

CROPS

This issue of the North Dakota Ag Mag focuses on the state's crops. However, this Crops Ag Mag doesn't include soybeans, corn and wheat since those crops have their own issues of the North Dakota Ag Mag. See www.ndda.nd.gov/aitc. However, since North Dakota grows such a wide variety of crops, many of the others are included in this Ag Mag.

The Ag Mag's information and activities are geared primarily toward the state's third, fourth and fifth graders. The Ag Mag is distributed three times per year. Subscriptions are free, but if you're not on the mailing list or if you know someone who wants to be added, contact the N.D. Department of Agriculture at 1-800-242-7535 or ndda@nd.gov.

Past Ag Mags and other Agriculture in the Classroom resources are at www.ndda.nd.gov/aitc.

This magazine is one of the N.D. Agriculture in the Classroom Council activities that helps you and other K-12 teachers integrate information and activities about North Dakota agriculture across your curriculum in science, math, language arts, social studies and other classes. It's a supplemental resource rather than a separate program.

Introduction

Explain to students that the U.S. Department of Agriculture, a federal agency, keeps official statistics about crops planted and harvested and much more. In this list of #1 and #2 crops for North Dakota, USDA counts, for example, non-oil (sometimes called confection) sunflowers and oil sunflowers separately but also together as all sunflowers.

To sort the crops, define an oilseed as any crop (usually its seed) that can be crushed for its oil. Legumes are plants with roots that can pull nitrogen out of the atmosphere to provide nutrients to the plant and soil. Cereal grains are grasses with the grains at the top that are used to make bread, pasta, cereals and more.

Answers to We're #1

Oilseeds

- Canola
- Flaxseed
- Oil sunflowers

Legumes

- Dry edible beans
- Pinto beans
- All dry edible peas
- Pink beans
- Great northern beans
- Small red beans
- Lentils

Cereal Grains

- Durum wheat
- Spring wheat
- Rye
- All wheat

Other

- All sunflowers
- Non-oil sunflowers

Non-oil sunflowers are what you eat as sunflower seeds, and oil sunflowers are crushed into sunflower oil.

Idea: Have students list the foods they ate yesterday and then circle the foods that came from North Dakota's #1 or #2 crops. See if they also can categorize the foods into oilseeds, legumes, cereal grains and other categories.

Idea: Ask a local farmer, the local elevator manager, your high school agriculture teacher or an Extension agent to help gather samples of these and other crops. Have students sort them by category.

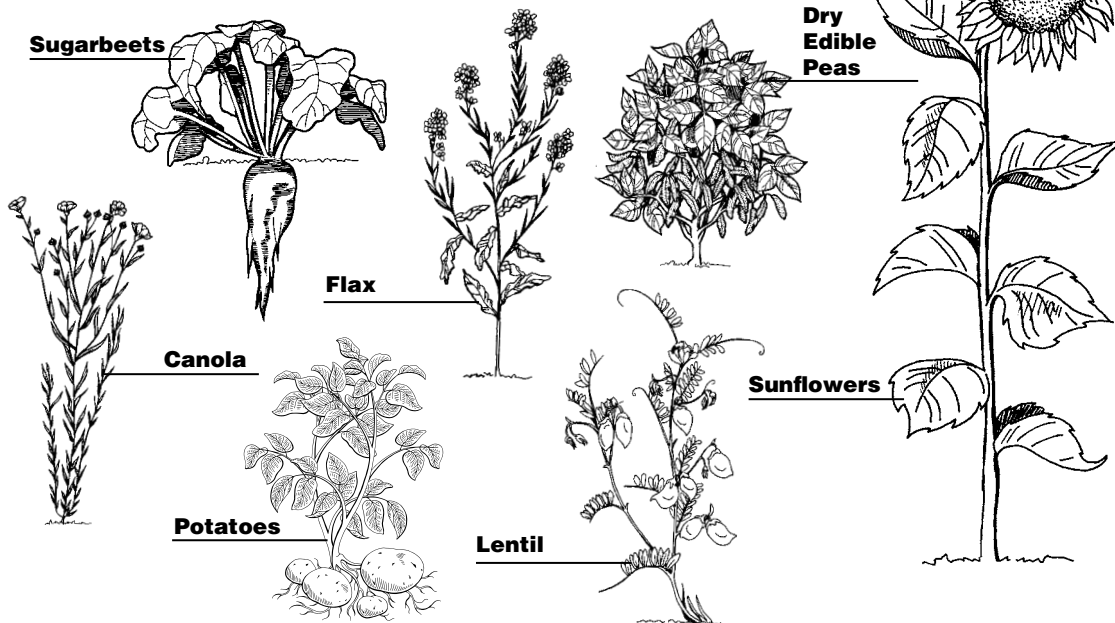
Idea: Have students bring from home items that contain North Dakota's #1 and #2 crops. Have a display or have students guess which crops the items contain.

Idea: Compare oil and non-oil sunflower seeds. Both can be purchased at stores: oil as birdseed and non-oil in shell or as kernels. How do they look similar? How are they different? What is each used for?

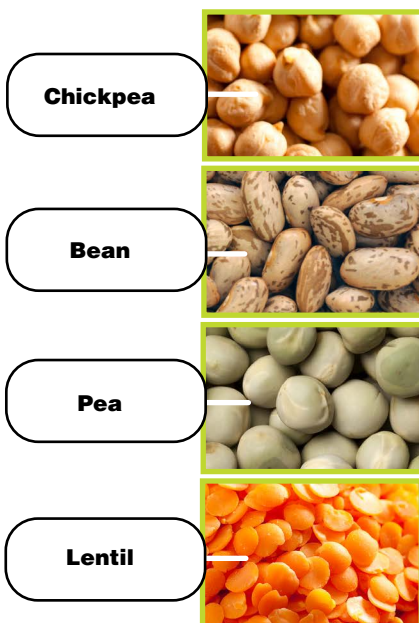
Idea: Have each student or team of students research the crops in which North Dakota usually ranks #1 or #2 among the states in production. How does the crop grow? In what part of the state does it primarily grow? How is it processed? What is it used in?

Production

Answers to Name That Plant



Answers to Which Pulse is Which?



Answers to From the Field to the Fork

- 1 The farmer plants the bean seed using special equipment called a drill or row planter.
- 2 With soil, sunlight and rain, the bean plant grows for 12-14 weeks.
- 3 When the plant has grown to its full height, small flowers begin to develop on the plant.
- 4 The flowers turn into pods and bean seeds begin to grow in the pods.
- 5 The bean plant, including the pods, turns from a green color to yellow, indicating that harvest time is near.
- 6 The farmer harvests the beans and augers them into trucks.
- 7 Trucks take the beans to a processing plant where the beans are tested to determine the quality and the price the farmer receives.
- 8 The beans are sorted by color, size and quality at the processing plant.
- 9 The beans are bagged and transferred into rail cars or trucks and sent to canners and packagers all around the world.

Idea: Discuss with students what an auger is and how augers are used not just on farms but in other ways – for example, to dig holes for fence posts or holes for ice fishing.

Idea: Use the Powerful Potato lesson to have students watch a potato grow with and without soil, chart potato geography on a world map, and hold a potato dress-up contest. At <https://agclassroom.org/matrix/lesson/524/> for grades 3-5.

Idea: Grow pinto beans or another kind of dry edible bean in small containers. Study the parts of the plants. How are various dry edible bean plants alike? How are they different?

Idea: Have the students use various colors, shapes and sizes of beans or other legumes or grains to make picture frames or mosaics or to copy famous paintings. Pencil designs on heavy disposable plates or cardboard first, then glue down beans, legumes and grains.

Idea: Make stained glass pictures with canola oil. On white paper, draw a picture using colored felt markers. Place the page on a sheet of newsprint or a paper towel. Using an old paint brush, cover the entire drawing with a light coating of canola oil. Let dry. Once dry, place or hang the picture in a window. See the sun shine through your drawing.

Source: Northern Canola Growers Association

Idea: Use the National Agricultural Literacy Curriculum Matrix lesson Sunflower Life Cycles at <https://agclassroom.org/matrix/lesson/175/> to observe the growth and development of sunflowers, identify how sunflower seeds are used, and make a paper plate sunflower to illustrate the life cycle of the sunflower.

Idea: Have students do the National Ag in the Classroom Matrix lesson “Farming in a Glove” at <https://agclassroom.org/matrix/lesson/831>.

Idea: Bean Graphs or Growth Charts

Materials:

Small plastic pots (left from plants purchased in the spring or margarine containers)

10 beans per week

Water sprayer

Growing medium

Procedure:

Plant two seeds each day in separate small pots. Label with date and keep moist. Remove extra seed from each pot when it becomes clear one is hardier than the other.

Keep a Record of Plant Growth: Encourage students to devise their own methods for record keeping. “What can we do to help us remember what our seeds looked like as they grew?” Most children will think of drawing pictures and writing descriptions. Some may want to make a graph of growth. Younger students may measure the growing bean plant with a strip of paper. Cut the strip to the length of the plant, record the date and paste it on a sheet of paper.

Record keeping may include:

What I want to find out.

What I did.

What I observed.

Why I think that happened.

Suggestion:

As a variation to this experiment, leave some bean plants in a dark area and some in the light. Give some plants too much water and others not enough. Give some plants fertilizer and don't fertilize others. Have students record their observations daily. Develop a weekly summary to analyze the experiments.

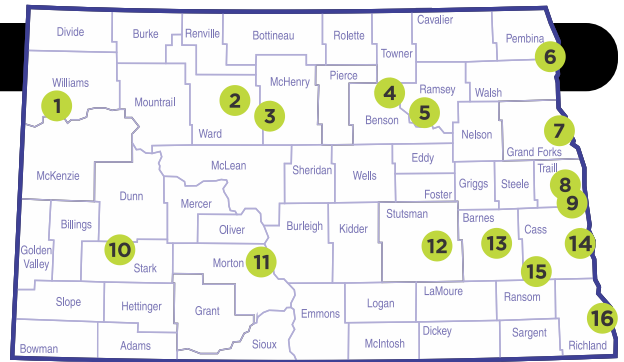
Idea: Beans Bingo Game

Create a BEANS bingo card and have students personalize their cards by randomly writing names of different beans from the Ag Mag in squares on the cards. Give each student several beans from different classes to use as game markers. The teacher or a student leader calls out a letter – B, E, A, N or S – and a class of bean (for example, turtle, pinto, light red kidney, Great Northern, etc.). Students place a bean (preferably of the class called) on that square. The first student to get five beans in a row wins. The teacher or a student leader should write down which bean was called for which letter to check students' accuracy. Other pulse crops could be used in addition to beans.

Processing

Answers to Processing

- 13 Heartland Flax, Valley City — flaxseed
- 14 Cargill, West Fargo — oil sunflowers, flaxseed, canola
- 3 ADM, Velva — canola
- 15 ADM Northern Sun, Enderlin — oil sunflowers, crambe, canola, soybeans
- 7 Dakota Dry Bean, Grand Forks — dry edible peas, barley
- 6,8 American Crystal Sugar, Drayton and Hillsboro — sugarbeets
- 16 Minn-Dak Farmers Cooperative, Wahpeton — sugarbeets
- 2,1 AGT Foods USA, Minot and Williston — lentils, chickpeas, dry edible peas



- 10,7 Minn-Dak Growers Ltd., Dickinson and Grand Forks — buckwheat, mustard, safflower
- 12 Cavendish Farms, Jamestown — potatoes
- 7 JR Simplot, Grand Forks — potatoes
- 5 CoJack Snack & Pack, Devils Lake — popcorn
- 4 Engstrom Bean, Leeds — dry beans
- 11 Copper Kettle Corn, Mandan — popcorn
- 9 CHS, Grandin — sunflowers

Answers to Processing Problems

- A potato processing plant loses about 15% of the weight of the potatoes to waste, such as low-quality potatoes and peelings. For every 1,000 pounds of potatoes that go into the factory, about how many pounds of waste will be produced?
1,000 pounds X .15 = 150 pounds
- The potato processor will give Mike, who raises beef cattle 13 miles from the factory, the product for free for cattle feed if he comes to get it. If it costs Mike \$2.25 per mile to drive his large truck, how much will each trip cost?
13 miles X 2 (round trip) X \$2.25/mile = \$58.50
- One sugarbeet produces about three teaspoons of sugar. How many sugarbeets would it take to make one cup of sugar?
1 cup = 48 teaspoons so 48 teaspoons per cup / 3 teaspoons per beet = 16 sugarbeets
- One brand of dry dog food is 28% barley. How much barley would that be in a 50-pound bag?
50 pounds X .28 = 14 pounds of barley
- Each canola seed contains about 45% oil. One bushel of canola weighs 50 pounds. How much oil can be produced from one bushel of canola?
50 pounds X .45 = 22.5 pounds of oil
- Pulses can be purchased dry in a bag or already cooked and preserved in a can. Kenyon's recipe calls for 2 cups of lentils. The bag says the dry lentils will double in volume after soaking. How many cups of dry lentils should Kenyon start with for this recipe?
2 X .5 = 1 cup or X cups X 2 (double) = 2 cups
- A can of light red kidney beans is 16 ounces, and Omar's chili recipe calls for 40 ounces. How many cans does he need?
16 ounces per can / 40 ounces = 2.5 cans
- A one-pound bag of sunflower seeds in the shells contains about 400 seeds. How many in-shell sunflower seeds would be in a two-pound bag?
400 seeds/lb. X 2 lbs. = 800 seeds
- Sadie fills a bag with sunflower kernels (without the shells), and it weighs 1½ pounds. The kernels cost \$2.50 per pound. How much will her bag cost?
\$2.50/lb. X 1.5 lbs. = \$3.75
- Suneet's oatmeal box says to add twice as much water or milk to the oatmeal before microwaving it. If he measures ¾ cup of oatmeal, how much water or milk should he add?
.75 cup X 2 = 1.5 cups

Idea: Have students research the origin of potato chips. Read “George Crum and the Saratoga Chip” by Gaylia Taylor and “Mr. Crum’s Potato Predicament” by Anne Renauld as resources.

Idea: Have students or teams of students select one of North Dakota’s #1 or #2 crops and research the steps required for processing to change it from a raw commodity to a finished product consumers can purchase.

Idea: Have students bring labels of products that contain these crops in a processed form.

Idea: Discuss some of the reasons why processing plants are in specific locations. Examples – accessibility to railroads or interstate highways, close to production of raw product.

Idea: Use the lesson “Step by Step” from Project Food, Land & People to have students study the sequence of production steps to discover the resources required and the variety of careers involved in taking a raw food from the field to the consumer.

Career Corner

Idea: Have students or teams of students select one of North Dakota’s #1 or #2 crops and research careers related to that product. Have a career day to share what they’ve learned.

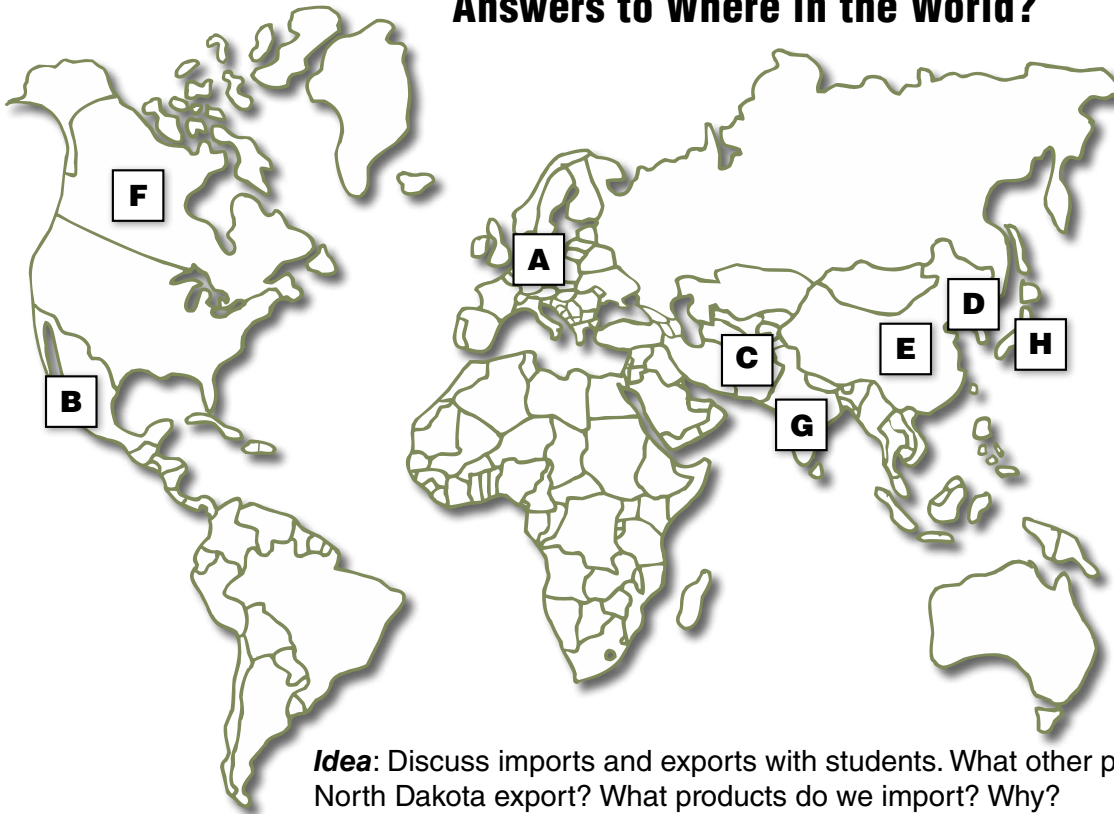
Idea: Have students research and gather the different crops the Busch family produces.

Answers to Career Corner

- | | |
|-------------|---------------|
| 1. diseases | 5. organisms |
| 2. balanced | 6. companion |
| 3. moisture | 7. sieves |
| 4. erosion | 8. processors |

Distribution

Answers to Where in the World?



Idea: Discuss imports and exports with students. What other products does North Dakota export? What products do we import? Why?

Idea: Have each student select one of the countries from “Where in the World?” and research the country further. Have students develop booklets or give presentations to learn from each other.

Idea: Use the lesson “From Sea to Shining Sea” from Project Food, Land & People to have students learn about the top products produced in each state.

Consumption

Answers to Crossword Puzzle



Answers to Pack MyPlate

GRAINS

Spring Wheat	All Wheat
Durum Wheat	Rye

NOT ON MYPLATE LIST

Oil Sunflowers	Flaxseed
Non-oil Sunflowers	Canola
All Sunflowers	

PROTEIN

Small Red Beans	Lentils
Great Northern Beans	Pink Beans
Dry Edible Beans	Pinto Beans
Dry Edible Peas	

Idea: Discuss why North Dakota doesn't produce many products in the vegetable, fruit and dairy groups.

Idea: Ask students why they think oils are not a food group. Explain that oils do provide essential nutrients, but only small amounts of oils are recommended, primarily because of their high calories.

Idea: Especially if a student in your class has peanut allergies, talk about why that might be and why SunButter is a substitute. Possibly make SunButter Overnight Oats – <https://sunbutter.com/recipe/sunbutter-overnight-oats> or SunButter Berry Power Balls – <https://sunbutter.com/recipe/sunbutter-berry-power-balls/>. If a student is gluten intolerant, make Gluten-free SunButter and Banana Muffins at <https://sunbutter.com/recipe/gluten-free-sunbutter-and-banana-muffins>.

Idea: Bring 1 pound each of dry peas, lentils and beans to class. Have students measure 1/2 cup of each into three containers, nine containers in all. Add 1/2 cup, 1 cup and 1 1/2 cups of cold water to one of the three containers of peas, lentils and beans. Let them soak overnight, then drain each one, keeping the water left. Have students develop math problems to illustrate how much the peas, lentils and beans expanded and how much water was absorbed.

Idea: During harvest, ask a farmer to donate a few sunflower heads. During the winter, place them outside your classroom window for a natural bird feeder.

Idea: Make a pine cone bird feeder.

Materials Needed:

- Sunflower, canola, flax or other seeds
- Pine cone
- 2-foot piece of string
- 1/4 cup peanut butter
- 1 tablespoon shortening or lard
- Pie pan

1. Tie string tightly to top of pine cone.
2. Mix peanut butter and shortening or lard until it's all one color.
3. Spread peanut butter mixture on pine cone.
4. Put seeds in pie pan. Roll sticky pine cone in seeds.
5. Hang the feeder from a tree where the cats can't get to it but where the birds can enjoy this sunflower seed treat.

From National Sunflower Association

Resources for Teachers and Students

- Northern Canola Growers Association Kids' Home Page — www.northerncanola.com/kids/
- Northarvest Bean Growers Association — www.northarvestbean.org
- National Sunflower Association — www.sunflowernsa.com/all-about/
- Ameriflax — www.ameriflax.com/teacherseducator-resources
- Northern Pulse Growers Association — www.northernpulse.com/resources/educators/
- NDSU Extension — www.ndsu.edu/eatsmart
- U.S. Department of Agriculture — www.myplate.gov
- ND Dept. of Agriculture Ag in the Classroom — www.ndda.nd.gov/aitc
- ND Farm Bureau — www.ndfb.org/edusafe/teachers
- National Ag in the Classroom's National Agricultural Literacy Curriculum Matrix — <https://agclassroom.org/>

YouTube Resources

- 10 Fun Facts about Agriculture — from KFYP AgrilInternational – Go to www.youtube.com and search for KFYP AgrilInternational 10 Fun Facts about Agriculture
- How It's Made: Canola Oil — Go to www.YouTube.com, search for How It's Made Canola Oil and choose the official Discovery Channel version
- Dan D. Pea Celebrates National Split Pea Soup Week — www.youtube.com/watch?v=T9N2v1qToms
- Lentil Harvest on the Palouse — www.youtube.com/watch?v=cTkW3EK5q24
- Beans being grown hydroponically — http://teachertube.com/viewVideo.php?video_id=237296

Teaching with Technology

- Incorporate SmartBoard lessons into this and other curricula. Go to the <http://exchange.smarttech.com> and search for topics related to crops.
- Create a Jeopardy game for students or have them create it using words related to ND crops. Go to <http://exchange.smarttech.com> and search for Jeopardy.
- Go to My American Farm at www.myamericanfarm.org from the American Farm Bureau Foundation for Agriculture for online games, e-comics, videos, activity pages and more. The games Ag across America, Finders Keepers, Let's Make Something Tasty and Farmer's Market Challenge especially apply to the concepts in this Crops Ag Mag

Standards and Benchmarks for this Ag Mag

ND Social Studies Standards: Economics

E.3-5.1 Describe how goods and services are produced and distributed.

G.4, RI.2 Determine the main idea of a text and explain how it is supported by key words.

E.3-5.5 Describe and analyze how North Dakota's location, culture and natural resources influence its economic decisions and development.

ND Social Studies Standards: History

G.4, RI.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.

Social Studies Standards: Geography

G.3-5.3 Use maps, photographs, and other representations to explain relationships between locations of places, regions, and their environmental characteristics.

ND Mathematics Content Standards

Number and Operation in Base Ten

4.NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

5.NBT.5 Fluently multiply multi-digit whole numbers using strategies flexibility, including the standard algorithm.

Measurement/Data

4.MD.2.i Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Compare customary units by multiplying (4-M.10).

Science Standards and Benchmarks

Standard 2: Students use the process of science inquiry.

3.4.2. Life Cycles: Describe the life cycles of plants and animals (e.g., birds, mammals, grasses, trees, insects, flowers).

4.3.4 Identify principal exports of North Dakota (e.g., crops, energy, livestock).

North Dakota Agriculture in the Classroom Activities

This **Ag Mag** is just one of the North Dakota Agriculture in the Classroom Council projects. Each issue of the Ag Mag focuses on an agricultural commodity or topic and includes fun activities, bold graphics, interesting information and challenging problems. Send feedback and suggestions for future Ag Mag issues to:

Becky Koch
NDSU Agriculture Communication
701-866-6162
becky.koch@ndsu.edu

Another council teacher resource is **Project Food, Land & People** (FLP). Using the national FLP curriculum, ND Ag in the Classroom provides 600-level credit workshops for teachers to instruct them in integrating hands-on lessons that promote the development of critical thinking skills so students can better understand the interrelationships among the environment, agriculture and people of the world. Teachers are encouraged to adapt their lessons to include North Dakota products and resources.

Project Food, Land & People's 55 lessons include:

- Amazing Grazing
- Cows or Condos?
- By the Way
- Seed Surprises
- Schoolground Caretakers
- Could It Be Something They Ate?
- What Piece of the Pie?
- and many more.

For information, contact:

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N.D. Farm Bureau Foundation
701-799-5488
jill.vigesaa@gmail.com

The ND Geographic Alliance conducts a two-day **Agricultural Tour for Teachers**. The tour includes farm and field visits, tours of agricultural processing plants to see what happens to products following the farm production cycle, and discussions with people involved in the global marketing of North Dakota farm products.

For information, contact:

Jeffrey Beck
North Dakota Geographic Alliance
701-240-9231
jeff.beck@minot.k12.nd.us

Educators may apply for **mini-grants for up to \$500** for use in programs that promote agricultural literacy. The Agriculture in the Classroom Council, working with the ND FFA Foundation, offers these funds for agriculture-related projects, units and lessons used for school-age children. The mini-grants fund hands-on activities that develop and enrich understanding of agriculture as the source of food and/or fiber in our society. Individuals or groups such as teachers, 4-H leaders, commodity groups and others interested in teaching young people about the importance of North Dakota agriculture are welcome to apply.

Examples of programs that may be funded: farm safety programs, agricultural festivals, an elementary classroom visiting a nearby farm and ag career awareness day. Grant funds can be used for printing, curriculum, guest speakers, materials, food, supplies, etc. More ideas and an application are at www.ndda.nd.gov/aitc.

For information, contact:

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Doug Goehring

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