

Chapter 12—Nuts

Description of the Product and Its Uses

Nuts are a dry fruit consisting of a kernel or seed enclosed in a woody shell. The nut itself is widely used in candies, baked goods, and ice cream. It is an excellent source of protein. The shells of various nuts also have many industrial uses, including use as cleaning abrasives and as additives to chemical products such as glues, paints, and explosives. Uncracked nuts are also used as a decorative material for centerpieces and gifts (table 12–1).

Table 12–1. Nuts commonly used for food and commercial purposes

Beechnut	Hickory
Butternut	Pecan
Chestnut	Persmmon
Golden chinquapin	Piñon pine
Hazel nut	Walnut

Acorns

There are more than 60 species of oak trees throughout North America, and all produce edible acorns. Oaks are broadly divided into two groups: red (or black) oaks, which produce nuts with a bitter taste (a result of high tannin content), and white oaks, which contain less tannin and are considerably sweeter. The annual nut crop from oak trees in North America surpasses the combined yearly yield of all other nut trees, both wild and cultivated. Acorns provide a complete vegetable protein, up to 7 percent by weight in some species of oak. More than half their bulk consists of energy-rich carbohydrates.

Beechnuts

The American beech (*Fagus grandifolia*) is found primarily in the Eastern United States. The European beech (*F. sylvatica*) also produces edible nuts and has become naturalized both in the Northeast and in western coastal States. Beechnuts are small and triangular and are found within the small burrs that appear after the beech tree's leaves begin to fall. They are best gathered from lower branches just prior to dropping, before small animals have a chance to forage. The meat of the beechnut is sweet and nutritious, with nearly 20 percent protein content.

Black Walnuts

Black walnut (*Juglans nigra*) trees are most commonly found in the central and east central States, with some additional stands found in northern California. The flavor of the black walnut is much stronger and richer than that of the English walnut, and because of this it has established uses in several baking and ice cream products. The nuts are also used as a primary ingredient for many candies and as a topping. The kernels are high in fats, protein, and carbohydrates and compare favorably with meat in amounts of vitamin A, vitamin B, and riboflavin.

The shell of the black walnut is one of the most difficult shells to crack. While this creates a challenge for processors, it also creates market opportunities. The hard shell is an important product in its own right.

- Metal cleaning and polishing. Processed eastern black walnut shell is the perfect medium for cleaning jet engines, electronic circuit boards, ships, and automobile gear systems. This soft grit abrasive is well suited for air blasting operations, deburring, descaling, and polishing operations because of its elasticity and resilience, giving great durability. Eastern black walnut shell is nontoxic and dust-free and can be used on plastic, aluminum, and soft alloys, leaving the surface smooth without scarring.
- Oil well drilling. Black walnut shell is used widely in oil well drilling for lost circulation material in making and maintaining seals in fracture zones and unconsolidated formations.
- Paints. The paint industry uses the shells for new plaster-effect paint. Paints and varnishes mixed with this light-bodied agent are far superior to ordinary sand paint. It covers plaster, wallpaper, brick, and wall-board and conceals surface cracks and gouges. The paint goes directly over taped and filled joints, and the surface can be repainted with flat wall paint if desired.
- Explosives. Black walnut shell is used by explosives manufacturers as a filler in dynamite. It is compatible with other materials and works well in this use.
- Cosmetic cleaners. Black walnut shell is ideal as the gritty, rough agent in soap, cosmetics, and dental cleansers.



Eastern black walnuts on the vine. Photo courtesy of Jim Jones, Hammons Products Company, Stockton, Missouri. (SFP-9)

There is great competition for black walnuts among squirrels, so harvesting at the right time is critical, usually after first frost. The nuts are enclosed in smooth, green husks. In time, the husk will soften to a mealy consistency and turn black. At this point the hull can easily be rubbed off, but this is a messy job and the hulls will severely stain any skin or clothing that comes in contact with it. In some States, such as Missouri, the Farmers Association operates walnut hulling machines in season, and it costs a few dollars to have walnuts hulled, usually in units of 100 pounds. Corn shelling machines are also effective in removing the husks from walnuts. The hulling procedure generally is followed by a cleaning operation to remove the remaining husk residue. This operation can range from hosing down the nuts while spread out on the grass to soaking and agitating the nuts in a bucket or tub of water.

It is legal to sell uncracked walnuts. In many States, it is illegal to sell the nutmeats unless the process of extracting them is done in an approved facility and in accordance with State laws governing the manufacturing and sale of food. For further information on this subject, the appropriate State agency should be consulted.

Butternuts

A close relative of the black walnut and otherwise known as the white walnut, the butternut (*Juglans cinerea*) ranges farther north, extending into New England and parts of Canada, but not as far south. The butternut ranks among the highest in food energy of edible nuts, with 27.9 percent protein, 61.2 percent fat, and 3,000 calories to the pound. They are also among the tastiest nuts.

Hickory

The two most desirable nut hickories are shellbark hickory (*Carya laciniosa*) and shagbark hickory (*C. ovata*). Both have sweet nuts that vary in size and are encased in hard, thick husks that turn from green to brown in the fall.

Pecans

The pecan (*Carya illinoensis*), a member of the hickory family, is the most widely used tree nut. Wild pecan groves are predominantly found in the lower Mississippi Valley, predominantly in Oklahoma, Alabama, and eastern Texas, but as far north as Illinois and the Ohio Valley area. They grow naturally nowhere else in the world. Commercially, pecans are grown throughout the southern portions of the country. Pecan orchards in general are developed in connection with some interplanted cash or feed crop, until the orchards reach bearing age. Both the nuts and shells are used. For example, the ground shells are used as plywood filler.

Pine Nuts

Pine nuts are not true nuts since they lack the woody coverings identified with nuts. The mountainous and western portions of the country provide the bulk of the country's edible pine nuts. Pine trees that bear edible fruit include the ponderosa, Coulter, sugar, and Digger pines, but the most popular is the common or Colorado piñon (*Pinus edulis*) and the closely related single-leaf piñon (*P. monophylla*), both commonly found in the Southwest. Seeds of these pines have the size and appearance of puffed rice: elongated, white kernels a centimeter or so long and half as wide. Wild Colorado piñons do not bear full crops until they are about 75 years old.

Processing

Acorns

After removing caps and shells, acorns can be eaten raw or roasted. To roast, nuts should be baked at 250° to 300°F for 1 hour. For more bitter acorns, boil kernels whole for 15 minutes and pour off water. The discarded water will be brown with tannin. Add fresh water, boil another 15 minutes, and continue this process until the

water is only slightly tinted. Once tannin is removed, roast nuts as described above.

Beechnuts

Beechnuts have a thin shell that can be peeled with a fingernail. Fresh nuts spoil quickly and should be dried in full sun for a day or two or roasted in a slow oven.

Black Walnuts

The walnut husk must be removed before decomposition begins to saturate the shell and cause the meat to be bitter. The decomposition yields a black juice that causes this bitterness, as well as creating a truly indelible dye that stains clothes and skin.

In the absence of processing machinery, removing the husks and shells of black walnuts is a messy and cumbersome job at best. A good summary of suggestions is available (Pastoret, 1990). One way is to place the nuts on a hard surface and step on them or run an automobile over them. The nuts are then cleaned by washing them in a garbage can several times, and the hulled nuts are dried in shallow layers for a couple of weeks and stored in their shells in mesh bags in a cool place. Cool storage is necessary because the oil in the nuts can become rancid. Some experts still suggest the old-fashioned method of rock and hammer to crack the nuts. There are walnut crackers available for purchase that crack one nut at a time.

Nuts can be hulled and bagged and sold to nut processors who clean the outside of the nut and dry the nut to exact moisture specification. Processors crack the shell by running the nuts through large steel wheels; the nutmeats and shells are then passed through another series of rollers with sawlike teeth which are used to separate the nutmeats from the shells. Nut kernels are graded into various sizes, passed before an electric eye to remove low-quality kernels, and then sent over inspection belts. They are then sterilized, boxed, sealed, and prepared for shipment.

Butternuts

Butternut trees bear early—at just 2 or 3 years of age. The fruit has a thin, green outer husk covered with fine, bristly hairs that give off a near-permanent brown dye. The inner surface of the husk produces an equally strong orange dye, so rubber gloves are advised in working with this nut. The inner nut is oval, with a deeply ridged and pitted shell that is almost as difficult to crack as black walnut. The thin, fragrant, oily kernel inside can go rancid quickly, so it is important to shell and use butternuts soon after they have been husked and dried. They are sweet and delicious straight from the shell, raw or roasted, or baked in cakes or pastry.

Hickory Nuts

Hickory nuts should be gathered as soon as they fall and then hulled and placed on screens to dry. When the kernels are crisp, they should be stored in a mesh bag in a cool, airy place. Like walnuts, hickories keep well in the shell once husked and dried. They are easier to crack than walnuts or butternuts, but the job still calls for real force.

Pine Nuts

The largest and tastiest pine nuts are produced by the piñon pine. Piñon nuts are most easily harvested in late September or October during dry weather, when most of the moisture in the cones makes the nuts easy to remove. The best method of gathering is to shake available branches and gather the cones as they fall into a tarp laid beneath the branches. They can be eaten raw or roasted in a low-heat (300°F) oven until the shells turn brittle. After roasting, the shells can be cracked using a rolling pin.

Market and Competition Considerations

Black Walnuts

Some rural residents buy black walnuts from farmers and others then sell them to companies. Nutmeats sell for \$6 per pound or more, and uncracked walnuts range in price from \$0.75 to \$1.25 or more per pound.

There are only two known plants in the United States that commercially shell black walnuts. They are located in Lodi, California, and Stockton, Missouri. The plants purchase the nuts from area farmers. In addition to the commercial distribution of nutmeats (black walnuts retail for as much as \$3 per pound, nearly twice as much as commercially grown English walnuts), these plants also market the shells. The shells are used as fuel in cogeneration power plants, and because they are so hard, they are marketed as additives in abrasive and chemical products. The black walnut shells bring from \$60 to \$90 per ton. Most nuts for personal consumption are sold seasonally, from fall through winter. This falls shortly after the harvesting season for most nuts, when the meats are at their freshest.

Pecans

A few nut companies specialize in selling nuts from trees that grow wild, rather than the specially bred papershell pecans grown commercially in the Southeastern United States. The papershell pecans are larger, but many feel that the wild pecans have a sweeter flavor and a higher oil content.

Pine Nuts

The average market value of the pine nut is estimated at about \$500,000 a year.

Distribution and Packaging

Typically, nutmeats are distributed by small local growers or harvesters to larger regional processors and distributors. These operations generally package the nuts for sale to bakeries, candy makers, food stores, and sometimes through mail order catalogs. Vacuum packaging is the preferred method of packaging, which keeps the natural flavor much longer.

Resource Conservation Considerations

The use of nut-bearing crops as part of an agroforestry management plan results in little or no tillage and provides a permanent cover during both growing and dormant seasons. This, in turn, creates lower runoff rates and soil loss. It also means there will be a reduction in fuel consumed in plowing and tilling, a reduction of pesticides, and a reduction of soil compaction. Finally, any type of tree cultivation has a tremendous potential to reduce the buildup of carbon dioxide, the most important gas in the creation of the so-called “greenhouse effect.”

Black Walnuts

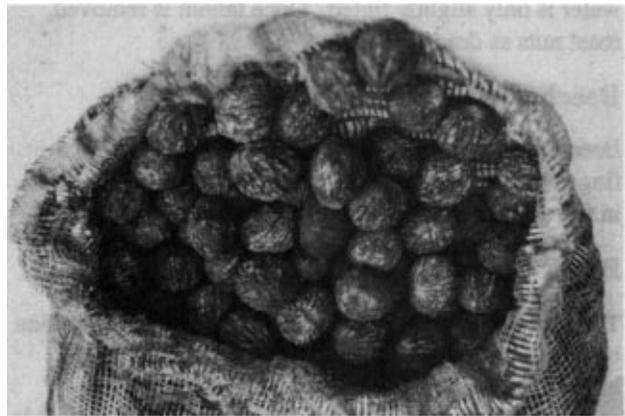
Black walnut trees require a minimum permanent spacing area of 50 feet square. They are usually grown on a wide spacing, with crops of wheat, milo, soybeans, or fescue grown between the rows.

Pecans

Pecan trees require a minimum permanent spacing area of 50 feet square.

Pines

Pines are slow to bear. Estimates for the time required for the first crop typically range from 15 to 20 years. However, individual members of some species have been known to bear within 5 years or take as much as 70 years. The pine requires minimal care, being highly adaptive at finding nutrients and storing water. More important than fertilization and water, pines require ample sunlight and soil with good drainage.



In-shell eastern black walnuts ready to be processed. Photo courtesy of Jim Jones, Hammons Products Company. (SFP-11)

Profiles

Hammons Products Company

Ralph Hammons took a natural resource—black walnuts, which had grown wild in the Ozarks and throughout the central and eastern parts of the United States, uncultivated and unharvested—and turned it into the world’s largest business of its kind. As a small grocery store owner in 1945, Hammons recognized that there was an abundant supply of black walnuts in the area and that a market for them was needed. That year he purchased 3 million pounds of nuts and shipped them to a plant in the State of Virginia. The success of this venture, combined with the high cost of freight and the good supply of black walnuts in the Midwest, started him thinking seriously about building a processing plant in Stockton, Missouri. Thus, Hammons Products Company was born in 1946.

Today Hammons Products Company is still family owned and managed and annually processes most of the Nation’s eastern black walnuts. They buy millions of pounds of wild black walnuts each year from a large portion of the Midwest and Southeastern United States. Still, the black walnut industry is only 2 to 3 percent the size of the English walnut industry in terms of pounds harvested.

The company buys all its nuts on the open market. It provides a contractor at each of 200 to 250 buying stations throughout the range of the walnut and a hulling machine to remove the green husk from the nut. The contractor receives a commission from operating the machine and buying the crop for the company. The company provides bags and a truck to pick up the nuts and to bring them to either the storage or central processing facility.



*Bagged eastern black walnuts.
Photo courtesy of Jim Jones, Hammons
Products Company. (SFP-10)*

Harvesters receive \$8 per hundred pounds of walnuts. A pickup truckload might take two people about 5 hours to collect in a good year and make a total of \$60 to \$65, which means the average harvester in a good year would be making about \$6 an hour. Many of the harvesters are people who simply have a history and tradition of being prudent and do not want to let the nuts “go to waste.” Often, weather conditions can be a major factor in the loss of a good crop if weekend weather is poor.

All wild nut crops vary dramatically from year to year. Consequently, it would be very difficult for a large company to enter the marketplace in wild nuts. By way of example, in 1990, the company was only able to purchase 6 million pounds. In 1991, it was able to buy 12 million pounds. By contrast, in 1982 the company had one of its best years after buying 49 million pounds of walnuts.

The crop is a truly organic one—the trees receive no fertilizer. However, the yield of nutmeat is very small—only 6-1/2 to 9 percent of the nut can be recovered and sold as nutmeat.

The company hopes to increase the yield in the next few years. Some managed plantations have yielded an average of 20 percent on their native black walnut crops (Slusher, personal communication). The company sponsors research on walnut culture and production, and is active with the Missouri Department of Agriculture. The company has been working to develop improved processing machinery and tree care and also to improve genetics for the tree. Within 2 years, some new patented trees are going to be available for sale to the public.

The company has several different plants and divisions in addition to the nutmeat plant:

- The shell plant processes the hard outside shell of the nut, producing valuable shell products.
- The feed plant uses the nutmeats that do not meet the company’s high-quality standards. These nutmeats are blended with shelled corn to produce an animal feed called cornwal. Because of the high fat content of the nutmeats, the processed cornwal is extremely high in nutritional value. It is further mixed with other ingredients to produce a variety of specialized complete feeds.
- The “Missouri Dandy Pantry” is the mail order and retail sales division, offering not only black walnuts but also a variety of other nutmeats and specialty gift items. The “Pantry” caters to the needs of individual mail order customers and industrial gift givers. The primary retail store is located next to the plant in Stockton, Missouri.
- The Land Management Division researches and demonstrates how landowners can better use black walnut trees as a cash crop. The result of the division’s long-range projects will be a greater, more stable supply of nuts.
- The Arkansas Division of Hammons Products Company in Gravette, Arkansas, is a high-volume production facility that processes both black walnut kernels and shell products.

Lodi Nut Company

The Lodi Nut Company in Lodi, California, processes almonds, English walnuts, pistachios, pecans, and macadamia nuts, but black walnuts have always been the main focus of the company. Virtually all of the black walnuts purchased by the company come from wild trees. The black walnut is indigenous to California, but most of the trees in the State were planted about 50 years ago along State highway corridors under the Works Progress Administration.

The nuts are harvested annually throughout much of the State. Buying agents advertise in local papers, telling

people how much the company is paying for sackfuls of the nuts and providing the sacks. Paying stations are identified, mostly in feed stores. Harvesters collect the nuts and bring them to the agents, where they receive about \$2.50 per sack. A standard potato sack full of black walnuts may weigh anywhere from 20 to 100 pounds, depending on the moisture content of the nut, the hull thickness, and other factors.

Hundreds of different individuals in California depend on picking black walnuts to supplement their incomes. Most of the harvesters have been doing it for years. The work is hard, but the company will buy all that people harvest. In an average year, the company purchases over 100,000 sacks. In drought years, the harvest has been down to around 60,000 sacks. The company is finding that the number of people willing to put in the manual labor required to pick up the nuts is diminishing.

The nuts are most famous for their use in ice cream (the source of the flavor in maple nut ice cream), particularly in the southeastern United States. However, the company often sells out their supply of shells before they sell all the nutmeats. For example, the company currently is under contract with NASA to provide shells to be used to clean the surface of the space shuttle. The shells are used as a grit for non-slip surfaces, as filler in oil drilling to plug pressure leaks, to fill bean bags, and to polish shell casings.

Some uses are so specific that no other shells have been found to substitute for the black walnut. One interesting example is that crushed black walnut shells are the only material found thus far that is both hard enough and absorbs shock well enough to be used to fill special padded arms on machines used to hold and shake the nuts from commercial English walnut trees. In 1990, this market used up 95 percent of the company's supply of black walnut shell.

Considerations for a Rural Development Strategy

Apart from the black walnut, there is currently little or no commercial foraging of native American nuts. However, it is interesting to note that the market for black walnut shells is strong, and there may be other applications of nut shells that could be identified. There is also the potential for a greater agroforestry role for nut-producing trees. Finally, the collection and processing of wild edible nuts has potential to be part of a broader community project or nature learning experience.

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Resources

- Phil Ahrens, General Manager, Ahrens Nursery, Rural Route 1, Box 351, Huntingburg, IN 47542. 812–683–3055.
- Earl Douglas, Red Creek, NY 13143. 315–754–6621 (hybrid chestnut trees).
- Dr. Gene Garrett, Professor of Forestry, School of Natural Resources, University of Missouri, Columbia, MO 65211. 314–882–3647.

Organizations

- Missouri Nut Growers Association, Route 1, Nevada, MO 64772.
- Northern Nut Growers Association, 9870 South Palmes Road, New Carlisle, OH 45344.