _____

Name: _____

Watershed Uses

Conduct research to identify at least one specific example of agricultural, industrial, residential and recreational land uses. Use an X to mark them on the map below. Label the business, recreation area, city, or farm.

Mississippi River Watershed



Pretend you are the owner of a new business and want to build near the one of the rivers that feed into the Mississippi. In the space below, or on a separate sheet of paper write a persuasive letter to the watershed board describing why your business should be granted permission to build. Include how you will use water and outline your plans to conserve and protect soil and water in the watershed.