



Plants in the Classroom: The Story of Oklahoma Pecans

EXTENSION

September 2020

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Introduction

Oklahoma is a major agricultural state and produces winter wheat, hay, cotton, peanuts, sorghum and other field crops. It's specialty crops include fruits, vegetables, nuts and horticultural crops such as bedding plants and flowers. One of the major specialty crops in Oklahoma is the pecan. It has a long history in the state and is part of the state meal.

Habitat and Early Spread of *Carya* Species

The pecan is the only major nut native to America. A member of the Juglandaceae family, along with hickories and walnuts, the pecan's scientific name is *Carya illinoensis* – "carya" from the Greek word for walnut and "illinoensis" from Illinois, where it was first described.

The Juglandaceae family arose during the Cretaceous period, about 135 million years ago, when temperatures were about five degrees warmer than today. The *Carya* genus was originally found in North America, spreading east to Europe and Asia via the North Atlantic land bridge over 5 million years ago. Climate cooling caused regional extinctions across Europe, so now North American *Carya* species are distinctly different from the Asian *Carya* species.

The native range for pecans is from northern Mexico to northern Illinois, and from central Texas to central Arkansas. Preferring well-drained loamy soil along rivers, pecan trees are well-adapted to deal with a wide variety of precipitation, temperature (heat waves as well as ice storms) and soil types, and can be cultivated worldwide.

Pecans and Native Americans

Archaeologists found human waste showing pecan remnants near the banks of the Rio Grande and calculated that humans have been eating pecans in North America since at least 6,750 BCE. Many tribes of Native Americans have both eaten pecans and used them for trade, presumably for hundreds of years prior to European contact. The word "pecan" derives from the Algonquin language term "pakani," meaning "a nut too hard to crack by hand."

Pecans traveled with Native American tribes all over the southern part of what is now the United States. Mescalero Apaches, nomadic hunters in the American Southwest, followed and hunted bison herds from New Mexico to Texas, where they gathered pecans. When they headed back west to New Mexico from their winter camps in central Texas, they brought pecans back with them. The Iguaco, from coastal

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Texas, gathered pecans when they traveled in the winter to the Colorado River, staying there for six months; pecans were a major part of their winter diet. Pecans were traded between tribes, especially those from outside the native range of the pecan; trade items found in Native American burials indicate a large trade network that reached into Arkansas, Alabama and Florida. Pecans also were traded with early explorers; the Jumano Apaches had villages throughout New Mexico and Texas and traded with Spanish explorers upon meeting them by chance. The explorers had come into central Texas looking for freshwater pearls, but found good trading in buffalo skins and pecans with the Jumanos.

Pecans were an important food source for Native American tribes, providing many more calories than other foods like fruit or corn. Pecans are rich in oil, about 72% fat and fat

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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President for Agricultural Programs and has been prepared and distributed at a cost of 20 cents per copy. 09/2020 GH.



was scarce in many Native American diets. Pecans also were easier to transport and didn't have to be dehydrated like root crops to save space and extend storage life (root crops are about 80% water and less than 1% fat). They also could be gathered in large quantities, since the trees were concentrated along rivers. The Mariame tribe in Texas ate pecans for one or two months a year, according to Cabeza de Vaca. They were joined by other tribes from up to 75 miles away during harvest. According to Wells (p. 18), Juan Sabeata, a Jumano who lived in west Texas in the late 1600s, told explorers: "The river which they call Las Nueces is a three day's journey from that place; that there are nuts in such abundance on this river that they constitute the maintenance of many nations who enjoy friendship and barter and exchange with his."

In the early 1700s, missionary Isidro Félix de Espinosa wrote in his diary that the Payaya of Texas gathered large quantities of pecans during harvest, saving them for food by burying them in the ground, as well as storing them in leather pouches. One family of the Creek was observed storing up to 100 bushels.

In addition to being used as a food source, pecans were used in other ways by many Native American tribes. Pow-hiccora (from the Algonquin word for "hickory") is a drink made from fermented hickory or pecan nuts. It was consumed by some tribes during religious ceremonies and to enhance bravery in battles. The Comanche tribe ground pecan leaves into a poultice to treat ringworm. The Plains Apaches used the wood for handles on tools, while Kiowa tribes boiled pecan bark and gave the extract to sufferers of tuberculosis to "build up the lungs." The Lumbee used bark tea to treat upset stomach. The importance of the pecan to Native American tribes is illustrated by an ancient Caddo tale:

THE OLD WOMAN WHO KEPT ALL THE PECANS (told by Wing)

"There lived an old woman who was mother to all the pecan trees. She owned all of the trees and gathered all the nuts herself. When people went to her lodge she would give them a few pecans to eat, but would never allow them to take any away. The people were very fond of pecans and they wanted some for their own use, but the old woman would not let them have any. One time, the people were very hungry and the old woman had everything in her lodge filled with pecans, but she would give them only a few when they went to see her

and she made them eat them before going away. This made the people angry and they decided that something must be done.

There was in the village an old man who had four little sons who were very troublesome and meddlesome. The people—they were the field Rats—thought that these four little boys would be the right ones to go over to the old woman's house some night to try to steal some of the nuts. They chose the four boys both because they were small and quiet and sly and because they were such a nuisance around the village that they would be no great loss to the people if the old woman killed them. The Rats were willing to go because they were always glad to be meddling. They chose one to slip over and make sure that the old woman was asleep. He went to her lodge and peeped in through a small crack and saw that she was still at work. He waited until she finished her work and went to bed; then when he heard her snore he ran back home to tell his brothers to come. When he went inside his father's lodge he saw a stranger sitting there. The stranger was Coyote. He had come to tell the Rats not to trouble about stealing pecans from the old woman, for he was going over the next day and kill her. Coyote was afraid to trust the Rats. He wanted to go himself, so he could get the most of the pecans. The next morning he went over to see the old woman and acted very friendly. The old woman gave him some pecans and he sat down and ate them all up. Then he asked her for some more, and as she turned around to get them he pulled out his stone knife and struck her on the head. She died, and ever since then, the pecan trees have grown everywhere and belong to all of the people (Dorsey, p. 52)."

To help the pecan trees grow, Native Americans cleared competing vegetation in pecan groves in order to allow the pecan trees to thrive. This also may have been done to increase food sources for animals they hunted. Because of the value of pecans, many tribes probably planted and tended pecan groves. There was a significant amount of Native American canoe traffic on the Mississippi River and tribes may have planted pecans along the river, extending the range of the pecan. When the Cherokee were forced to move in the 1830s during the Trail of Tears, they settled along the Arkansas River. They cleared land to plant crops but left the pecan trees.

Natural Dispersal of Pecans

In addition to being helped by Native American tribes, pecans were also passively cultivated in their native range by animals such as crows, foxes and squirrels. These animals dispersed the nuts, choosing the ones that were easiest to crack, naturally selecting for thinner-shelled nuts.

Squirrels, crows and blue jays are still major dispersers of pecans. They prefer pecans to other hickories and oaks. Squirrels bury pecans in many locations and are good at recovering almost all of the nuts they bury. Squirrels can hoard up to 25 pounds of pecans a year, but many forgotten pecans grow into trees. Crows store their pecans along fencerows and forest edges and can carry pecans several miles from the tree. Blue jays, with their short beaks, eat smaller nuts but can carry several at once, although not very far (less than a mile). They hold the pecan while cracking the shell, accidentally dropping pecans along fence lines and trees. Blue jays also store pecans. These animals help spread pecans wherever they go.

Pecans should always be stored in a refrigerator or freezer. If stored properly in a freezer, pecans can maintain their quality for more than two years. It is best to store pecans in airtight containers. They can be repeatedly frozen and thawed without losing their texture or flavor.

Interesting Kernels of Information About Pecans

- How do you pronounce pecan – puh-KAHN, PEE-kahn or PEE-can? "Pecan" comes from the Algonquin word "pakani" and evolved into the American-French "pacane." The National Pecan Shellers Association did a survey on pronunciation of the word pecan, finding 45% of Americans say PEE-can, with the other 55% split between "puh-KAHN" and "PEE-kahn."
- There are more than 1,000 recognized pecan varieties today. Pecan trees can live up to 150 to 250 years, attaining heights of 80 to 100 feet.
- During the Great Depression, one of the WPA projects in Okemah was a sports arena known as the Pecan Bowl.
- Most plants have root hairs, which expand the surface area of the root and allow for more uptake of nutrients. Pecan trees do not have root hairs. They do, however, have mycorrhizae. Mycorrhizae are beneficial fungi closely associated with the roots of many types of plants. In this symbiotic relationship, the fungi receive carbohydrates from the plants (fungi do not photosynthesize and make their own food), and the plants get access to more water and nutrients (hundreds and even thousands of times more nutrients) when the fungus colonizes the plant roots (essentially acting like root hairs for the plant). The fungi surround pecan tree roots and form a dense covering called a mantle, which further assists the tree by protecting the roots from harmful microbes and actually produces antibiotics to help the tree stay free from infection. This relationship is such a good deal for the pecans that producers often inoculate the roots of trees with the fungus.
- Some pecan trees have truffles. Truffles are fungi that grow underground near tree roots and are highly prized in European cuisine. The pecan truffle (*Tuber lyonii*) has been found in pecan orchards in Texas, Florida, Georgia and New Mexico. It is sometimes found under native Oklahoma pecan trees. It's the size of a golf ball and looks like a small, brown potato. The edible part is in the top couple of inches of soil under the tree and is not attached to the tree roots. Truffles are worth a lot of money but are not visible above the surface, so pigs and dogs are trained to find them. Pecan truffles bring in \$100 to \$300 per pound, as opposed to their European counterparts (that bring in \$600 to \$1,000 per pound).
- Pecans are related to walnuts, which are allelopathic. Walnut trees produce a compound called juglone in their leaves, hulls and inner root bark that causes nearby trees to yellow, wilt and even die. This is a method of keeping competing tree species away from the walnut so it can utilize all the nearby resources when growing. Pecans also produce juglone, but at lower levels.
- Okmulgee has a Pecan Festival every June. World records have been attempted (and set) during the festival. In the late 1980s, the world's largest pecan pie was baked in

Okmulgee. It was 40 feet in diameter and weighed more than 16 tons. In 1990, the biggest pecan cookie was 32 feet in diameter and weighed 7,500 pounds.

- The Oklahoma state meal includes barbecued pork, chicken-fried steak, sausage with biscuits and gravy, fried okra, squash, grits, corn, black-eyed peas, cornbread, strawberries and pecan pie.
- In 1949, Chandler was declared by the state legislature as the "Pecan Capitol of the World."
- In 1965, Basil Savage of Madill built a prototype pecan trunk shaker that was affordable for small producers. He later developed harvesters, sprayers, crackers and processing equipment to keep pecan production affordable for the smaller producers. The largest pecan equipment dealer in the world, Savage Equipment, is still located in Madill.

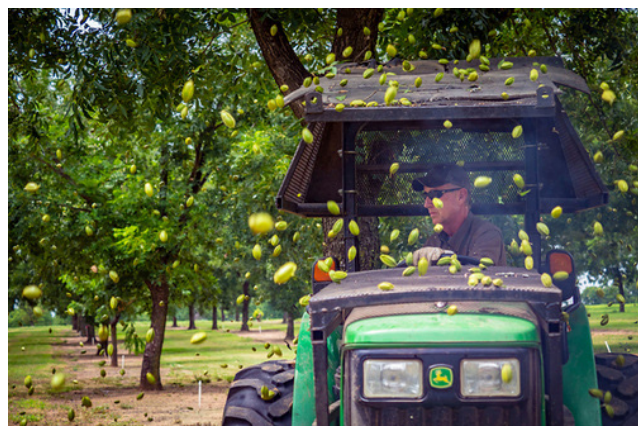
Conclusion

America's only native commercially produced nut has a long history in the southern U.S., including Oklahoma. Having been overlooked at times, poached, cultivated and finally improved, the pecan has played an interesting part in the agriculture industry. Its great taste has won over Native Americans, European explorers, settlers in its native area and even people from other countries. Oklahoma researchers have contributed greatly to the development, cultivation, harvest and use of pecans. From the state meal to the world's largest pecan pie, Oklahoma loves its native nut.

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reproductive activity (a phenomenon called “masting”), their alternating heavy- and light-yield years create a big problem for pecan producers. Dr. Smith found a way to manage the boom and bust cycle of improved cultivars and get a good crop every year. By shaking the trees in late summer, producers can reduce the overabundance of nuts during high-yield years, which allows the tree to save some of its energy to make a bigger crop during the low-yield years without putting too much of a dent in the current crop. Also, nut quality is better in crop-thinned trees, so not much income is lost on the current crop. Trees with too many pecans relative to the number of leaves produce smaller, poor-quality nuts, are more likely to incur cold injury in winter and may even weigh so much it causes branches to break.



To get a good crop, orchards planted to improved cultivars need to be sprayed for insects and disease, fertilized, pruned, irrigated and crop-thinned, as well as properly spaced to maximize sunlight exposure on each tree. Pecan trees can use up to 150 gallons of water a day during the summer! Native trees also need proper spacing, as well as fertilizer and insecticide applications. This is all very expensive, so pecan orchards are typically large to justify the expense, usually at least 40 to 50 acres. To protect the large investments of producers, specialists in horticulture and entomology at OSU produce Extension fact sheets on the control of pecan pests and diseases, especially the pecan weevil. Since 1997, the OSU Department of Horticulture and Landscape Architecture has hosted a monthly Pecan Management Course for new and experience growers. More than 600 students have completed the course, which runs from February (when pecan trees are dormant) to the harvest in October.

Noble Research Institute’s Contribution to the Pecan Industry

In 1973, the Noble Foundation acquired Red River Farm in Oklahoma. Since then, they have been engaged in pecan research on their 450 acres of pecan orchards. Two of the 10 horticulturists in the U.S. who specialize in pecans work at the Noble Research Institute. Researchers throughout the Institute work on issues important to producers, such as pecan diseases (like pecan scab), management practices, pests, leasing orchards, recommended pecan varieties, rootstocks and controlling animal predation of pecans.

China and Pecans

In 2009, Chinese consumers bought more than a quarter of the U.S. pecan crop (83 million pounds out of 300 million pounds produced). In the year 2000, there was not even a Chinese word for pecan, and in 2004 only 2 million pounds had been exported to China. The sudden increase in pecan export to China occurred for several reasons. A rapidly expanding Chinese middle class and upon being introduced to pecans, didn’t mind spending \$6 for a 9-ounce bag of pecans – which brought more money to U.S. farmers. In 2007, a bumper crop of pecans in the U.S. occurred simultaneously with a small walnut crop in China, and the Chinese purchased 47 million pounds from the U.S. At the same time, U.S. pecan organizations started aggressively marketing to China, as China was in a “health craze,” and associated pecans with longevity because of their high antioxidant properties. Pecans also are a favorite during the Chinese New Year. Pecans had been introduced to China multiple times in the early 1900s by missionaries and visiting scientists, but the land suitable for pecan production is mostly used for crops such as rice, corn and soybeans that are necessary to sustain an increasing population.

The native Chinese hickories have small nuts with a very little kernel inside and they are hard to crack. When Chinese consumers were introduced to pecans with a soft, large kernel and buttery flavor, they became very popular. The U.S. now produces more than 300 million pounds of pecans a year largely fueled by their popularity in China. Unfortunately for American consumers, the Chinese demand for pecans prices American food producers out of the market, and pecans are not found in processed foods as often as they were when pecans were plentiful and subsidized by the government. There also is additional competition from new pecan production in Australia, South Africa and other countries, as well as some in China.

Health Benefits of Pecans

Pecans are a very healthy part of a diet, referred to as “nutrition in a nutshell.” More than 90% of the fat is unsaturated and pecans are one of the foods with the highest phenolic acid, a very potent antioxidant. Antioxidants protect the body from diseases such as cancer and lessens the risk of Parkinson’s and Alzheimer’s diseases.

The American Heart Association has labeled pecans “heart healthy.” Nut consumption lowers cholesterol, maintains a healthy blood pressure and sustains normal blood flow to tissues – preserving the health of blood vessels and slowing hardening of the arteries.

Pecans are 9% protein, have very few carbohydrates, no cholesterol and contain more than 19 vitamins and minerals. Eating just one ounce of pecans provides 10% of the daily recommended amount of fiber. Pecans can be used in gluten-free recipes. Pecans also help with weight control, since they have a lot of fat and fiber, which helps with the feeling of fullness.

Tips for Buying and Storing Pecans

Look for plump pecans uniform in color and size, with no cracks or holes. The nuts should not rattle when shaken, which signals a shriveled pecan. Shelled pecans should be plump and not shriveled. Fresh pecan kernels are light gold in color; dark pecans can indicate rancidness.

In addition to animals, water also helps distribute pecans. When pecans fall near waterways, they can be washed into creeks, tributaries and rivers and can travel many miles from their origin.

Pecans (Finally) Get Appreciated Outside Their Native Range

When Spanish and French explorers encountered the pecan, they believed it to be a walnut, which was prevalent throughout Europe. But this “walnut” looked different and still tasted good to them. Pecans traveled east with Christopher Columbus’ exchange, but didn’t catch on in Europe; Europeans preferred the familiar walnuts. In fact, when Europeans settled in the northern U.S., they planted walnuts they had brought with them. Pecans naturally grow mainly in the southern U.S. but the Europeans didn’t even try planting any pecans in the north.

Gradually, pecans became known outside of their native range and by the mid-1700s made their way to New England. Fur traders had returned to New York with pecans from the Mississippi area. In 1772, the first documented pecan planting in the U.S. occurred at Prince Nursery on Long Island, New York. In 1775, George Washington planted pecans at Mount Vernon. He loved the taste of them and, according to a Frenchman who served with Washington in the Revolutionary War, “always has these nuts and was constantly eating them” (Wells, p. 28). Thomas Jefferson also planted large amounts of pecan trees at Monticello.

Settlers in the native pecan regions of what is now the U.S. would harvest the nuts and even thin native pecan groves to leave the trees with the best crops, but made no attempt to farm them. Pecan trees were mostly overlooked except for every couple of years when a big harvest was available. When Texas lumber was being heavily harvested to ship northeast in the late 1800s, pine trees were the trees harvested and pecan trees were left in place, since the pecan wood is inferior to other woods for most uses and takes too long to dry. Even when cotton was planted widely across the southern U.S., pecans were left along riverbanks, which often flooded and were not good cotton-growing areas. By 1925, the pecan’s ability to withstand flooding was appreciated by farmers in Oklahoma. Thanks to their unfavorable wood, tasty nuts harvested with no inputs required, and the ability to withstand riverbank flooding, the pecan quietly flourished while escaping “the full grasp of agriculture science longer than any other commercial fruit or nut crop in the history of American plant life (McWilliams, p. 52).”

People in the south-central U.S. gradually realized the pecan’s potential as income and trade. Between the 1850s and 1900, pecans were increasingly harvested with competition among people to gather the most pecans when they were ripe. When demand was more plentiful than supply (early in harvest season), children were sent into pecan groves to gather as many nuts as they could, often climbing into trees to knock the nuts down. Sometimes trees were cut down in order to reach the nuts (which not a sustainable harvest). In 1902, one girl got to the nuts at the very top of the tree in a hot air balloon anchored by a group of men, and shook many pecans out. The competition to gather the most pecans was so fierce that pecan poaching was not uncommon.

The centers of agriculture for exporting pecans were in Texas and Louisiana, as the south had the densest population of native pecans. With increasing demand, more formal pecan orchards began to take shape, although they were few and far between. Commercial production of pecans started in the U.S. in the 1880s, but even by 1899, pecan production was “dead last among all American-grown nuts (McWilliams, p. 49).”

The Beginnings of Pecan Crop Uniformity

Just like people, pecans are not clones of their parents; planting seeds from a strong tree with bountiful harvests of quality nuts does not guarantee similar traits in the offspring. Pecan trees have both male and female flowers, but they mature at different times to prevent self-fertilization. This produces nuts of varying qualities. The quality of nuts a tree will produce is not known for many years; pecan trees do not start producing nuts until they are between 15 and 20 years of age. Methods to guarantee consistent, high-quality nuts were necessary before pecans could become a significantly viable means of income.

Such consistency is achieved through grafting. Grafting is the process of taking the most desired parts of different plants and joining them so they will grow as one. Trees that provide the root system of the graft are called the “rootstock.” Aboveground sections of the graft are provided by “scions” – the buds or branches taken from the tree with the desired pecan characteristics. The top part of the grafted tree will be a clone of the desired tree. Grafting provides a way to eliminate variability and guarantee a consistent crop of high-quality pecans. Grafted pecan trees also produce a crop faster than native trees; grafted pecan trees start producing at six to eight years of age, though full production often doesn’t occur until 10 years of age.

Grafting has been used for thousands of years with other crops—at least since the time of the ancient Greeks—but was not seen as necessary with the pecan, as they produced usable nuts naturally. Abner Landrum was the first to successfully graft pecans and even wrote an article recommending the process in an 1822 publication of the *American Farmer* publication. Grafting pecans did not catch on until the mid-1800s, when a plantation slave named Antoine, successfully grafted pecans on the Oak Valley Plantation in Louisiana. Upon examination of Antoine’s pecans, the head of agriculture at Yale remarked that Antoine’s variety produced large, tender-shelled pecans of “very



special excellence (Wells, p. 40).” His grafted trees became a variety named Centennial, the first improved pecan to be widely distributed. The variety was named Centennial because it was introduced to the world at the Centennial Exposition, the first World’s Fair in the U.S. More than 10 million people attended the Exposition, in which the telephone, typewriter and Heinz ketchup also were first introduced, as well as the right arm and torch of the in-progress Statue of Liberty.

Novel Pecan-Producing Ideas that Didn’t Catch On

Trees tend to grow better in loose soil because their roots are not impeded. In the early 1900s, loosening soil was one suggested use for dynamite. In 1911, Dupont published a brochure named “Farming with Dynamite: A Few Hints to Farmers.” Suggestions were made to use dynamite to dig holes, break up hardpan and clear land, among other uses. A Mr. Bolinger in Louisiana used dynamite to make holes to plant 1,080 pecan trees. He explained, “A 2-inch hole was bored about 4 to 4.5 feet deep. In the auger hole, one stick of 40% dynamite with fuse attached was inserted, the hole filled and lightly tamped; then exploded. The explosion created a space of about the size of an ordinary barrel. The ground was not blown out but was simply raised on the top about 3 or 4 inches. In almost every case, however, it could be seen that the ground had been thoroughly loosened up for a distance of 10 to 15 feet around the hole.” (Wells, p. 111). Even university experts condoned the use of dynamite in planting orchards. Studies with apple, peach and pear trees showed conflicting results of the effects of the use of dynamite regarding root depth and strength, growth, circumference and yield. The overall conclusion was the benefits did not outweigh the expense and danger of using dynamite.

Another (safer) novel idea involved weed control and fertilizer. Since there is no profit for almost 10 years even after planting grafted pecans, some farmers raised cattle in the orchard. This allowed the land to still provide an income, and also was a source for weed control and fertilizer. In the 1930s, Deane Stahmann of New Mexico removed his cows upon realizing the downside of having cattle in the orchard – soil compaction and damage to the trees. Still wanting natural fertilizer and weed control, he introduced 25,000 geese to his orchards in 1953. His trees still got fertilized and weeded, but with no soil compaction or tree damage. He increased his flock to several hundred thousand, and leased some out to other farmers as well. At one time, he was the largest producer of geese in the world. Eventually herbicides replaced the geese.

The Increase of Pecan Consumption

When the French immigrated to Louisiana and brought along their cuisine, it included the praline. Almonds were in the original praline recipe. While almonds were rare in colonial Louisiana, pecans were not and they became part of the ubiquitous Louisiana treat. In a 1758 book on Louisiana history, the author reported that the pralines made with pecans were as good as the ones made in France with almonds.

During the Civil War, pecans were consumed to compensate for staple foods that were scarce, and Union soldiers became acquainted with the pecan while fighting in the South. Around that time, John Harvey Kellogg was born in Michigan.

Kellogg’s father was one of the founders of the Western Reform Institute, a health clinic that specialized in vegetarianism. After John Kellogg got his medical degree, he took charge of the Institute and served only vegetarian foods, using nuts and seeds for protein sources. The pecan was one of his favorites and he considered it one of the most nutritious food sources. An excellent promoter, Kellogg influenced the popularity of pecans through more than 5,000 public presentations. By the late 1800s, the invention of the nutcracker and nut pick, which made nuts (including pecans) easier to shell and eat, also contributed to the increasing consumption of pecans and other nuts.

During World War I, pecan consumption increased as it had during the Civil War because nuts were an alternative for rationed meat. After the war, when pecan consumption declined and there were still millions of pounds of pecans to be sold, one producer was determined to increase pecan consumption and held a national contest for pecan recipes. After testing 21,155 recipes from 5,083 homemakers, the winning recipes were published in 1925 in *800 Proved Pecan Recipes: Their Place in the Menu*, the largest collection of pecan recipes ever assembled.

One of the biggest uses of pecans is in desserts, especially pecan pie. Pecan pie in today’s form (with Karo Syrup instead of molasses or sorghum), was developed after Karo Syrup was created in 1902. One of the earliest recipes with Karo Syrup in the pie was written down by Mrs. Frank Herring in Sallisaw’s *The Democrat-American* on Feb. 19, 1931. Bama Pies, headquartered in Tulsa since 1937, and major supplier of hand-held pies to fast food restaurants since the 1960’s, had a legacy of pecan pies loaded with pecans and a special blend of light and dark Karo syrups (that flavor was discontinued in the early 2000’s). Their pecan pie slogan was, “Be careful with ‘em—they’re about half nuts (Boudreau).”

Pecan production increased nationwide in the 1940s. Oklahoma harvest 12,007,662 pounds of pecans in 1940. Even with the increase in production, consumption was still less compared to other nuts because pecans were more expensive. Pecans often were reserved for special occasions and were not part of the daily American diet, as were sugar and corn, for example. All of those extra pecans had to go somewhere, and World War II helped impact where those pecans went. Since one ounce of pecans has the same protein of two ounces of lean meat, the USDA touted the pecan’s protein content as a meat substitute during food rationing. Newspaper and magazine food writers noted that pecans (among other nuts) are at least half fat, and suggested that readers use them in place of shortening. In 1943, the federal government put a price ceiling on pecans to encourage consumption, but that angered the pecan growers, so the government bought the surplus pecans. Much of the surplus went to the school lunch program and soldiers received care packages that included “pecan caramel rolls.”

Post-war, the USDA encouraged Americans to consume pecans as a demonstration of national pride. Other factors also spurred an increase in pecan consumption. The mail-order industry was starting to mature, and pecans were a good fit since they can be shipped and stored for months at room temperature. Pecans were increasingly used in commercial preparation of foods, specifically frozen foods, which could be shipped throughout the country (this is how the pecan pie became popular). The USDA’s Recommended Daily Allow-

ances (RDAs) were developed during World War II and led to more consumer interest in healthy diets, of which pecans are a part. In addition to being consumed, pecans also are part of non-food products, such as pecan shell mulch, plywood filler, heavy metal absorbent and even oil filters.

In the 1960s, NASA was searching for lightweight, nutritious snacks that didn’t need refrigeration and could be eaten in the weightless conditions of the Apollo missions. Pecans fit the bill and went to the moon on the Apollo 16 and 17 missions of 1972. By the 1980s and 1990s, pecan use in cereals was common because a little bit of pecan added many vitamins and minerals.

Oklahoma’s Pecan Industry

Pecan country covers half of the Oklahoma, from Miami in the northeast, to Frederick in the southwest and east to Hugo.

Pre-statehood, steamboats were used to move goods along rivers, both to and from the Oklahoma and Indian Territories. Starting in 1824, Fort Gibson, along the Arkansas River, was a major site of commerce – pecans and hides were the earliest products included in the exports. Pecans have been continuously grown in Oklahoma since it became a state, with the 1910 U.S. Census of Agriculture recording more than 150,000 trees and a harvest of 894,172 pounds of nuts. By 1920, the Oklahoma pecan industry had grown to more than 500,000 pecan trees and more than 4 million pounds of Oklahoma pecans harvested. By the late 1920s, Frank Cross and D. C. Mooring, from the Oklahoma Agricultural and Mechanical College’s (now Oklahoma State University) Horticulture Department were grafting “paper-shell” pecan varieties onto strong native trees. These two professors, along with Herman Hinrichs and Fred LeCrone, formed an annual pecan show with prizes awarded, in order to find good trees to use in early grafting experiments. The Oklahoma Pecan Growers Association still holds the annual pecan show near Beggs, Oklahoma. One of the first graduates of Oklahoma Agricultural and Mechanical College, Homer Adams, was one of the earliest to plant a commercial pecan orchard and largely used the early grafts resulting from the Oklahoma A&M Horticulture research.

In 1939, a pitcher for the New York Giants, Carl Hubbell, became interested in pecan production. From Meeker, Carl donated \$150 for the purchase of a traveling plaque that would be exhibited in the Extension office of the county growing the winning pecan at the yearly show. Named after their growers or where they were first found (such as Maramec from Maramec, Oklahoma), some winning varieties in the pecan show were Mount, Oakla, Patrick, Hayes, Cowley and Gormley. Examples of many of these are on display in the Herman Hinrichs Conference Center at the Cimarron Valley Research Station north of Perkins, Oklahoma.

Harvested pecans were originally shelled by hand, sometimes being sent to cities for help with the task. By the 1920s, pecan shelling was mechanized. Harvested pecans are put in large drums and spun to remove debris, then graded, sterilized, soaked to make the shell easier to crack and fed into cracking machines, where the meat is separated from the shell. In 1925, Okmulgee alone had four pecan shellers. By 1926, Ardmore area farmers had formed the Oklahoma Pecan Growers’ Association and every June they have their

annual meeting with education sessions, demonstrations and tours. As of 2019, 240 pecan growers were members.

Fifteen states grow pecans commercially, all of them southern states, since the pecan needs over 200 frost-free days to produce a crop. Oklahoma producers average about 15 million pounds of pecans a year, putting Oklahoma consistently around fifth in overall pecan production, but usually second for native pecan production. Oklahoma and Texas produce the most native pecans. The top three pecan-producing states, counting native and improved varieties, are Georgia, New Mexico and Texas.

Oklahoma’s pecans are grown in 60 of Oklahoma’s 77 counties, but much of the crop is not harvested consistently. This is because many of the native groves are unmanaged, and pecans are only harvested if the prices are high and the yield makes harvesting profitable. Of the 104,000 acres in pecan production in the state, 75% are native pecan trees, often grown in fields also used for cattle production. Oklahoma farmers are increasingly planting groves of improved varieties, especially as advanced mechanization makes the production easier.

OSU’s Contributions to the Pecan Industry

In 1946, OSU Extension established the Pecan Research Station in Lincoln County, which operated until 1990. Pecan trees were then planted at the Cimarron Valley Research Station in Payne County. Horticulture professor Herman Hinrichs discovered that properly spacing pecan trees increases production. He also invented a tree-shaking pecan harvester. By 1953, Oklahoma was the second or third largest pecan-producing state, with 27,600,000 pounds of pecans produced. Pecan growers started working with Frank Cross, the head of the OSU Horticulture Department, to experiment with disease-resistant pecan varieties. Around this time, equipment design progressed to make pecan harvest easier. Trunk shakers and self-propelled harvesters negated the need for harvesting nuts by hand off of the ground.

OSU continues to produce valuable research into pecan production. Dr. Michael Smith experimented with crop load management to help alleviate a big problem in pecan production, that of “masting.” Pecan trees are alternate-bearing, and produce heavy crops one year and lean crops the next year or even longer. When pecans in a large area synchronize their

