

AgMag

Agriculture: Helping you every day!

4



Agriculture is Everywhere!

When you woke up in your bed this morning, you already had your first meet-up with agriculture. Somewhere in your **bedding and pajamas** were probably fibers from cotton plants.

Did you wash or shower with **soap**? That soap is made from fat from cattle and oil from plants such as palm, corn, and soybeans.

Did you have **cereal, eggs, milk, bacon, pancakes, buttered toast, or juice** for breakfast? Thank agriculture again!

Did you pack a lunch in a **paper bag** or finish your math by writing on **paper**? That paper comes from another agricultural crop--trees. Corn and soybeans also help make up the **ink** in your books.

Did you ride to school today? The **tires** on your bus, car, or bike are made from the rubber plant, cords from cotton, and modified fat from cattle.

Did you see a **city park or orchard** along the way? These are all part of agriculture too.

Agriculture brings us almost everything we eat, wear, or use each day.



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

What is Agriculture?

Agriculture is farming! Farming is planting and harvesting crops, growing fruits and vegetables, as well as raising cattle, pigs, turkeys and chickens.

Agriculture is also much more than this. It is the **industry** that grows, harvests, and supplies us with food, fiber, trees, turf, and landscaping materials.

- Food comes from plants and animals.
- Fiber is the raw material from plants and animals that we use to make cloth, clothing, rope, and more. Cotton, linen, silk, wool, sisal, and hemp are fibers.
- Trees give us wood that becomes lumber, furniture, and firewood; **pulp** to make paper; and hundreds of other things, including turpentine (a useful oil) and medicines.
- Landscaping materials include flowers, plants, and turf (already planted grass) for beauty, pleasure, and fun activities.



Minnesota is the #1 producer in the country for:
Red Kidney Beans,
Sugarbeets
& Turkeys

Minnesota Grown

What makes Minnesota such a terrific state for agriculture? It has many soil types and terrain that are good for farming. It also has the right amount of rainfall during our growing season. All of these things make our state a top 5 producer in the country of the plants and animals listed below. Can you find them in the word search?

SPRING WHEAT GREEN PEAS TURKEYS BARLEY
SUGARBEETS SWEET CORN SOYBEANS HOGS

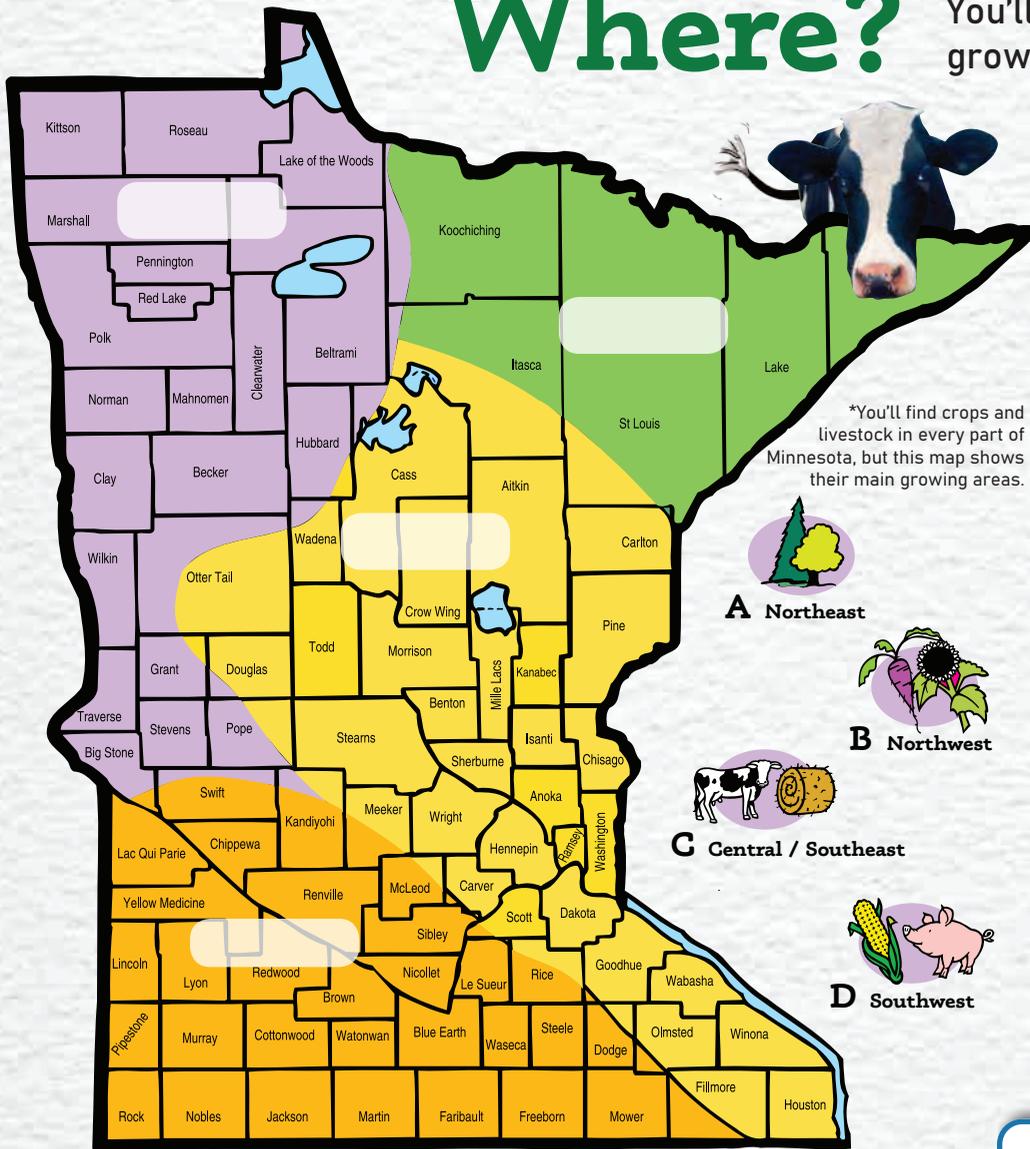
L K S O Y B E A N S B T W B J S V A B Q R V Z P G Y
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S Y S Y F X O O A T Z A T M E T S G P M S L D Y F P
A X M P V P J B B M S M S J B Q R M L V F E K E A P

Fun Facts!

- **ONE** bushel of whole wheat can make **64** loaves of bread.
- The average potato is **75%** to **80%** water.
- **ONE** bale of cotton makes **215** pairs of blue jeans.
- Minnesota is the **TOP** producer in the country of sugar beets and **cultivated** wild rice.
- More than **80%** of all jobs in Minnesota agriculture are **not** farming.
- An **acre** is about the size of a football field.

What Grows Where?

Which plants and animals grow where? Check out the map and clues. You'll discover Minnesota's four main growing areas. In which do **YOU** live?



*You'll find crops and livestock in every part of Minnesota, but this map shows their main growing areas.



A Northeast



B Northwest



C Central / Southeast



D Southwest

MATCHING

Match these 4 clues with the names of the growing areas on the right (A,B,C,D). Write the name of each area in its space on the map.

1 Flat terrain where large machinery can operate. Fertile prairie soils. Less moisture than other areas. Produces crops like wheat, oats, barley, soybeans, sunflowers, sugarbeets, dry beans and potatoes.

2 Fertile soils with good moisture. More southern location (longer growing season). Produces corn, soybeans, cattle, and hogs.

3 Hilly with moisture. Big producer of hay, pasturelands, dairy cattle, and turkeys. Soil types include rich, shallow, poorly drained, and sandy.

4 Rough terrain. Short frost-free season, lots of snow. Big producer of forests, but few field crops.

Minnesota Rainfall What and Where?

Imagine you're a farmer. In which of the four growing areas would it make sense to grow these crops? Write your answers in the table below. Check your work by going over the growing area descriptions on the right side of the page.

Crop	Which Growing Area?
Hay and Pastureland	
Sugarbeets	
Corn and Soybeans	
Forest and Pine Trees	
Wheat	

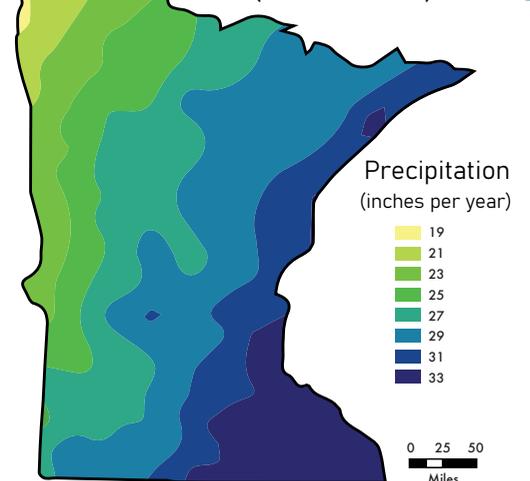
Which growing areas normally get the least rainfall each year?

Which areas get the most?

Why must farmers understand rainfall patterns when they choose which crops to plant?

What happens to farm crops when rainfall is way ABOVE normal?
What if it is way BELOW normal?

Average Annual Precipitation (rain and snow)



Data Source: National Weather Service, MN DNR, Soil & Water conservation Districts, and others; compiled by the MN DNR.

Farming Across Minnesota

Farmers in Minnesota work hard to grow their plants and take care of their animals. They pay special attention to the soil, water, and climate. Keeping their farms healthy for the future is very important. They use skills and knowledge learned from past farmers, while also learning new ways to farm. Let's meet Minnesota Farmers Roland and Brian.



NW
MN

ROLAND ROUSU WITH
SISTER AND NEPHEW

Roland Rousu, Wild Rice Farmer

Wild rice is an important crop in Minnesota. Wild rice grows best in lakes and rivers.

For the Ojibwe people, wild rice is a sacred food. They call the rice Manoomin (Mah-NO-min) meaning “the food that grows on the water”. Roland Rousu is a ricer. He grows wild rice on the waters of his family’s farm on the White Earth Reservation near Callaway, MN. Roland knows that wild rice needs a very special environment to grow well, so he takes care in every part of the growing process to make sure he is using his resources wisely. Because the water level is so important when growing wild rice, Roland uses a system of culverts to make sure the water doesn’t get too high or low. If there is a lot of rainfall and flooding, the water levels can rise, and cause the rice to uproot and die. The system of culverts allows water to drain without causing harm to the surrounding land.

Roland also sets aside enough rice to plant for the next year before he harvests the rice for food. If Roland doesn’t do this he could run out of seed and not have enough to plant the following year.

Roland works hard and uses his resources wisely so that he can protect the wild rice, water and the land. He also strives to protect his family’s traditions. For the Ojibwe people, growing wild rice is more than just a way to earn a living. It is also an important part of their history

HARVESTING WILD RICE IN AUGUST



WILD RICE READY
TO COOK



CULVERTS



PHOTOS PROVIDED BY White Earth Native Harvest

Brian Pfarr, Farmer

Brian Pfarr is a farmer in Redwood County, Minnesota. He raises corn, soybeans, wheat, and cattle. Recently, Brian wanted to decrease his **inputs** (time, money, and materials he spends to run the farm) while still having good **outputs** (growing enough corn, soybeans, wheat, and cattle to sell).

One way Brian has lowered his inputs is by using technology to make sure the soil in his fields is healthy. Brian first collects small samples of soil from different parts of his fields and then sends the soil to be analyzed in a soil science laboratory. This tells Brian if his soil is healthy or if he needs to add nutrients to the soil. Brian then creates maps that show where in his fields more nutrients are needed and adds fertilizers to these spots. **Fertilizers** are substances added to soil to help plants grow better. Technology helps Brian save money on fertilizer by buying the correct amount and putting it where it is needed.

Brian also changed when he tills his fields. Tilling is when farmers loosen and turn up the soil. Instead of tilling the fields every spring and fall, Brian only tills in the spring. By not tilling in the fall, things like earthworms and microbes can get to work making the soil even healthier.

Brian also uses technology to save money on the seed that he plants and grows. Growing seeds too close or too far apart can cause the plants to not grow as well. The machine Brian uses to plant the seeds uses technology to place the seeds so they are spaced out just right. This allows them to have the perfect amount of space to grow. By making a few changes to how he farms, Brian has been able to lower his inputs and still grow healthy crops every year.



BRIAN PFARR AND HIS DAD

SW
MN



PLANTING MACHINE



BRIAN IN HIS CORN FIELD SOON AFTER IT WAS PLANTED



BRIAN'S FARMING PRACTICES HELP KEEP THE SOIL HEALTHY TOO! HEALTHY SOIL MAKES HEALTHY PLANTS!

THINK & DISCUSS

If you were going to farm, what would you grow? Where would you have your farm?

Can you spot the earthworm?

Science in Agriculture



CARI SCHMITZ CARLEY

PROCESS OF BREEDING A NEW POTATO



1

ONCE THE POTATO PLANT FLOWERS, COLLECT THE POLLEN.



2

TAKE THE POLLEN FROM ONE PARENT AND POLLINATE THE OTHER PARENT.

3 TO PROTECT THE PLANT FROM OTHER POLLEN, COVER THE FLOWER WITH A MESH BAG THEN WAIT FOR THE FRUIT TO GROW!



4 ONCE THE FRUIT IS RIPE, REMOVE THE SEEDS.



4

Many people love potatoes, whether they are mashed, baked or fried! Potatoes are grown in three main areas of Minnesota. Growing potatoes in Minnesota can be difficult because of the cold climate, so farmers need special potatoes that can grow well here. Farmers can choose from potato **varieties** that have different **traits** because of plant breeders. Let's meet a plant breeder who worked to develop potatoes for Minnesota farmers.

Cari Schmitz Carley is a plant scientist and potato breeder. Cari's job as a potato breeder involves working with potato farmers to help them grow better potatoes. To accomplish this, Cari uses science and technology to develop potatoes with traits that make them easier to grow, and also taste better.

How does Cari breed potatoes?

Once Cari finds a potato variety that tastes good, she tests it to make sure it doesn't have any diseases (just like humans, plants can get sick too!). The great tasting potato might not grow well in our cool Minnesota climate, so Cari will find another variety of potato that grows well in cold climates. These potatoes are called cold-hardy.

Cari will then **breed** the great tasting potato with a cold-hardy potato. The great tasting potato and the cold-hardy potato are the "parent" potatoes. By combining the traits of these two different types of potatoes, Cari hopes to produce a new type of potato that has **inherited** the great tasting trait from one parent, and the cold-hardy trait from the other parent.

This process of breeding potatoes can take many years. If Cari is successful, she will have helped develop a variety of potatoes that Minnesota farmers can grow and that we can eat.



Red River Valley

WHERE POTATOES ARE GROWN IN MINNESOTA

From Elk River to Park Rapids

Near Albert Lea.



5

GROW THE NEW SEED IN A GREENHOUSE.

6 NEW POTATO BREED!



Potatoes are grown in three areas of Minnesota: under irrigation on the sandy soils from Elk River to Park Rapids, on the rich soils of the Red River Valley from Fergus Falls north to Canada, and on peat soils near Albert Lea.

Farming in a Glove

MATERIALS NEEDED:

Bowl of Water
5 Cotton Balls
1 Clear Plastic Glove
Seeds
Marker

For this activity, you get to be a farmer and grow your own seeds. As the seeds grow in a glove, you will be able to see the life cycle of plants and learn what seeds need to germinate and grow. It is important to understand how seeds become plants because plants produce food, fiber, shelter, and oxygen--we need and use these things every day!

1. Make sure you have a clear plastic glove with no rips or tears.
2. With a marker, label each finger of the glove with the type of seed you are going to plant inside of it. Write your name in the center of the glove.
3. Dip five cotton balls into the water. Squeeze any extra water out of the cotton balls so they are wet but not dripping.
4. Place a different type of seed onto each cotton ball. You can use 2 or 3 seeds of each variety.
5. Place the "seeded" cotton balls into the correctly labeled fingers of the glove.
6. Hang your glove upside down in a sunny spot.

Over the next week the seeds will begin to sprout. Observe how each variety is similar and different. Make sure that your seeds have everything they need so they successfully grow into plants.

You have now created a farm in a glove!



Farmer Connection

Wild Rice farmer **Roland Rousu** pays special attention to the resources

needed to grow wild rice. What resources do you need to provide to your Farm in a Glove so your seeds sprout and grow?

Brian Pfarr uses technology to grow corn, soybeans and wheat on his farm. What seeds will you grow?

Cari Schmitz Carley uses science to develop new varieties of potatoes that are healthy. How will you keep your seeds healthy and growing?

What do seeds need in order to grow?

Find the answer on mnagmag.org

State Symbols & Agriculture

Are you good at understanding symbols? A symbol is an object that represents a bigger idea. A symbol can take the place of words when it is the right picture or design. A great example of a symbol is an emoji because it is an image that expresses a certain emotion.

A symbol can also be something that is not a design or photo, but represents special things about Minnesota. The Minnesota state legislature has chosen many items from agriculture as official symbols to represent our state. See some of them below and test how well you know Minnesota's state symbols!

DID YOU KNOW?



Minnesota Governor Walz named the Rusty Patched Bumblebee the new state bee in 2019. It is an endangered species that you might be able to find in your own backyard!

Minnesota State Symbols

STATE DRINK Milk

Minnesota cows produce over one billion gallons of milk each year!



STATE FRUIT Honeycrisp Apple

Fourth graders from Anderson Elementary in Bayport lobbied the State Legislature to give us this state apple.



STATE GRAIN Wild Rice

Wild rice was an important food of the Ojibwe for centuries. Minnesota produces over half of the world's hand-harvested wild rice.

STATE TREE Red (Norway) Pine

The tallest red (Norway) pine in Minnesota stands 120 feet high and is over 200 years old.

Name the Symbol



Clue: Thriving in swamps, bogs, and damp woods, they grow slowly, taking 4 to 16 years to produce their first flowers. It is illegal to pick them.

Clue: These large black-and-white water birds have long black bills. While they are clumsy on land, they are excellent divers, underwater swimmers, and high speed flyers.



Clue: They live in waters all over the state, but mainly the large, cool lakes in northern Minnesota. They like to go to deep, dark waters during the day and move to shallow lake areas at night.

State Flower: _____

State Bird: _____

State Fish: _____