



# Teacher Guide

Volume 20, Issue 3 2005/2006

Happy 20<sup>th</sup> Birthday AgMag!

## About Your AgMag

Your AgMag is distributed primarily to teachers in grades studying Minnesota (usually fourth or sixth). If the magazine fits better into the curriculum program at another grade level, we encourage you to pass the material on to the appropriate teachers. Offered at no cost to you, the AgMag is a product of Minnesota Agriculture in the Classroom. Here is your third and final Minnesota Agriculture Magazine for the 2005-2006 school year. This issue of your AgMag is designed to help you:

- provide students with a base of information for identifying and understanding the connections between agriculture and natural resources
- foster a stewardship ethic toward land, water and air
- show some of the ways native plants and rain gardens protect the environment
- develop awareness and make connections between Minnesota's soil types and vegetation regions
- give students a glimpse of how the land was formed and the role glacial activity played in our state's agricultural productivity
- describe immigrant patterns in Minnesota and how immigrants are affecting agriculture.

## Academic Standards Connection

The student Minnesota AgMag and other educational materials from Minnesota Agriculture in the Classroom can meet many of the new academic standards. These materials can serve as a wonderful "real life" connection and supporting piece as you incorporate the standards into your classroom activities. Here are a few examples of potential connections:

### SOCIAL STUDIES

**(Geography Strand) Standard:** The student will identify and locate geographic features associated with the development of Minnesota..

**(Geography Strand) Standard:** The student will identify examples of the changing relationships between the patterns of settlement of land use in Minnesota..

### SCIENCE:

**(History and Nature of Science Strand) Standard:** The student will understand how science is used to investigate interactions between people and the natural world.

### LANGUAGE ARTS

**(Reading and Literature Strand) Standard:** The student will use a variety of strategies to expand reading, listening and speaking vocabularies.

## Hello out There (Resources)

*Additional opportunities to enhance your AgMag use and to help you implement the academic standards.*

### MINNESOTA AGRICULTURE IN THE CLASSROOM

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*Visit this web site to find great educational resources for classroom integration.*

[www.agclassroom.org](http://www.agclassroom.org)



### New Photo CD Now Available!

Are you looking for some great pictures of Minnesota agriculture? Consider ordering our new FREE "Minnesota Agriculture Images CD" featuring 150 great images. Seeing is believing! All images are courtesy of the University of Minnesota Agricultural Experiment Station. Contact Al Withers or order online from M-AITC.

### FOOD FOR THOUGHT; A GEOGRAPHY OF MINNESOTA AGRICULTURE

*A Standards-Based K-12 Curriculum*

Order FREE today! Food for Thought mapping curriculum includes a full-color desk map for each of your students, plus a 72-page Teacher Guide with nine geography lessons and 36 black-line master maps. All lessons are written to support the new social studies academic standards. Co-sponsored by the Minnesota Alliance for Geographic Education. Great for grades 4-8 geography. Order online at the Minnesota Ag in the Classroom website at [www.mda.state.mn.us/maitc](http://www.mda.state.mn.us/maitc).

### AGRICULTURAL CHILDREN'S LITERATURE "BOOK BUNDLE"

M-AITC now offers a unique collection of children's books that focus on plants, animals, food, fiber and gardening. This 22-title book bundle has been assembled for your convenience. Great for classroom or library use. Most are factual, non-fiction titles. List price is \$370 but is now available to you at a special price of \$285 plus \$14.25 shipping and handling. Order online at the Minnesota Ag in the Classroom website at [www.mda.state.mn.us/maitc](http://www.mda.state.mn.us/maitc).

### MINNESOTA PROJECT FOOD, LAND AND PEOPLE

*55-lesson "Resources for Learning" Second Edition Teacher Handbook*

Modeled after the nationally acclaimed Projects Learning Tree, Wild and Wet, you'll love the diversity and scope of these lessons (950- page book). Available through a nominal cost six-hour workshop (preferred) or for direct purchase at \$60 postage-paid.

Interested in attending or helping to organize a workshop in your school district?

Contact: Susan Anderson at [sandband@rconnect.com](mailto:sandband@rconnect.com)

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## In This Guide: Don't Miss...

- SHOW WHAT YOU KNOW pretest and post-test on page 6. Check your students' knowledge of key agricultural concepts before and after reading the AgMag.
- Discussion prompters, background information, extended activities and answers.
- Reproducible activities designed to increase understanding of Minnesota's soil types and water sheds.

## Glossary

Each AgMag contains several words that may be unfamiliar to your students. You may wish to preteach these words, or take time to define them as they appear throughout the magazine. In most cases, the words appear in bold type and/or are defined in the magazine. Highlighted words in this issue are: **sand, silt clay, strip cropping, photosynthesis, aquatic, pollution, prevailing winds, erosion, perennial** (pages 2 and 3); **glacial till, moraines, biomes, peatlands, peat** (pages 4 and 5); **native plants** (page 6); **immigrants** (page 7).

## Integration

Your AgMag materials are created by experienced classroom teachers. An Editorial Review Committee of teachers and subject matter experts provides content ideas and reviews each issue for accuracy and relevance.

Some teachers use the magazine as a separate lesson; others integrate magazine content into specific areas of the curriculum. The subject matter and skills listed will help you select appropriate agricultural activities to integrate into other curriculum areas.

**Language Arts, Reading:** Use the articles and activities to develop a variety of skills: outlining, reading for the main idea, vocabulary development and spelling words (bold words).

**Social Studies:** After reading pages 2 and 3, invite students to tell about things they are doing to help the environment. Encourage ideas about things they would like to study or projects they would like to take on to further help and understand the environment. Some of their ideas will bridge into science and other areas.

**Geography:** See maps on pages 4 and 5 in AgMag and reproducible page 5 in this Teacher Guide.

**Science, Environmental Education:** The entire AgMag is directed toward environmental education. See pages 4 and 5 for glacial effects, soil types and more.

**History:** See page 7 for "Changing Faces of Minnesota Agriculture."

## Discussion Prompters

### AgMag Cover (Social Studies, Science, Environmental Studies)

1. Discuss what students know about forces that created Minnesota's terrain and soils. What land features do students see in the photo? How do they think they got there? What is the irregular shadowed area on the map? (Glacial Lake Agassiz.) Learn more on page 4.

### AgMag Pages 2 and 3 (Economics, Social Studies, Science)

1. Just what are "Minnesota's natural resources"? (Brainstorm a list; think about all the wonderful things that occupy our air, land and water. Don't forget people!) Why is it necessary to protect these treasures?
2. Why do we say farmers are some of our most important environmentalists? (They manage such a large amount of land—over 46% nationally—so the ways they care for and protect resources are very important.)

3. How many ways do you use water each day? How much water do you use? (Showering, 5 gal/min; toilet flushing, 6 gal.; brushing teeth, 2 gal.; hand washing, 2 gal.; automatic dishwasher, 15 gal./load; washing machine, 20-30 gal./load.) **NOTE:** *The 200 gallons of water needed to produce each person's food for a day includes all the water used to grow, clean, process, preserve and get the food to the table.*

### AgMag Pages 4 and 5 (Science, Social Studies)

1. Minnesota is the meeting place of a powerful "big three" that play a role in our leading place in agriculture. The "big three" are water, weather and good soils/terrain.
  - a. Water: Major watersheds meet here, sending water flowing in three directions. What are they? See *Minnesota Drainage Basins* in this Teacher Guide on page 5.
  - b. Weather: Dry weather from the west; warm, moist weather from the Gulf of Mexico; and frigid, cold weather from Canada all collide in Minnesota. What does that mean for our weather patterns? (They produce the right amount of rainfall in the right places at the right times. We get a great variety in our weather.)
  - c. Soils/Terrain: Compare Minnesota's four soil and growing regions. Then identify your area and your growing region. Ask students to describe water, weather and soils in your area. How does this influence agriculture in your area?

Minnesota's distinct biomes are: Pinelands in the east and north; Prairies in the south and west; and Hardwoods in the east and central sections of the state. How do the natural biomes correspond with growing regions?

2. Choose another state where you'd like to visit or live. How are the water, weather and soils different from your Minnesota home? What causes the differences?

### AgMag Page 7 (Social Studies, History, Geography, Math)

1. Until the 1900s, most immigrants into Minnesota were from Europe. Newcomers from Sweden, Germany and Norway led the way, with settlers from Ireland, Italy, Greece, Poland and other countries joining them over time. Less of our immigrants come from Europe today; more come from Africa, Asia and Latin America. (See graph.)
  - a. What are some of the reasons for the changes in where immigrants are coming from? (Poverty, joblessness, discrimination and/or violence are main reasons people leave their homelands. What is happening in the countries from which our newer immigrants come?)
  - b. Have any of your relatives immigrated to Minnesota now or in the past? What countries did they come from? What were their reasons for leaving their homelands? What foods or traditions did they bring with them? Does your family still eat some of these foods, or practice the traditions?
2. Early settlers in the Minnesota region often came for the good farmland. Once the better land was taken, more moved into settlements that grew into towns and cities. They took jobs in mills, factories, stores and growing businesses. Minneapolis, St. Paul and Duluth were fast-growing cities.
  - a. How did agriculture contribute to the growth of Minnesota cities? (Agricultural products were transported to the cities for processing and shipment to markets throughout the growing nation. Examples: Minneapolis was the flour capital of the world in the mid 1800s, when wheat from farms throughout the northwest was shipped to the city for milling. Logs from Minnesota forests were floated down rivers to sawmills in Stillwater and other places. These agricultural activities created jobs for city workers.)

*Discussion prompters continued on next page.*

- b. Why do many people move from Minnesota's rural areas into cities today? (Better work opportunities, colleges and professional training, cultural opportunities, etc.) Why do some city dwellers move out into rural areas? (Many like the open spaces and slower pace of living away from the city. If they are not able to find work in rural communities, they may become commuters, traveling into the city for work. Jobs in cities usually pay more than those in rural areas.)
3. Immigrants to Minnesota come not only from other countries, but also from other states. What makes Minnesota an attractive place to live?
4. How has immigration changed your community, now or in the past? How have immigrants made a difference in agriculture in your community?

# Edible Dirt

Here's how you can make a "dirt cake" you can eat...and learn about soil at the same time!

## You'll need:

- see-through plastic cups (1 per person)
- 1 large pkg. chocolate sandwich-type cookies (Oreo is an example)
- 3/4 lb. gummi worms
- 12 oz. miniature chocolate chips
- green-colored coconut (Toss coconut with green food coloring)
- 4 Tbs. butter or margarine
- 8 oz. cream cheese
- 1 cup powdered sugar
- 3 1/2 cups milk
- 2 3-oz. pkgs. vanilla instant pudding
- 12 oz. whipped topping (Cool Whip is an example)

*Did you know...Gummi worms are made of agriculture products! These tasty critters are made mostly of corn syrup, sugar and pork gelatin.*

1. Crush and set aside cookies.
2. Cream together butter, cream cheese and powdered sugar.
3. Mix together milk, pudding and whipped topping.
4. Blend together the creamed mixture and the pudding mixture. Mix well.
5. Set the plastic cups out. Fill with layers as described in steps 6-8.
6. **Bottom (bedrock) layer:** Begin with a layer of crushed cookies. Mix chocolate chips with half of the blended pudding mixture and smooth it over the cookies.
7. **Middle (subsoil) layer:** Add more crushed cookies, then a blended pudding layer and the gummi worms. Save one worm for the top!
8. **Top (topsoil) layer:** Finish with a layer of crushed cookies. Sprinkle with green coconut "grass" and poke a gummi worm through the top to peek out of the soil.
9. Enjoy!

## ANSWERS: AgMag

Please Note: If answers are supplied in the AgMag itself, they are not repeated here.

### NATURAL RESOURCES, p. 2

water; soil; air. Wildlife, plants and all living things benefit from healthy resources.

### CARE FOR THE SOIL, p. 2

soil

### CARE FOR THE WATER, p. 3

250 gallons of water equals one ton.

### HOLDING ONTO SOIL, pgs. 2 and 3

1. strip cropping - D
2. windbreak - C
3. no tillage - A
4. grassed waterways - B

Photo numbers:

Clockwise 3, 4, 1, 2

### DIVERSE SOILS, pgs. 4 and 5

Which Region? In order top to bottom:

C, D, A, B

### SHOW WHAT YOU LEARNED, pgs. 4 and 5

What makes Minnesota a great agricultural state?

Answers will vary. Accept any reasonable responses which may include good soils, moisture, growing season, terrain for farm machinery, etc.

### THINK AND DISCUSS, p. 6

1. Community leaders and parks people, city foresters and neighbors working together are usually the best ways to move a community toward planting natural plants and creating rain gardens.
2. Seed banks are important because they help protect our food supply. If plant diseases, droughts, insect invasions or other conditions affect certain kinds of seeds or hybrids, others can be used to keep the crops growing.

### NAME THE DAY, p. 8

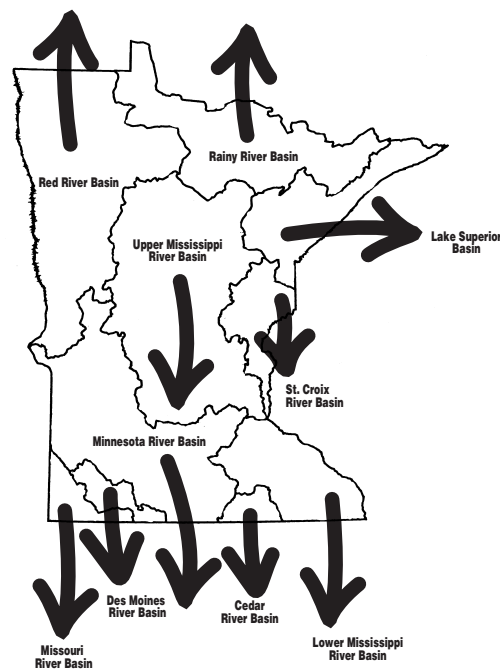
Arbor Day, on Friday, April 28, 2006.

## Teacher Guide

### SHOW WHAT YOU KNOW!

1. b; 2. c; 3. b; 4. a; 5. b;  
6. d; 7. a; 8. a; 9. d; 10. a.

### MINNESOTA DRAINAGE BASINS!



# What Type is Your Soil?

**S**

and, silt and clay are the particles that make up soils. Clay soil, sandy soil and loam soil are three basic kinds of soil.

- Clay soil is very fine.
- Sandy soil has larger particles and feels gritty.
- Loam soil is a mixture of sand, clay and organic matter—once-living leaves, twigs, stems and parts of animals and plants. Loam is usually black.

## Try This!

Use a magnifying glass to examine the particle sizes of various soils. Get about two cups of soil from each of these places: a garden, field, empty lot, woods and any other place you are curious about. Keep the samples separate. Spread the soil on a newspaper, crush any lumps and remove large rocks, sticks or trash. Then do these two investigations!

### 1. Get the feel of your soils! Here's how:

1. Moisten several samples of soil and roll into small balls.
2. Squeeze each ball between your thumb and forefinger. Identify each of the soils. (Most soils are mixtures.) Soil scientists say your findings should be similar to these:

- Loam Soil** Easy to crumble (because it contains organic matter). Loose.
- Sandy Soil** Runs through fingers. Some feels like it has rocks in it. Brown, slippery, gritty.
- Clay Soil** When moistened and squeezed between thumb and forefinger, will ribbon like toothpaste. Hard to crumble if dry. Lumpy when crumbled.

### 2. Find out how much of each particle type is in your soils. Here's how:

1. For each of your soil samples, fill a quart jar one-quarter full with soil. Label with where you found it, then add water until the jar is three-quarters full.
2. Add one tablespoon of alum, close the lid and shake hard. Let the jar stand for several minutes. You will see the mixture separate into layers.
3. Hold a card or heavy piece of paper against the side of the jar and draw a diagram showing the different layers. Label each layer: clay, silt, sand.

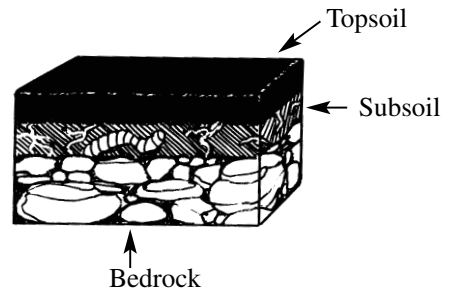
#### What do you think?

- Did some soil samples take longer to separate than others? If so, what do you think caused this difference?
- Compare the different soil samples. Which has the most organic matter? In which soil do you think plants would grow best? What could be done to improve soil with little organic matter?

#### Did you notice?

The larger particles, coarse sand or rocks, settle to the bottom of the jar. The finer particles of silt and clay will form the next layer. The material left floating on top of the water is organic matter.

## Going down...



Soil has three main layers.

**1. Topsoil** - Here's where most of the plant roots grow. Wind or water erosion can wash away this valuable layer; that's why farmers, soil scientists and conservationists work hard to protect it. It takes nature over 500 years to replace one inch of topsoil.

**2. Subsoil layer** - This layer begins about one foot below the surface and may be many feet deep. Tree roots and earthworms live here.

**3. Bedrock layer** - This bottom layer is also called the "parent material." Imagine this about three feet below the surface with large rocks in it.

## Knowing about soils helps:

- **Homeowners** avoid costly mistakes in choosing homesites.
- **Farmers** conserve soil and improve water quality.
- **Taxpayers** save money when roads and schools are built on suitable soils so they are easier to maintain.

**Did you know?** By studying soils, scientists learn how to best use and protect each soil type.



# Minnesota Drainage Basins

A **basin** (or drainage basin) is the area of land that drains to a particular river or lake. Minnesota has 10 major drainage basins. Each drainage basin is made up of smaller units called **watersheds**. A watershed is an area of land from which rain and melted snow trickle down to the lowest point ... a stream, river, lake or ocean. On its way, the water travels across and under farm fields, forestlands, lawns, city streets and gardens.

The squiggly lines on the map show watersheds.

## Show the Flow!

The water in Minnesota's drainage basins flows in three directions. Mark arrows on the map to show the direction each basin flows:

1. The Red River of the North Basin and the Rainy River Basin flow *north* to Hudson Bay.
2. The Lake Superior Basin drains *east* to the Atlantic Ocean.
3. The remaining seven basins drain *south* to the Gulf of Mexico. This includes the Minnesota, Missouri, Des Moines, Root and St. Croix Rivers. All are part of the greater Mississippi River Basin.

## Think & DISCUSS

- In which drainage basin do you live?
- In which rivers, lakes and ocean does the water from your drainage basin end up? For example, the major watersheds of the Lake Superior Basin are the St. Louis River, the Cloquet River, Lake Superior (North) and Lake Superior (South).
- If you pollute water in your community, who is affected? (**HINT:** Remember your answer to the question above.)
- How would you explain: "We borrow water! We get it from someplace, we use it, then send it somewhere else?"

**Note to Teachers:**

You are encouraged to send the Pre and Post-Test results to Ag in the Classroom to help document student learning. Use the attached post-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.

Glaciers moved across Minnesota

- a. in 1900.
- b. several times.
- c. once a thousand years ago.

6.

Trees and plants help the environment by

- a. releasing oxygen.
- b. holding soil.
- c. providing habitat for animals.
- d. a, b, and c.

2.

The two main natural resources affected by agriculture are

- a. iron ore and minerals.
- b. air and natural gas.
- c. soil and water.

7.

Forests, prairies and wetlands

- a. are important as they naturally occur.
- b. are useless unless we change them.
- c. should be turned into farms to produce more food whenever possible.

3.

A rain garden is

- a. a garden with many fountains.
- b. a collecting pool that filters water.
- c. a garden with goldfish ponds and water lilies.

8.

Many of Minnesota's newest immigrants are from

- a. Somalia, Mexico and Southeast Asia.
- b. Canada.
- c. South America and the Middle East.

4.

The water we use today is the same water that was here when dinosaurs roamed the earth.

- a. True
- b. False

9.

By protecting soil and water, we protect

- a. wildlife.
- b. the human food supply.
- c. trees and plants.
- d. a, b, and c.

5.

This immense lake was bigger than all the Great Lakes combined. It once covered the center of North America, including parts of Minnesota.

- a. Lake of the Woods
- b. Lake Agassiz
- c. Long Lake

10.

Minnesota's Arbor Day is always the last Friday in April.

- a. True
- b. False