Illinois Ag Mag

An agricultural magazine for kids

Apples

Apple Production

Apples are grown in all fifty states, but only thirty-six states, including Illinois, grow apples to sell in large amounts. An estimated 7,500 apple growers manage orchards covering 346,000 acres in the United States. Most of these apple orchards are in our northern states, such as Washington, Michigan, and New York. Washington state has the best climate in the world to grow apples because of its warm days and cool nights. There are over 5 million tons of apples produced in the United States per year, all of which are picked by hand! Half of those apples are sold fresh and the other half are made into apple sauce, apple juice, or dehydrated apple products.

Agricultural products are measured in volume and weight in a unit of measurement called bushels.

ONE BUSHEL EQUALS:

VOLUME	WEIGHT
8 dry gallons	*(apples only)*
4 pecks	42 pounds
35.24 liters	
9.31 fluid gallons	

APPLE MATH

Americans eat an average of 16 pounds of apples per year.

- How many apples does an average American eat per year?
- How many apples are in a bushel?
- How many apples are in a peck?
- How many pounds of apples would you need for 3 gallons of apple cider if it takes 36 apples to make 1 gallon of apple cider?

An Apple a Day

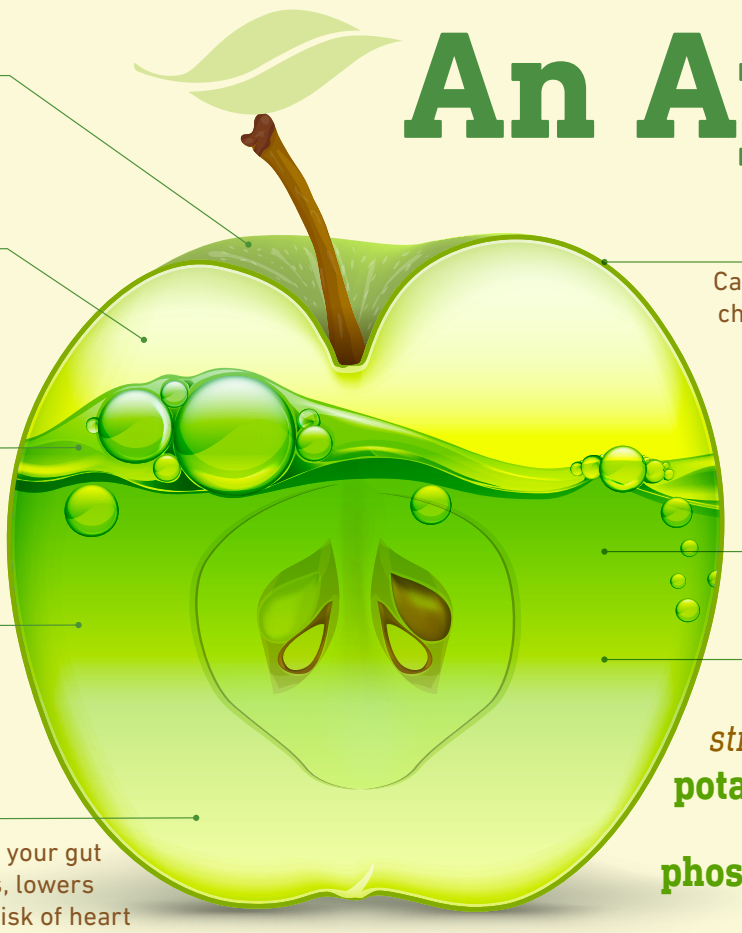
Vitamin B
Helps maintain red blood cells and keeps your nervous system strong.

Vitamin C
8mg Helps boost your immune system to fight infectious agents.

Vitamin E
Contributes to healthier skin and stronger immune system.

Vitamin K
4mcg Helps make the proteins which strengthens your bones.

Dietary Fiber
4g Mostly found in the peel and helps keep your gut "regular," can help maintain weight loss, lowers cholesterol levels, and can reduce the risk of heart disease, diabetes, and some types of cancer.



Peel
Can also help lower the chance for tooth decay, acting as a natural toothbrush.

84.6%
water

Minerals

calcium 3g
strengthens bones

potassium 129mg
builds muscle

phosphorus 9.5mg
filters out waste

Everyone has heard the phrase, "an apple a day keeps the doctor away," but what about apples makes them so healthy? Apples are known as nutritional powerhouses because they contain a variety of vitamins and nutrients that have many benefits to help our bodies function. Apples may not actually keep the doctor away, but they are a step in the right direction.

APPLES ALL THE TIME

In the 1600s the settlers could not grow fresh fruits and vegetables to eat during the long, cold winters. Instead, they found ways to preserve them. Harvested apples were peeled, cored, and hung out to dry on a big net or string tied to trees or posts. The warm air would evaporate the water inside the apples, and they would be dried in a few days.

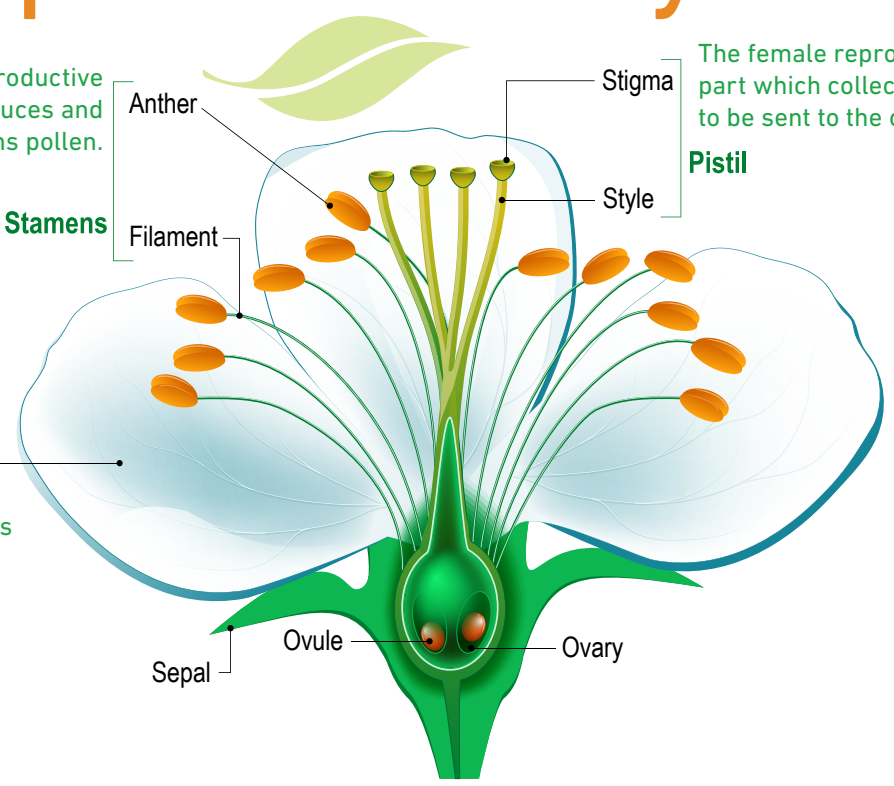
Unlike the settlers, we can buy fresh apples from the store all year no matter what season it is. This is due to Controlled Atmosphere Storage. Controlled Atmosphere Storage regulates the temperature, oxygen, carbon dioxide, and humidity in the storage room. Because each variety of apple requires different conditions, computers are used to help keep the specified conditions constant.

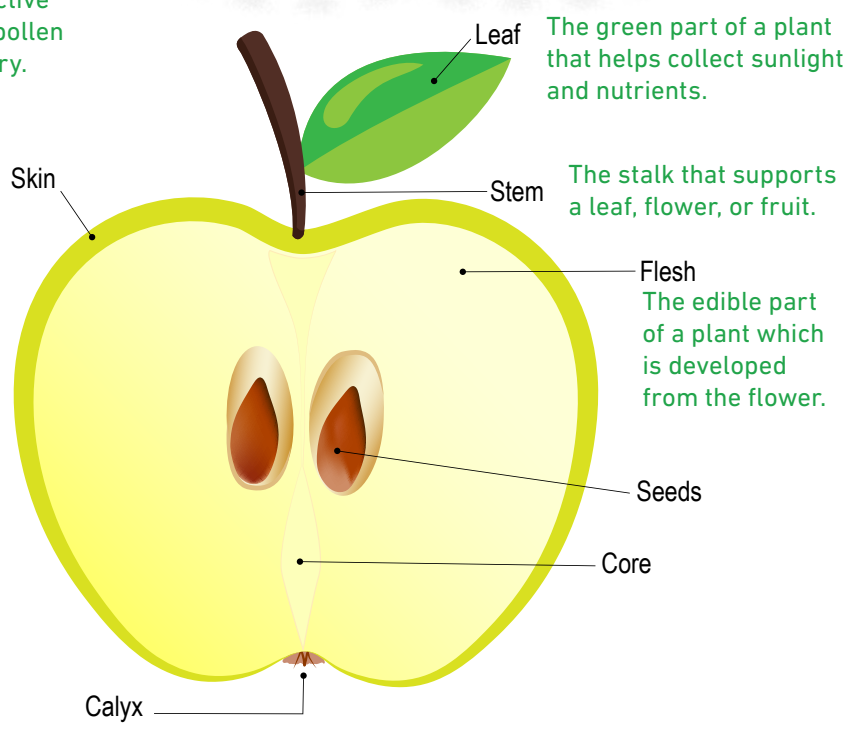
Apple trees, like all plants, go through a process called photosynthesis. The apples themselves also go through a process called respiration, or "breathing." During respiration, the apples take in oxygen and give off carbon dioxide, causing the starches to change to sugar which ripens the apples. In Controlled Atmosphere Storage, the respiration process is slowed down so the apples do not ripen quickly. Most varieties of apples can be stored for 12 months or longer! Because of Controlled Atmosphere Storage, we can enjoy apples all year round.

All it Takes is a Bee

Pollination is the process that allows plants to make seeds and reproduce. This happens when the pollen is transferred from the anther to the stigma. Apples, just like all other fruit trees, need a little more than just the wind to help with the transfer of pollen. Honeybees, mason bees, and bumblebees are the main pollinators of apples. The bees get signals from the smell of the flowers that there is sweet nectar inside their blossoms. As bees fly around collecting nectar to take back to the hive, grains of pollen from the blossoms stick to their bristly legs. Pollen grains are brushed off and picked up as the bees fly from blossom to blossom. When the apple blossom is pollinated, it will begin to develop into an apple. Many apple growers place beehives in their orchards to promote pollination.

Apple Anatomy





Flower: The blossom of a plant.

Nectar: The juice of a fruit that attracts the insects or birds which pollinate the flower.

Pollen: The yellow powder inside a flower which fertilizes other flowers.

Where Did Apples Come From?

The apple was brought to the United States by the Pilgrims in 1620. While the Native Americans taught the early settlers how to grow corn and vegetables, the settlers taught the Native Americans how to grow apples with apple tree seeds and seedlings. They used the apples to make apple juice, apple cider, dried apples, apple butter, and vinegar. The apples were even food for the pigs, cows, and horses! But what was the apple's journey before and after the settlers?

Prehistory: Carbonized remains of apples have been found by archeologists in prehistoric lake dwellings in Switzerland, dating back to the Iron Age. There is also evidence to show that apples were eaten and preserved by slicing and sun drying during the Stone Age in Europe.

1st Century: In the earliest writings of China, Egypt, and Babylon, records were found that mentioned that man understood the art of budding and grafting fruit trees.

1066: Apple Cider became a popular beverage in England.

1470: Bartholomeus Anglicus wrote his encyclopedia, one of the earliest printed books, which contains a chapter focused on the apple.

1560s: It became custom to serve roast apples with a saucer of caraway as dessert. This tradition is kept up in a few European Universities and old-fashioned London Livery dinners.

1622: Because apples are not native to America, early orchards produced few apples because there were no honeybees to pollinate. Shipments of honeybees were later sent to America.

1666: Isaac Newton witnessed an apple drop from a tree in the orchard of his childhood home, causing him to ponder why apples fall straight to the ground and not in other directions. In 1687 he published the Law of Universal Gravitation.

Image Sources: a) www.theconversation.com b) www.historydaily.org c) www.guinnessrecordsworld.blogspot.com

GALA

Crispy, juicy, and very sweet. Galas are ideal for snacking.

RED DELICIOUS

Sweet-tasting and best eaten fresh or in salads.

FUJI

Sweet flavor and firm, perfect for eating fresh.

GOLDEN DELICIOUS

A mild, buttery-honey taste that is perfect for pies and crisps.

GRANNY SMITH

Green-colored, crisp, and tart makes for a fun snack- try it with peanut butter!

HONEYCRISP

Explosive crispiness and sweet like honey, these apples are great for snacking, putting in salads, or making into sauces.

The Apple of Your Eye

What's your favorite kind of apple? There are nearly 100 varieties grown in the United States, but only a handful of those make it to the top of the charts and account for more than 90 percent of apple production. Listed above are a few of America's favorites.

A BUDDING IDEA

Apple trees are difficult to grow from seeds. It takes about 15 years for a tree grown from a seed to produce an apple. Because of this, most apple trees are propagated by grafting or budding onto already existing rootstocks. Rootstocks are the trunk portion of the apple tree with well developed roots.

Grafting, as shown in the picture to the right, is a process where growers will take a cutting from a tree they want and adhere it to the rootstock to get the cutting to grow and reproduce quickly. Many growers graft the branches of a desired type of apple tree to a rootstock to produce a new plant. Budding is a process where growers take one bud from a tree and attach it under the bark of the rootstock with glue or tape. New trees created by grafting and budding live in a protected nursery for about twelve months before they are replanted in an orchard.

Not only are these processes great for speeding up the apple production process, they are also beneficial for creating new varieties of apples. The combination of branches, buds, and rootstocks creates new genetic material which adjust the taste, color, texture, shape, resistance to diseases, and growing season of the apple.

Grafting in practice

Graft on an apple tree branch.

Create an Apple Chain

Materials:
Two red paper plates
Colored construction paper
Tape and yarn

Cut one of each shape out of construction paper: seed, tree, blossom, bee, little green apple. Punch hole on each side of the items, except the seed. Only punch one hole on one side of the seed.

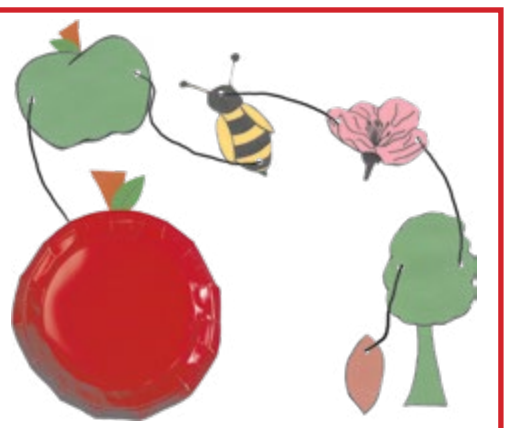
Flatten the two red plates and staple the edges together 2/3 of the way around, leaving the other 1/3 of the circle open.

Tape one end of a piece of yarn to the inside of the stapled paper plates and extend the yarn out of the opening.

Add a stem to the red paper plates so they look like an apple. You can even add a leaf if you would like.

Tie the little apple to the yarn coming out of the paper plates. Tie the bee just below the little apple, the blossom below the bee, followed by the tree and the seed, so they form a chain.

Tuck the chain and shapes into the apple. Starting with the seed, slowly pull the shapes out of the apple and tell the story of how apples grow.



Patterns are available at: www.agintheclassroom.org

1737: Prince Nursery, the first commercial apple tree nursery in America, was founded by Robert Prince in Flushing Landing, Long Island, New York.

1779: George Washington and Marquis de Lafayette mapped out Revolutionary War strategies under the shade of an apple tree.

1801-1841: Johnny Appleseed (John Chapman) dreamed of planting enough apple trees that no one would ever go hungry. He gave many seeds to everyone he met who was headed west.

b

1804-1806: Lewis and Clark explored the Northwest and sent many botanical treasures back to Prince Nursery.

1837: The Native American Tribe Nez Perce leader, Josiah Red Wolf, planted apple trees at Alpowa Creek in the state of Washington. He is one of the first Native Americans to have a European-style garden.

1843-1869: Covered wagons traveling the Oregon Trail carried apple seeds and "scion wood" for grafting as a part of their cargo. Families often planted apple orchards before the ground was broken for their log cabins.

1868: At 69 years old, Maria Ann Smith discovered a seedling growing by the creek on her farm property in Australia. This tree matured and grew what later became known as the Granny Smith apple.

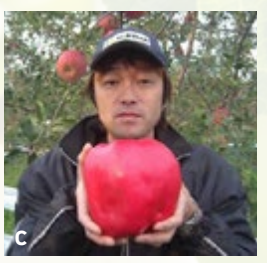
1847: Henderson Luelling traveled the Oregon Trail with his family. Three yoke of oxen were required to pull the lead wagon which held approximately 700 one-year-old fruit trees.

1875: On his farm in Iowa, Jesse Hiatt noticed a mutant seedling in his orchard. He chopped the tree down, but it grew back next season. He chopped it down again and it once again grew back and so he gave up. This tree produced what we now know as the Red Delicious apple.

1934: Gala apples were discovered in New Zealand. They are a cross between the Golden Delicious apple and the Kidd's Orange Red apple.

1939: The Fuji apple was 'founded' in Fujisaki, Japan. They are a cross between Thomas Jefferson's Virginia Ralls Genet apple and the classic Red Delicious apple.

October 24, 2005:
The largest apple ever picked from a tree was grown by Chisato Iwasaki at his apple farm in Hirosaki City, Japan. It weighed 4 pounds and 1 ounce!



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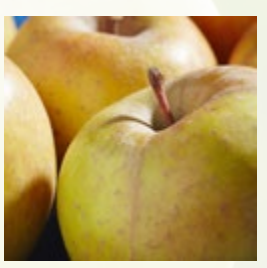
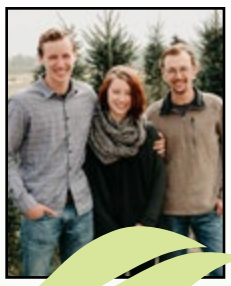
August 21, 2007: The GoldRush apple is officially made Illinois' State Fruit per State Public Act 95-0328.



CAREERS



Kuiper's Family Farm
Apple Producers

Wade & Kim Kuiper
Maple Park, Illinois
Size of Farm: 230 acres, 35 acres being apple trees
Year Established: 1998
Primary Market: Retail direct to customers at the farm

How would you describe your business?
Like many farms in Illinois we grow several crops, but the big difference with our farm is we invite our customers out to harvest our crops instead of doing that job ourselves. Each fall, people can come to our farm to pick their own apples or go out into our pumpkin patch to find just the perfect pumpkin. We also have a store they can visit and buy many things, including apple cider that we make here by squeezing the juice from our apples. We also use our apples to make caramel apples and everyone's favorite treat, our apple cider doughnuts! We know most kids do not get to grow up on a farm and we like to share some of those experiences with them, so we also have hayrides, farm animals to pet, giant mountains of straw to climb, and cornfields cut into maze designs to run through. In the summer, we host wedding celebrations for couples who want to have our beautiful apple orchard as the backdrop for their special day. They are so excited to be able to come back each year to share the place where they got married with their children as their family begins to grow.

How did your family get into the apple business?
Wade Kuiper, the head of the family, grew up on a produce farm in Geneva, Illinois. It was there he learned he loved planting things and watching them grow and that people wanted to come to his family's farm to buy the fruit and vegetables because they tasted good and were so fresh. He left the farm when he graduated high school and started working in the construction industry. Later when he and his wife Kim started their own family, Wade decided that he wanted to show his children what farm life was all about. So in 1993, they sold their construction company, bought an apple orchard across the road from their country home and started Kuiper's Family Farm. The Kuiper children, second generation farmers, are pictured above. Today, we produce apples, pumpkins, squash, gourds, and now sunflowers, too!

What kind of work goes into growing apples each season?
We tend to the orchard all year round. Our youngest son, Will, went to college to learn about caring for apple trees and is now in charge of our orchard. Each winter we spend hours and hours in the orchard trimming the branches back on the trees so they stay small and the apples grow big and healthy. In the spring when the trees are blooming we bring in honeybee and bumblebee hives so the bees can pollinate the trees. We are also mindful of the winter weather since there are things that can damage the trees and cause them to not bear any fruit. Very cold temperatures can freeze the buds and hail or high winds can knock the buds off. We also plant new trees in the spring. In the summer we monitor the trees and the growing apples to make sure there are no diseases or bugs that could harm them. If we see any we need to treat them right away to avoid ugly apples with spots or worms in them. Then as fall approaches we check the apples each day to see if they are ready to be picked by our customers. We currently grow over 40 different apple varieties which produce roughly 35,000 bushels of apples each fall. Apple harvest begins in August and runs through October each year, then we start all over again!

What do you enjoy most about your job?
We all enjoy seeing the customers who come to the farm each fall with their friends and families just enjoying a simple day together doing fun things like picking apples or enjoying a hayride or a hot dog while being outside. There is so little time in today's culture to spend quality time with loved ones so it's nice to see them unwind and enjoy an afternoon together. With social media now we can also enjoy the countless photos they tag us in so that's fun for us!

Rendleman Orchards
Apple Producers

Wayne & Michelle Rendleman
Alto Pass, Illinois
Size of Farm: 800 acres, 100 acres being apple trees
Year Established: 1873
Primary Market: Wholesale to food distributors, retail at family farm market

How would you describe your business?
Rendleman Orchards is a 6th generation centennial family farm. We are nestled in the hills of Southern Illinois' Shawnee National Forest. Since 1873, Rendleman Orchards has been committed to growing and shipping local, quality peaches, nectarines, apples and vegetables to the commercial produce markets throughout the Midwest. We are one of the few wholesale apple orchards left in the state of Illinois that is Globally Food Safety Certified. This prestigious food safety certification gives our farm the ability to sell our product to schools, grocery stores, and other institutions such as hospitals, restaurants, prison systems, food distributors, and food banks.

Rendleman Orchards is fortunate to have great buying partners. We try to stay in continuous contact with our buyers to keep them up to date on our apple crop. Each growing season is different and we like to let our buyers know about how many apples they can expect to get from us. Many of our apple buyers plan far in advance with the schools they serve so that they can have a good supply throughout the fall. We truck fresh picked apples weekly to our food distributors so that they have the freshest produce possible for their customers.

During our harvest season, which runs from June through October, Rendleman Orchards also offers our best quality farm-fresh, tree ripened peaches, nectarines and apples along with a wide selection of other fruits and vegetables, as well as jams, jellies, pickled items, baking and soup mixes, ciders, salsas, snack mixes, candles, linens, and apple cider donuts in our Farm Market. We have several value-added products made from our apples such as three different kinds of apple butter, three different kinds of apple sauce, apple cider, apple pies, and apple pie ice cream. For these items, we select certain apple varieties for specific products we are making because some apples are sweeter and some are more tart. We often mix varieties in products to create a depth of flavor! An online store featuring apple gift boxes and specialty food gift boxes are quite popular during the months of November and December! Rendleman Orchards also offers on-farm experiences such as hand-picking from our U-pick flower and pumpkin fields, playing with our farm goats, visiting the American flag mural wall, taking unique photos with our heritage farm implements, and various other special events.

How did your family get into the apple business?

With each subsequent generation, the farm grew and evolved. John and Isabelle's youngest son Grover, and his wife Iva, assumed the farm in 1906, raising asparagus, rhubarb, sweet potatoes, and corn for his truck farming operation. Grover also began to develop a fruit farming business with the strong influence of his wife's family who were prominent area fruit farmers at that time.

Union County was known for being the largest peach producing area in the state of Illinois. Peach orchards could be seen on at least one side of the road all the way from Bald Knob Cross to Anna, Illinois – a distance of 18 miles. As Grover's children grew, he and his son James (Jimmy), formed Grover Rendleman and Son, and by the late 1930s had expanded the original farm to include 540 acres. Despite the fact that many local fruit growers discontinued growing peaches all together, Grover Rendleman and Son continued operating as they had for the previous twenty years with peaches as their mainstay and summer apples as merely a supportive crop.

New apple varieties were also then planted in anticipation of the future market demands, and a new apple grader was implemented to pack the fall apples with more accuracy and ease.

The farm's first cold storage facility was added. The harvest was then handled by large bulk bins and forklifts rather than by simply manpower.

What do you enjoy most about your job?
The best part about being a farmer is that we know we are having a positive impact on the world! We are growing fresh, healthy food for our consumers. We employ a lot of people at the farm. Our favorite thing to do is talk about our apples in our farm market and give our customers an idea of what it is like to be an apple farmer!

Curtis Orchard
Apple Producers

Randy & Debbie Graham with Jeremy & Rachel Coventry
Champaign, Illinois
Size of Farm: 80 acres,
Year Established: 1878
Primary Market: Retail direct to customers at the farm and some to local distributors

How would you describe your business?
Curtis Orchard is an 80-acre apple orchard and pumpkin patch where we produce between 2-3 million apples and about 200-250 tons of pumpkins each year. Our farm also offers entertainment and activities for the whole family. We are open each year from July 20th through December 23rd. Our orchard country store and bakery offer a wide variety of gift and food items including pies, fritters, apple crisp donuts, award winning cider, preserves, popcorn, and gift items. Outdoor activities include seasonal apple and pumpkin picking, kids play structures, a petting zoo, and a toddler play area. In September and October, we offer weekend activities that include pony rides, an orchard wagon tour, a giant inflatable slide, jumping pillow and obstacle course, two mazes including a corn maze, and free live entertainment. Curtis Orchard also offers educational tours, birthday parties, corporate picnics, and other group events.

How did your family get into the apple business?
Curtis Orchard is part of an Illinois Centennial farm established in 1878 when George Curtis moved to Champaign, Illinois from Indiana. The family raised grain and livestock until Paul and Joyce Curtis planted the first apple trees in 1977. They planted the first 700 trees even though they didn't know the first thing about growing apples! Today, my wife Debbie, Paul's daughter, and I co-own Curtis Orchard with our daughter Rachel and her husband Jeremy.

What type of products do you make from your apples?
We offer many apple-based products at our farm and sell them at our farm's market. Everything from apple cider and applesauce to apple donuts, apple fritters, and apple pies. It takes about 30-35 apples to make a gallon of cider, but only about six or seven to make a quart of applesauce. A 10-inch apple pie also requires about six apples. For sweet treats like pie, we use a tart apple like Jonathan or Granny Smith because the tart apple produces more apple flavor when paired with the sugar in the pie. For applesauce we use a combination of Golden Delicious and Jonagold apples with no sugar added. This makes a nice, balanced, flavorful sauce that is not too sweet and not too tart. When we make our apple cider, we use a combination of six to twelve varieties commonly. Apple cider making requires constant tasting to maintain the desired balance of flavor throughout the batch. The skill for this is developed over many years.

Of course, we offer pies and things made from other fruits as well, and our pumpkins make the best pies and pumpkin bars you've ever tasted. We are also famous for our honey and in 2016, Curtis Orchard honey was voted Best Tasting Honey in the World at the International Black Jar Honey Contest!

What do you enjoy most about your job?
Paul Curtis still lives on the farm and has watched his vision of reconnecting people to the soil come to pass far beyond his wildest dreams. We are grateful to see families with members of all ages exploring the farm together. It amazes us to watch the fascination people experience picking their first apple or pumpkin. Remarkably, Paul has also seen a farm that could not sustain one family increase revenue to the point where it now supports five families year-round and 150 families throughout the fall busy season.

This Ag Mag complements and can be connected to the following Common Core and Next Generation Science Standards:

Common Core State Standards: ELA-Literacy. RI.4.2; RI.4.3; RI.4.4; RI.4.7; RI.4.10

Next Generation Science Standards: From Molecules to Organisms: K-LS1; 1-LS1; 4-LS1-1; 5-LS1 Heredity: 3-LS3

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