



MINNESOTA
Agriculture in the Classroom

AGMAG Teacher Guide



AgMag 4th Grade - Fall Edition

ABOUT YOUR AGMAG

In 1985, the Minnesota Agriculture in the Classroom program (MAITC), is a unique public/private partnership between the Minnesota Department of Agriculture and the MAITC Foundation. The program goal is to advance agricultural literacy to all learners, especially K-12 students, and educators. MAITC's mission is "to promote understanding and awareness of the importance of agriculture."

We are pleased to offer the free AgMag series for kindergarten through 6th grade. Each issue is written and targeted to each specific grade level. The magazine is sent early in the school year for beginning readers. Teachers can use it when the reading level of their students matches the reading level of the magazine. We publish two issues each school year, in October and March. Enjoy!

Why Ag in the Classroom?

Previously, people were very aware of the role agriculture played in their lives—it meant survival. Nearly everyone—men, women, and children—worked the land.

Agriculture still means survival. That will never change. But as time goes on, fewer people have close contact with farming. They're not aware of their own—and the nation's—total dependence on agriculture. Think about it:

- **Fewer than 2 out of 100 Americans work directly in production agriculture (farming). This small group meets the food and fiber needs of the nation as well as many people abroad.**
- **Agriculture, along with its related occupations, is one of the nation's largest industries. It generates billions of dollars each year; one out of every five jobs depends on it in some way.**

Agriculture is constantly changing. But one thing remains the same: Agriculture is a vital part of your day! Even as early as the primary grades, it's important for students to gain an understanding and appreciation for the ways agriculture touches their lives, each and every day. Food doesn't magically appear in the grocery store or on the kitchen table. It all starts with agriculture.

AgMag 4 Fall Issue Theme: Agriculture is Every

- What is Agriculture?
- What Grows Where?
- Farming Across Minnesota
- The Science Behind an Apple
- Apple Taste Testing
- State Symbols & Agriculture

MINNESOTA ACADEMIC STANDARDS CONNECTION

SUBJECT	STANDARD CODE	BENCHMARK
Social Studies	4.2.11.1	Explain how a nation's resources influence the goods and services it can produce and why people in different cultures, regions or countries may make different decisions about resource use.
Social Studies	4.2.10.1	Explain what it means for a resource to be productive and how productivity can increase.
Social Studies	4.3.14.2	Describe physical and human characteristics needed for different types of agricultural and energy production regions.
Science	4L.4.2.1.2	Obtain information from various media sources to determine that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.
English Language Arts	4.2.3.3	Explain events, procedures, ideas, or concepts in a historical, scientific or technical text, including what happened and why based on specific information in the text.

GLOSSARY

Some words in your AgMag may be unfamiliar to your students. Many are defined in the articles. There is also a glossary on the AgMag website: <https://mnagmag.org/ag-terms-glossary/>. Words you might wish to pre-teach are:

Agriculture

Growing plants and raising animals that people use for food, clothing and many other things every day. It's also harvesting those farm products and getting them to us so we can use them. Agriculture is the industry that grows, harvests, processes, and brings us food, fiber, fish, forests, sod, landscaping materials, and more. It uses soil, water, sun, and air to produce its products. The process starts on farms, orchards, gardens, and ranches with the growing and harvesting of crops and livestock, then moves to processing plants before finally traveling as finished products to stores, farm markets, lumberyards, greenhouses, and more, where consumers buy the products. Agriculture is connected in some way with almost everything we eat, wear, and use.

Quote from an Unknown Source: "Agriculture is not simply farming. It's the supermarket, the equipment factory, the trucking system, the overseas shipping industry, the scientist's laboratory, the houses we live in, and much more. It affects the air we breathe, the ground we walk on, the water we drink, and the food we eat."

Acre

An acre is an area of land that is 43,560 square feet.

Bushel

A measure of capacity equal to 64 US pints (equivalent to 35.2 liters), used for dry goods. For wheat, one bushel equals 60 pounds of wheat or approximately one million wheat kernels. A common semi-truck grain hopper can hold approximately 1,000 bushels of wheat—or 60,000 pounds of wheat in a single load.

Climate

The long-term patterns of weather in a particular area or region. Temperature, air pressure, humidity, precipitation, sunshine, cloudiness, and wind all impact the climate.

Cultivate

To cultivate is to nurture and help grow. Wild rice is grown in the wild, whereas cultivated wild rice is grown under regulated conditions in man-made paddies.

Culvert

A culvert is a structure that allows water to flow under a road, field, or similar obstruction from one side to the other. Typically embedded so as to be surrounded by soil, a culvert may be made from a pipe, reinforced concrete or other material.

Distribution

Getting products from farms to consumers.

Fiber

The raw material from plants and animals, like cotton and wool, which are used to make cloth, rope, and more.

Grafting

Joining part of one plant to another so they grow together.

Grazing:

When animals eat grass, weeds, or other plants growing on the land.

Growing Season

Period of the year that is warm enough for plants to grow.

Heredity

The passing of traits from parent plants or animals to their offspring.

Livestock

Farm animals (including poultry) raised for food, clothing, and other products or uses.

Industry

The businesses, organizations and people that provide a particular product or service.

Inputs

The materials, time, and money required so a business/farm/entity can function.

Landscaping Materials

Vegetative materials such as trees, shrubs, perennial plants, and annual plants used to decorate the outside of a home, business, or outdoor area.

Outputs

The amount of something produced by a person, machine, or industry. For farmers, outputs are things like crops or livestock.

Pasture:

Land covered with grass or plants where animals can graze.

Plant Breeder

A scientist who focuses on changing the traits of plants in order to produce designed characteristics.

Pollination

The movement of pollen from one flower to another.

Soil Types

Soils are differentiated by the amount of sand, silt, and clay particles present. This is called soil texture. The soil texture affects the soil's ability to hold moisture, nutrients, and air. These factors influence the conditions needed for plant growth.

Precipitation

Rain and snow.

Processing

Changing raw materials into many different things.

Production

Growing and harvesting plants or raising farm animals.

Productive

Able to help make or grow something useful.

Terrain

The physical features of an area including elevation, slope, vegetation, and surface material. Terrain affects water movement and drainage characteristics, and it can also affect weather and climate patterns.

Trait

A distinguishing characteristics or quality.

Turf

The upper surface of soil that is made up of grass and plant roots.

AGMAG COVER: AGRICULTURE: HELPING YOU EVERY DAY!

Discussion Prompts

- Agriculture is everywhere. What are the agriculture connections on this page? (Bike, backpack, etc). Can you think of any other examples of how you've connected with agriculture today?
- Why is it important for all people to know about agriculture? (We all depend on agriculture for food, clothing, and shelter. It's important to understand how our needs are supplied as we make decisions about using land, protecting resources, keeping food safe, and much more.)

Connecting to Agriculture

Your students may need a little guidance in connecting the everyday items they use to a raw agriculture product. Draw a diagram on the board that connects an item to agriculture.

- Ex: Bike tires → rubber shaped and molded in a factory → made from natural rubber (latex) → harvested from rubber tree plantations
- Ex: Backpack → woven and stitched in a textile mill → made from natural cotton fibers → grown and harvested in a cotton field

Define:

Because agriculture related words may be new to some of your students, make sure to go over their definitions:

Agriculture

Agriculture is making things that grow on farms, like plants and animals, into things that we use.

PAGE 2: WHAT IS AGRICULTURE?

Discussion Prompts:

- 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? Hogs? Poultry?
- Why do we say agriculture depends on natural and renewable resources? (The things 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.)

Minnesota Grown Discussion Prompts:

- Why is soil type important for farming? Different plants require different types of soil to grow. Because Minnesota has areas with diverse types of soils, Minnesota is able to grow many different kinds of crops.
- Minnesota is a leading producer of many crops and livestock products. Have you ever seen any of the crops in the word search growing? What did they look like?

Word Search Answer Key:

Use the word search on page 2 of the AgMag.

PAGE 3: WHAT GROWS WHERE?

DISCUSSION PROMPTS:

1. **What physical features of Minnesota make it a good state for agriculture?**
 - a. *Variety of terrain and soil types, climate, rainfall, and weather.*
2. **What makes the Northwest area a good place for crops such as wheat, oats, barley, soybeans, sunflowers, sugar beets, kidney beans, and potatoes?**
 - a. *Flat land, fertile prairie soils, and growing conditions that fit these crops.*
3. **Which growing region has a main crop that people may not always think of as agriculture? Explain your answer.**
 - a. *The Northeast. Forests are an agricultural resource, and people can grow and harvest trees for many products.*
4. **In what weather situations can farmers do things to protect their crops and animals?**
 - a. *Farmers can plan for cold, wet, or dry weather by choosing when to plant, water, or harvest. Farmers cannot control storms, hail, floods, drought, wildfires, or frost.*
5. **Discuss annual precipitation as an average of data collected over many years.**
 - a. *Too much rain can flood fields, and too little rain can dry out crops. Frost, floods, and droughts can damage plants. When fewer crops grow, there may be less food to sell, and prices can go up.*

Matching Answers:

1. **B**
2. **D**
3. **C**
4. **A**

PAGES 4-5: FARMING ACROSS MINNESOTA

Today's farmers and agriculture experts in Minnesota have different backgrounds and use different resources to grow crops and raise animals. Farmers use natural resources such as soil, water, land, and climate. They also use knowledge, skills, tools, technology, and nearby businesses.

This section introduces students to three Minnesota farms: **Red Lake Buffalo Ranch, Radman Family Farm, and Moose Livestock Goat Grazing**. As students read, ask them to notice how the resources available in each part of Minnesota affect what the farms grow, raise, or produce.

Discussion Prompts:

Have students answer these questions about each farm:

- **Where is the farm located?**
- **What does the farm grow or raise?**
- **What natural resources does the farm use?**
- **What knowledge, skills, tools, or technology help the farmer?**
- **What makes that part of Minnesota a good place for this type of agriculture?**
- **How does the farm use its resources to stay productive?**

Think & Discuss:

Use the questions from the AgMag:

- How do the soil, water, land, and weather help each farm grow crops or raise animals?
- What skills, tools, buildings, or nearby businesses help each farm do its work?
- What does each farm do to keep its land and other resources healthy for the future?

Activity Idea:

Assign students to work in pairs or small groups. Give each group one of the three farms. Have students make a list of the resources the farm uses and explain how each resource helps the farm. Have groups compare their findings. Discuss why the three farms use some of the same resources but also need different resources.

PAGE 6: THE SCIENCE BEHIND AN APPLE

Background Information

Students may already know that apples come in many colors, sizes, flavors, and textures. These differences are examples of **traits**.

Traits can be passed from parent plants to new plants. This is called **heredity**. Apple breeders use their knowledge of traits and heredity to develop new apple varieties.

Breeders choose parent trees with traits they want, such as crispness, flavor, size, or how long the apple stays fresh. They move pollen from one parent tree to the flowers of another. Seeds from the apples can then grow into new trees. Because each seed has a different combination of traits from its parent trees, each new tree may be different.

Discussion Prompts:

1. What is a trait? What traits can you observe in an apple?

- A trait is a characteristic—a feature that describes how something looks, feels, or tastes. You can observe traits like its color (bright red, yellow, or green), size, shape, how crunchy it sounds when you bite it, and whether it tastes sweet or sour.

2. Why do apple breeders choose parent trees with different traits?

- Breeder trees act like matchmakers. They pick trees with different traits to create a new apple that has the best features from both parents, like combining extra sweet flavor with extra crunch.

3. Why might apple trees grown from seeds be different from their parent trees?

- Each seed gets a mix of features from two parent trees. Just like kids look a little like both parents but aren't exact copies, a seed grows into a completely new apple tree.

4. What traits do you think people want in an apple?

- Consumers want apples that are juicy, sweet, and crunchy. Farmers want trees that stay healthy, grow lots of fruit, and do not bruise easily when shipped to stores.

5. If you were an apple breeder, which two traits would you choose for a new apple variety?

A Minnesota Favorite: Honeycrisp

The Honeycrisp apple was developed through the University of Minnesota apple breeding program. Honeycrisp is known for its juicy crunch and sweet-tart taste. It was also developed to survive Minnesota winters.

Ask students:

- **Why would surviving Minnesota winters be an important trait?**
 - *Minnesota winters get extremely cold. If an apple tree cannot survive freezing temperatures, it will freeze, die, and produce no fruit. Breeders need winter-hardy trees so farmers can grow apples year after year.*
- **What Honeycrisp traits do you notice when you eat one?**
 - *When you bite into a Honeycrisp, you notice its famous explosive crunch, lots of juice, and thin skin. It also has a balanced taste that is both sweet and tart.*

Growing More Honeycrisp Trees

Once breeders find an apple with traits they want, farmers use **grafting** to grow more trees with those same traits.

With grafting, a small bud or branch from one apple tree is joined to another tree. The pieces grow together, and the new tree can produce apples with the same traits as the original variety.

Think & Discuss:

- **Why might apples grown from seeds be different from their parent apples?**
 - *Every seed gets a mix of traits from two parent trees. Just like you do not look exactly like your parents, a seed grows into a completely new apple tree. It will not make the exact same apple.*
- **Why do farmers use grafting to grow more Honeycrisp trees?**
 - *Honeycrisp seeds do not grow true Honeycrisp apples. Farmers use grafting by cutting a branch from a Honeycrisp tree and attaching it to a new tree. This makes an exact copy so every apple grows sweet and crunchy.*

Activity Idea:

Have students complete the **Think Like an Apple Breeder** activity in the AgMag. Ask them to choose two traits they would want in a new apple variety and explain why they chose them.

PAGE 7: APPLE TASTE TESTING

Background Information

Apple varieties have different traits. Students can observe these differences by comparing color, size, shape, flavor, and texture.

The **Apple Taste Testing** activity gives students a chance to make observations, predictions, and comparisons. It also connects back to page 6 because many of the traits students notice are the same traits apple breeders study.

Discussion Prompts:

Before tasting:

- What differences do you notice between the apple varieties?
- Which apple do you predict will be the sweetest?
- Which do you predict will be the most tart or crisp?
- What observations helped you make your prediction?

After tasting:

- Which variety did you like best? Why?
- Did everyone prefer the same variety?
- What traits made each apple different?
- How could knowing what people like about apples help an apple breeder?

Apple Tasting Activity:

Have students follow the **Observe the Apples, Make a Prediction, and Taste and Compare** steps in the AgMag.

Have students record their observations using the **Apple Tasting Chart** created for this activity.

If possible, include Honeycrisp as one of the varieties so students can compare Minnesota's state fruit with other apples. To help students notice differences in traits, choose apples with different colors, flavors, and textures. For example, teachers or families might compare Honeycrisp with a tart apple, a softer apple, or an apple with a different skin color. Apple varieties can vary by store and season, so use what is available locally.

Before beginning any food tasting activity, follow your school's food allergy and food safety procedures.

PAGE 8: STATE SYMBOLS AND AGRICULTURE

Discussion Prompts:

1. How do symbols communicate ideas more quickly than written words?
2. What is meant by the old saying, "A picture is worth a thousand words"?
3. What are some slogans or sayings that represent Minnesota? ("Land of 10,000 Lakes," "the Gopher State," "the North Star State," or the "Star of the North")

Take the [Minnesota State Symbols game quiz](https://www.house.mn.gov/hinfo/StateFair3/) on the Minnesota House of Representatives website. (<https://www.house.mn.gov/hinfo/StateFair3/>)

Additional Information About State Symbols:

- Wild rice is hand-harvested in lakes and marshes. Cultivated wild rice is planted in water-filled paddies and harvested by machines.
- Honeycrisp apples were developed at the University of Minnesota by apple breeders. Students can connect this state symbol back to what they learned about apple breeding on page 6.
- Red (Norway) pine trees live an average of 250 years.

Did You Know? Rusty Patched Bumblebee

For additional information on the Rusty Patched Bumblebee, check out this [article](https://www.mprnews.org/story/2019/05/31/bombus-affinis-meet-the-rusty-patched-bumblebee-new-state-bee-minnesota).

(<https://www.mprnews.org/story/2019/05/31/bombus-affinis-meet-the-rusty-patched-bumblebee-new-state-bee-minnesota>)

Name the Symbol Answers:

- **State Flower:** *Pink and white lady slipper*
- **State Bird:** *Common Loon*
- **State Fish:** *Walleye*

LESSONS

Curriculum Matrix Lessons

(<https://minnesota.agclassroom.org/matrix/>)

Searchable database of over 500 lesson plans and resources. All lessons are agriculture focused and aligned with Minnesota academic standards.

Source Search

(<https://minnesota.agclassroom.org/matrix/lessons/5/>)

Students determine that agriculture provides nearly all of the products we rely on in any given day by participating in a relay where they match an everyday item with its “source.”

Food For Thought

(<https://minnesota.agclassroom.org/educator-center/food-for-thought/lesson35-agregions/>)

Students learn about the different agriculture growing regions in Minnesota. Minnesota’s vegetation regions offer distinct soils, and growing patterns for different types of crops. These regions have influenced the development of cities and transportation systems throughout the Midwest.

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The following page is a printable resource to display in your classroom alongside the lesson.



“Agriculture is not simply farming. It’s the supermarket, the equipment factory, the trucking system, the overseas shipping industry, the scientist’s laboratory, the houses we live in, and much more. It affects the air we breathe, the ground we walk on, the water we drink, and the food we eat.”

-Quote from an Unknown Source