30 Years of Exploring Agriculture

AgMag

Agriculture: Helping you every day!

Minnesota Agriculture in the Classroom

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Agriculture, the Land, and You!

What would people living in towns and cities do if there were no farmers?

Where would they get food? Wool? Building supplies? Flowers, trees, and shrubs? What would growers do if there were no consumers to buy these things? What would it be like if each of us had to grow everything we need all by ourselves?

- **City people and growers need each other.** We are interdependent. We buy and sell among ourselves so everyone can get the food, shelter, and clothing they need.
- Agriculture grows what we need and changes it to forms we can use. Getting those things into our hands is part of agriculture, too.
- When you write a note, do you think about the tree fiber that went into the paper? As you eat your cereal, do you think about the soil, water, and workers between the grain field and your cereal bowl?
- Agriculture starts with soil, seeds, water, and energy from the sun. It continues as millions of workers and billions of dollars change and move agricultural products from the land to you. Agricultural products come to you through supermarkets, lumberyards, drugstores, clothing shops, restaurants, Christmas tree lots, sports stores, and dozens of other places.

Find teacher guide and student resources at www.mnagmag.org

Steps Along the Way

Where do the supplies come from that are made (processed) into the things we eat, wear, and use every day? The **raw materials** come from Earth's **natural**, **renewable resources** through the work of farmers and growers. Your wool sweater, your strawberry jam sandwich, your hockey stick – they're all thanks to renewable resources.

What happens to the raw materials between the land and you? It depends on the product. Which goes through more steps: grain between the field and your cereal box and bread, or carrots between the field and your salad bowl? What about your quarter-pound burger? It started out as a thousand-pound steer eating corn, soybean meal, and grass. Your bread began as "amber waves of grain" and your wooden hockey stick as a tree.

Raw materials go through a cycle of processes before they get to us in forms we can use. After all, a handful of wheat kernels or a hunk of wool freshly shorn from a sheep wouldn't do us much good in these forms. The food, clothes, and other things we use from agriculture all go through a cycle that:

- starts with sunshine, air, water, soil, and plants
- uses energy and equipment
- changes raw materials into many different things
- gets agriculture products to us in forms we can use!

Photos Courtesy University of Minnesota Agricultural Experiment Station

Agriculture Cycle

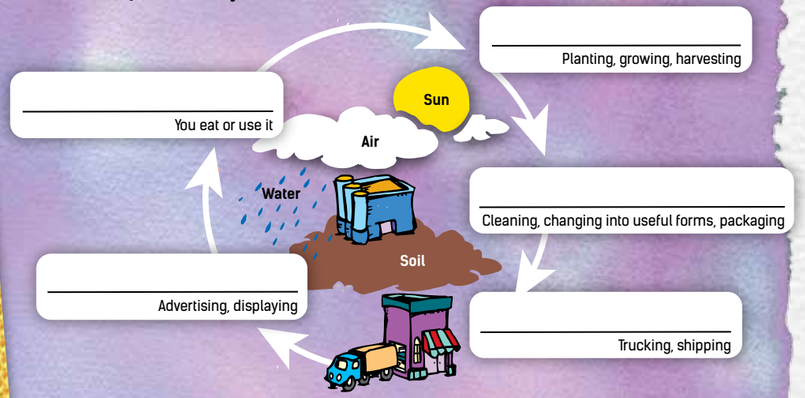
Most agriculture cycles have 5 steps:

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

Matching & Naming

Science and Technology Keep the Cycle Going!

For each photo on the left, write the number that describes its step in the agriculture cycle. Then label the steps in the cycle below.



Discussion

Products with more steps in their cycles have more impact on Earth's resources. Why?

Why are sun, air, water, and soil part of the agriculture cycle?

A Tale of Two Kingdoms

Plants

They are the only living things that make their own food. They are also the source of food for every other living thing. Plants become our medicines, fibers, paper products, cosmetics, spices, and building materials. We burn plants for fuels. That includes wood as well as the fossil fuels (coal, petroleum, natural gas) that came from plants eons ago. We eat plants – roots, leaves, stems, and fruits. Finally, we depend on plants for the oxygen we breathe. Without plants, we would not survive.

Animals

Only about one-fifth of the land in the United States is suitable for growing crops. The rest has poor soil, too little rainfall, or rocky, rough surfaces that machinery can't handle. Forests cover millions of acres. Even though we can't grow food crops on these lands, livestock can often graze there. As livestock eat grass, they turn it into food and fiber people can use. Animals provide the eggs, milk, fish, burgers, steaks, chops, and roasts that give us protein. They produce the wool and leather people use for clothes, shoes, and baseball gloves. Animal fats are important in soaps, cleaners, cosmetics, paints, plastics, and much more. Thanks to animals, we have better lives.

Soybeans & Corn: Terrific Top Crops

In your last AgMag, you learned that soybeans and corn are two of our state's most important crops. But did you know that you use soybeans and corn yourself in dozens of ways every day? Zoom in for a closer look at these amazing plants.

Soybeans: Miracle Crop

Chinese people have grown and appreciated soybeans for 5,000 years. They called soybeans "Yellow Jewel" and "Great Treasure." We call soybeans "the miracle crop" because they have hundreds of uses. Each of us eats 35 to 40 pounds of soy products every year. People use tons of soy in nonfood products, too. Soybeans are one of the world's most efficient and inexpensive sources of protein for both humans and animals.

How many ways have you used soybeans today?

A mature soybean plant averages 3 to 3½ feet tall.

Corn: America's Gold

Early settlers coming to America often hoped to find gold. But they found an even greater treasure – one that could feed the world – when Native Americans shared corn, the golden grain.

America's native peoples have grown corn for centuries. Corn was such an important crop that many of their villages and cities built up around it. Millions of people around the world still depend on corn as a main food for themselves and their animals. Corn is more than food. Those golden kernels have more than 3,000 uses!

Mature corn averages 7 to 8 feet tall!

Super SOY and King CORN

Soybeans and corn are Minnesota's leading cash crops. These are the top crops that feed our cattle, hogs, and poultry. They are processed into thousands of other uses in human foods, industries, fuels, and more.

1 Planting and Harvesting

Soybeans and corn, both row crops, are planted in April and May. During the summer:

- Soybeans flower and produce pods (beans).
- Corn grows tassels and silks, producing ears with kernels.

Both crops are harvested in the fall.

2 Storage and Transportation

Soybeans and corn are stored in grain bins on the farm or at local elevators. They are kept dry to prevent mold and spoiling. Farmers raising livestock often grind and mix soybeans and corn with other grains to feed their animals. Many farmers sell their crops, which are then hauled away from the farm by truck.

3 Processing

Cleaning is the first step. Then crops are processed in different ways, depending on how they will be used.

- Soybeans are mainly processed for oil, meal (flour), and biodiesel (biofuel). Corn is mainly processed for livestock feed, human food, and ethanol (biofuel).
- Soybean hulls are usually removed. Beans are warmed and moistened. The heat expands the beans and the hulls pop off. Then the beans are flattened into flakes, making it easier to remove the oil.
- Corn may be soaked, softened, pressed, ground, cooked, mixed, or sometimes flaked before it is further processed into many different products.

soybean flakes

ground corn

Interesting!

1. The U.S. produces nearly half of the world's soybeans.
2. Coffee cups, grocery bags, even surfboards made from corn plastic biodegrade in just a few months. The key is proper composting.
3. Henry Ford once built a car from soybeans. It was so tough he could beat on it with an axe!
4. Most of the corn grown in Minnesota is field corn. Its hard kernels are a main ingredient in livestock feed and industrial products. What is the sweet and tasty corn that you eat called?

Group Labeling

Corn and soybeans come to us in many different forms. Label each group in the diagram below with one of these titles:

- **Other Soy and Corn Foods**
- **Industrial Products**
- **Meal and Flour Products**
- **Oil Products**

A _____

- Biofuels for cars and trucks
- Livestock feed
- Antibiotics
- Paints and inks
- Glues
- Plastic eating utensils
- Biodegradable packaging peanuts

B _____

- Tofu
- Soy nuts
- Soy sauce
- Soy burgers
- Soy yogurt
- Soy milk
- Corn flakes
- Corn syrup
- Pancake flour
- Tortillas

C _____

- Bakery products
- Cornmeal
- Pasta
- Breads
- Cereals
- Grits

D _____

- Cooking oil
- Salad dressing
- Mayonnaise
- Crackers
- Candles
- Lotions
- Soaps

What Do You Think?

1. List 3 things you use that are made with corn or soybean oil.

2. How can you know if your food or your pet's food has soybeans or corn in it?

3. List 3 of the valuable nutrients soybean meal and cornmeal add to our foods.

Trivia

Soybeans are a source of this important nutrient needed by both humans and animals.

a. Carbohydrates **b. Fats**
c. Protein

4 Distribution

Processed and packaged soybean and corn products travel mainly by truck, rail, and barge to reach customers.

5 To You!

We find the finished products in our grocery stores, co-ops, building centers, gas stations, hospitals, restaurants, factories, movie theaters, and more.

Photos Courtesy University of Minnesota Agricultural Experiment Station

Global Markets for Minnesota Agriculture

Just because food is grown in a country doesn't mean it stays there. **Minnesota exports (sells) one-third of our agriculture products!** We import (buy) from other countries, too, so world agriculture is important for you here in Minnesota. Why do countries buy and sell ag products from one another?

- Some places have little suitable land to grow food. They may have poor climates, or be on islands, mountains, or deserts. Much of the land may be covered with cities. With limited land and water, they can't grow enough food to feed the people. These places must import.
- Most people enjoy eating foods that don't grow in their area. Did you have a banana or cinnamon toast for breakfast? Did someone drink cocoa, coffee, or tea? Importing made it possible; these things don't grow here. We use products from other countries, and they use products from us. Food exports and imports bring variety and flavor to our meals.
- The demand for our exports is increasing. In countries where family income is rising, people who can afford more variety welcome our exports (especially meat). Many countries buy our raw commodities for ingredients in their own food. Imported soybeans for tofu or corn for tortillas are examples. We're not just feeding people, either. Countries growing more livestock need feed (corn, soybeans, etc.) for their animals. In countries where populations are exploding, people need more of everything.

Minnesota agriculture helps keep our state's economy strong! Our top four exports are soybeans, corn, pork, and livestock feed. China is our largest export customer.

Follow the Exports

You may need a Minnesota map and a world map to locate these places. The dots on the Minnesota map mark each of the communities mentioned.

1. **Chickens from Worthington are served in a restaurant in Canada. Draw an arrow from Worthington to Canada.**
2. **Sugar from Moorhead sugarbeets is sold at a German grocery. Draw an arrow from Moorhead to Germany.**
3. **Rochester pork is served at a wedding in Japan. Draw an arrow from Rochester to Japan.**
4. **Duluth timber is sold to a Mexican paper mill. Draw an arrow from Duluth to Mexico.**

Young boys get ready to help with milking.

Big Changes in Minnesota Agriculture:

Back to Variety

As the 1900s began, most farms were small family farms of an average 170 acres. **Diversified farming** was back. Farmers were raising a variety of crops and livestock instead of one main crop.

Early Technology: New Machines Help Farmers

Cars, trucks, and tractors came on the scene in the 1900s. Imagine the change in a farm family's life! Farm machines slowly replaced animal power and handwork. Timesaving inventions like the combine could cut, thresh, and clean crops in just one pass through the field. Cows could be milked by machine. New inventions helped families farm more land. They could produce more food in less time without as much back-breaking labor.

Dust Bowl Days

The Dust Bowl appeared in the early 1930s. This hard time lasted for more than a decade. The grasses holding soil in place were destroyed by farmers grazing cattle and plowing the plains. When drought and wind came, the soil eroded, and the Great Plains became the Dust Bowl. Tons of dust killed crops and forced people to flee their homes. Many farmers were forced out of business. Farmers learned new ways to save soil. They rotated crops, used strip cropping and contour plowing, and planted trees to protect soil from wind damage.

Solving New Challenges

Three big developments followed the Dust Bowl days: **Hybrid seeds, livestock vaccines, and commercial fertilizers**. Look up and define each as a class.

Discuss: Why do you think people were motivated to develop these things? How did each help agriculture – and people?

Crop Protection

After about 1950, scientists developed new **crop protection chemicals** to control weeds, pests, insects, and diseases. That means higher crop yields. Farmers are trained to use these chemicals with great care and caution to protect groundwater, air, soil, animals, and themselves. The challenge continues to find the best ways to feed the world while protecting natural resources.

Land Use: Farms to Cities

Minnesota cropland once stretched as far as the eye could see. That changed as people began leaving farms for urban jobs, and growing towns and cities took more space. By 1950, more Minnesotans lived in cities than on farms for the first time ever. Thousands of acres of farmland were turned into suburban neighborhoods, factories, businesses, public buildings, shopping malls, golf courses and more.

- Imagine a farm family moving to the city for a new life. How would their lives change?
- What would happen to our food and fiber supplies if everyone moved into towns and cities?
- What happens to rural communities when large numbers of people leave?

Early 1900s steel-wheeled tractor with combine.

Wind moves valuable soil from fields, filling ditches and burying fence posts.

Bagging hybrid seed corn, 1945.

By 1954, tractors outnumbered horses and mules. How did having a tractor make a huge difference to a farmer?

Farmlands give way to Twin Cities suburbs.

Photos Courtesy Minnesota Historical Society

Talking Corn ... and Soybeans

In 2014 Minnesota was fourth in the nation in both corn and soybean production. The top ten corn- and soybean-producing states are listed to the right. Label each state using the postal abbreviation. Then color the corn states one color and the soybean states another color. What can you tell us about the region where corn and soybeans are grown?

2014 Top Soybean States

1. Illinois
2. Iowa
3. Indiana
4. Minnesota
5. Nebraska
6. Missouri
7. Ohio
8. South Dakota
9. North Dakota
10. Arkansas

2014 Top Corn States

1. Iowa
2. Illinois
3. Nebraska
4. Minnesota
5. Indiana
6. South Dakota
7. Missouri
8. Ohio
9. Kansas
10. Wisconsin

Thin is In!

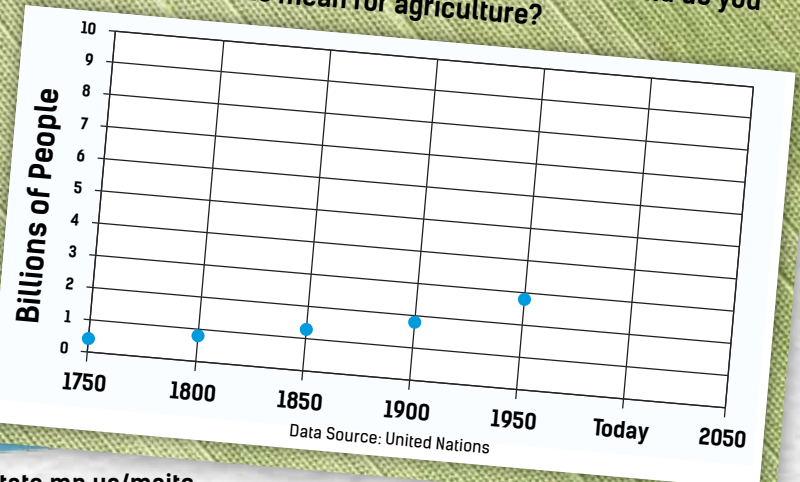
Today's pigs are bred and fed to be leaner than the pigs of yesteryear. Compared with pigs from the 1950s, today's slimmer model has 75 percent less fat, thanks to superior genetics and new technologies in hog production. Why? Livestock growers know it's what health-conscious Americans want and will buy. Pleasing the customers keeps their business growing.

1950

Today

World Population Growth: Connect the Dots

World population today is about 7.3 billion and growing fast. It is expected to reach 9.7 billion by 2050. Add those dots to the graph below, and connect all the dots. What trend do you see? What does this mean for agriculture?



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