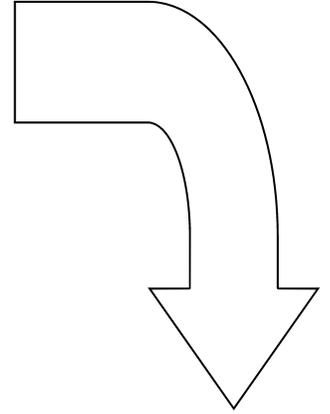
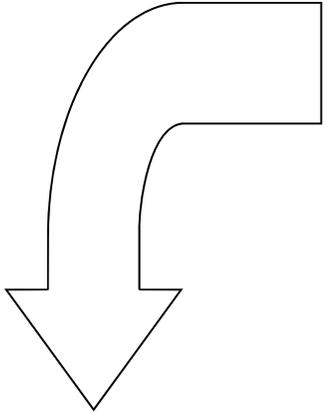


Agriculture:



Where Candy Comes From

Resource Guide



Where to Find Information About Candy Ingredients

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CORN

Corn Syrup, Corn Oil, and Corn Starch:



Corn syrup, corn oil and corn starch are made from corn. Corn is a native grain to the American continents. Aztecs, Incas, and Mayans were the first to grow corn. Christopher Columbus found native Americans growing corn in Cuba in 1492. Corn is one of nature's most amazing energy storing devices.

A corn kernel weighs about one hundredth of an ounce. Yet this tiny seed can produce a corn plant that will grow 7 to 10 feet tall and will produce between 600 and 1,000 seeds like the one from which the plant started. The seeds of a corn plant are the kernels that you find on an ear of corn. The kernels are arranged in rows along the ear. An ear of corn may have as few as 8 or as many as 36 rows.

The U.S. is the largest producer of corn. The U.S. produces about 40% of the world's corn. The area of the U.S. known as the "Corn Belt" includes the following states: Illinois, Indiana, Nebraska, Minnesota, Wisconsin, South Dakota, Michigan, Missouri, Kansas, Ohio and Kentucky.

When corn is harvested in the fall, it is taken to an elevator to be sold, or dried and stored in a grain bin until it is ready to be sold. Next, the grain is transported by train, truck or barge to a processing plant, or exported to another country. Some processing plants use the corn for livestock feed, some use it for human food, and some use it for other products.

Corn oil is made by separating the germ part of the corn from the other parts with coarse grinding. The germ part of the corn kernel is about 25 percent oil. Mechanical and solvent processes extract the oil from the germ. The oil is refined and filtered into finished corn oil. Corn oil can be used in peanut brittle.

Corn starch is made by soaking corn kernels in a stainless steel vat, called steeping. As the corn swells and softens in the water, the mild acidity of the steep water begins to loosen the bonds that the starch has with the corn kernel. Next it is ground in a mill. Then the starch, gluten, and fiber are suspended over screens which catch the fiber but allow starch and gluten to pass through. The starch-gluten suspension, called mill starch, is piped to starch separators. The starch and gluten are put in a centrifuge. Since the gluten has a lower density than the starch, the gluten is spun out. The starch is diluted and washed. Corn starch can be found in candies such as M&M's[®], Licorice, Brachs Maple Nut Goodies[®], Butterfinger[®], Jelly Beans, and Gumdrops[®].

Corn syrup is made from corn starch. The starch is suspended in water with acids/enzymes which convert the starch to a sugar syrup (dextrose). Some syrups are processed further to become high fructose corn sweeteners. Corn syrup is used for flavoring in candies and salad dressing. Corn syrup can be found in candies such as Snickers[®], Mars[®], Junior[®] Mints, Dots[®], York[®] Peppermint Patties, Almond Joy[®], Spree[®], Starburst[®], M&M's[®], 100 Grand[®], Pinwheel Mints[®], Licorice, Candy Corn, Brachs[®] Maple Nut Goodies, Gummy Bears, Whoppers[®], Butterfinger[®], Chocolate Covered Cherries, Peanut Brittle, Jelly Beans, Gumdrops, and Peeps[®].

SOYBEANS



More soybeans are grown in the United States than anywhere else in the world. In 2011, Illinois farmers grew 416.42 million bushels of soybeans. Illinois ranks second in soybean production among other states. Approximately 8.9 million acres of Illinois land are used for growing soybeans.

Soybeans are the most widely eaten plant in the world! They contain protein, carbohydrates, vitamins, minerals, and oil. Soybeans are high in dietary fiber and supply all of the amino acids (protein) needed for human health. Soy protein foods may cut heart disease risk if eaten as a regular part of a diet low in saturated fat and cholesterol. Studies suggest soy may also cut the risk of osteoporosis and fractures in later years of life by increasing bone density. Soy may also fight cancer through a naturally occurring organic compound called genistein, which suppresses the growth of cancer cells.

In processing, the soybeans are cleaned, cracked, dehulled, and rolled into flakes. This ruptures the oil cells for efficient extraction of the soy oil. After removal of the soybean oil, the remaining flakes can be processed into various edible soy protein products or used to produce protein meal for animal feeds.

The dry, solid portion of the bean provides many edible products. Soy flours and grits are used in the commercial baking industry. Soy hulls are processed into fiber-bran breads, cereals, and snacks. Soybean oil finds its way into such products as margarine, salad, and cooking oils.

Soy flour is the fine powder produced by grinding soybeans. It is an inexpensive, cholesterol free egg substitute for baked goods. You can make your own soy flour and use it in recipes that call for flour. Blend a half cup of cleaned dry soybeans in a blender until the particles are fine. Since no preservatives are used, you should freeze the extra flour that will not be used in the next few weeks.

Each soybean seed contains a seedling (young plant) and food for it. The main parts of the soybean seed are:

Hilum-the part of the seed where it was once attached to the pod. The hilum is often black or brown but is yellow on some varieties.

Seed Coat-a thin covering that protects the seed.

Cotyledon-the part of the seed in which food for the seedling is stored. Each bean has a pair of cotyledons forming a protective shield around the seedling.

Epicotyl-the uppermost part of the seedling. It has two leaves that are unifoliated (containing only one leaflet). These are the first true leaves to develop on the plant.

Hypocotyl-the lower portion of the seedling's stem.

Radicle-the main root of the seedling. It takes up water and nutrients from the soil to nourish the seedling.

SOYBEANS (cont.)

Soy lecithin is extracted from soybean oil. It is used as an emulsifier (mixes oils in with other ingredients) in food products that are high in fats and oils.

Soy lecithin can be found in candies such as Hershey® bars, Snickers®, Reese's® Peanut Butter Cups, Almond Joy®, M&M's®, 100 Grand®, Mars®, Junior® Mints, York® Peppermint Patties, Whoppers®, Butterfinger®, Chocolate Covered Cherries, Peanut Brittle, Tolberone®, and Chocolate Orange®.

Soybean oil is the natural oil extracted from whole soybeans. Soybean oil is used more than any other type of vegetable oil; 75% of our total vegetable fats and oils intake in fact. If you see a bottle in the store labeled "vegetable oil," it is usually 100 percent soybean oil or a blend of soybean oil and other oils. Partially hydrogenated soybean oil is oil that has hydrogen infused into it at a controlled temperature. The hydrogen solidifies the soybean oil by changing the chemical and physical structure of the soybean oil.

Partially hydrogenated soybean oil can be found in candies such as Snickers®, Almond Joy®, Starburst®, Licorice®, Werthers® Originals, and Brachs® Maple Nut Goodies.



SPICES

Allspice can be used to make a variety of candy, like sugarplums. It comes from the berries of the pimento tree. These berries are dried in the sun or in a kiln and then ground up or sold whole.

Cinnamon can be used to make a variety of candy such as cinnamon hard candies and sugarplums. It comes from the bark of the cinnamon tree. Large producers of cinnamon are Sri Lanka, China, India, and Vietnam. When the bark is peeled off the shoots, it turns brown and curls up.

Nutmeg can be used to make a variety of candy such as sugarplums and white chocolate truffles. It comes from the inner part of the seeds of nutmeg trees. Nutmeg trees are raised in the Spice Islands, Indonesia, the West Indies, Brazil, India, and Sri Lanka.

GRAINS



RICE

Archeological evidence finds that rice has been growing for more than 5,000 years. Rice seems to have originated in China and slowly worked its way to ancient Greece. Next, rice was grown in Persia, and then the Nile Delta. Rice then moved across continents until it reached the Western Hemisphere. Today, rice has grown into a crop that sustains two-thirds of the world's population.

The United States began cultivating rice over 300 years ago. Rice began growing in the U.S. when a storm battered ship accidentally arrived at the Charleston Harbor in North Carolina. The captain of the ship gave a small amount of rice as a gift to a planter. This rice, known as "Golde Seede Rice" was grown on Carolina and Georgia plantations. The "Golde Seede Rice" soon became known as "Carolina Golde," and by 1726 Carolina Golde was the world standard for high-quality rice.

The Civil War, along with hurricanes and competition from other crops, moved the rice westward along the Gulf Coast. After this occurred, an Iowa wheat farmer realized that the soils for growing rice could support the equipment used to produce wheat. The mechanization of growing rice allowed more states to be able to produce it. Now, Arkansas, California, Louisiana, Mississippi, Missouri and Texas are major rice producing states.

Rice needs long, wet growing seasons that are free of cold and snow for proper growth. It also needs flat areas of wet land with heavy soil and plenty of water to flood the fields, which are called paddies. Rice production requires a lot of manual labor.

After rice is harvested, it is taken to a mill for processing. The purpose of milling is to remove the hull and bran layers while preserving as many of the whole kernels as possible. The kernels go through a series of sorting machines, sheller machines, steaming, and drying depending on the form of rice that is desired. About 55 percent of the yields from rice milling are whole kernels, 20 percent are hulls, 15 percent are broken kernels, and 10 percent are rice bran and polish.

Rice is a very nutritious food found in the grain category of the Illinois My Plate. It contains complex carbohydrates that provide energy to the body. Rice also contains thiamin, riboflavin, niacin, phosphorus, iron, and potassium. Rice does not contain sodium, fat, or cholesterol, which is an added benefit for those on special diets. Brown rice will give you a little more fiber, calcium, phosphorus, and Vitamin E than white rice. Although most white rice in the United States is enriched, white rice provides more iron and thiamin than brown rice.

Rice can be found in candies such as 100 Grand[®] and Nestle Crunch[®].

GRAINS (cont.)



WHEAT

Illinois is a leading producer of wheat. Illinois produces over 47,300,000 bushels of wheat a year. Illinois wheat is used as livestock feed or made into flour for foods like cakes, cookies, crackers, and pretzels. Our wheat is also used for non-food items such as glue and pharmaceuticals. The farmer plants the tiny wheat kernels (another name for seeds) in the ground using a grain drill. The seed germinates (sprouts) and begins to grow into a plant, which consists of roots, a stem, long, slender leaves, and a head, which has kernels.

The farmer combines the wheat and unloads the combine hopper into trucks or wagons. The farmer will haul the wheat to the grain elevator. A grain elevator has giant silos to store grain. The farmer receives payment for his wheat, and then the grain elevator ships the wheat by truck, rail, or barge to a grain terminal. Next, the wheat is sold to various industries which make food or feed, or is shipped overseas.

The place where wheat is shipped to make flour is called the mill. The people who process the wheat are called millers. The wheat is put through a cleaning process to remove foreign matter (weed seeds, corn seeds, beans, stems). Rollers then press over the wheat kernels to break them into pieces, and they are shaken on screens to sift out the bran (the broken coat of the kernel) and germ (the part of wheat used to grow a new plant) not used in wheat flour. This is repeated three times to make a soft powdery substance we know as flour.

Wheat can be found in candy such as licorice and Whoppers[®]. Another grain, barley, can also be found in Whoppers[®].



NUTS

ALMONDS

Almonds are the seeds of a tree in the peach family. The earliest varieties of almonds were found in China and carried to Greece, Turkey, and the Middle East. The top almond producing countries include the United States, Spain, Italy, Iran and Morocco.

Almonds are harvested in late August through October using mechanical tree shakers and sweepers. Almonds must also be hulled, shelled, fumigated, sized, graded, processed, packaged, and shipped. Almond trees may grow up to 40 feet tall.

There are sweet almonds and bitter almonds. Sweet almonds are toasted, salted, eaten whole, or added to candies and pastries. Bitter almonds are not edible. Oil can be extracted from both sweet and bitter almonds. Almonds provide more calcium than any other nut and more dietary fiber than any other nut or seed.

Almonds are found in candy such as Hershey's[®] bars, Almond Joy[®], Mars[®], Tolberone[®], Zero[®], Heath[®], Skor[®], and Symphony[®].

NUTS (cont.)



PEANUTS

Peanuts probably originated in Brazil or Peru. Explorers to South America and Mexico took peanuts back to Spain. From Spain, traders and explorers took peanuts to Africa and Asia. In Africa, the plant became common in the western tropical region. When Africans were brought to North America, peanuts came with them. About 75% of peanuts grown are used domestically. The remaining are usually shipped raw to major buyers like Western Europe, Canada and Japan. In 2007, the U.S. produced approximately 3.7 billion pounds of peanuts.

The peanut plant actually flowers above the ground and fruits below the soil surface. The peanut plant averages about 18 inches tall. It produces a yellowish-orange flower that, after blooming, will create a “peg” that will grow down into the soil. After about 60-70 days the peg will mature into a peanut. The peanut plant is a legume, which means it can produce an essential nutrient called nitrogen, which is very beneficial for the soil. Runner, Virginia, Spanish, and Valencia peanuts are used primarily for peanut butter. Virginias are the largest kernels and account for most of the roasted in-shell peanuts. Spanish are used for candies and salted peanuts.

George Washington Carver was an agricultural researcher of the early 1900's. He is especially noted for his research with peanuts. George Washington Carver received many awards such as the Spingarn Medal from the National Association for the Advancement of Colored People and the Theodore Roosevelt Medal for his valuable contributions to science. There is a George Washington Carver National Monument on the Missouri farm where Carver was born and January 5th has been named George Washington Carver Day.

Carver's interest in plants began when he was a child. Although he was too sick to work in the fields, he kept a personal garden. Carver attended a school for black children in Neosho, Missouri, as a child and gained further education at Simpson College in Indiana, Iowa and Iowa State College in Ames. In 1896, George Washington Carver joined the faculty of Tuskegee Institute, an industrial and agricultural school for blacks. Carver was the head of the agricultural department, the director of a state agricultural station, and later the head of Tuskegee's Department of Research. He worked hard to teach more productive agricultural practices to Southern farmers, black farmers in particular. After finding over 300 uses for peanuts, Carver lectured about the uses before a committee of Congress. Some uses he found were shaving cream, leather dye, coffee, ink, and shoe polish.

*Adapted with permission from the Georgia Farm Bureau[®] Federation Ag in the Classroom Program.

Peanuts can be found in candies such as Snickers[®], Reese's[®] Peanut Butter Cup, Brachs[®] Maple Nut Goodies, Butterfinger[®], Peanut Brittle, Mr. Goodbar[®], and Pay Day[®]. Maple Nut Goodies[®] also contain peanut oil.

NUTS (cont.)



PECANS

Pecans are native to the U.S., particularly the Southern states. Georgia produces the most followed by New Mexico, Texas, Oklahoma and Arizona. 302.8 million pounds of pecans were produced in the U.S. in 2012. Pecan day is March 25-the anniversary of planting by George Washington at Mt. Vernon (1775).

Pecan trees don't bear nuts until they are 5 or 6 years old and they may take up to 20 years to produce a full crop of nuts. Pecan trees may grow 180 feet tall. Pecans can be harvested using mechanical shakers. They are then taken to processing centers where they are cleaned, graded, and packaged.

Pecans have over 19 vitamins and minerals including vitamin A, vitamin E, folic acid, calcium, magnesium, phosphorus, potassium, several B vitamins and zinc. They are in the protein group of the Illinois My Plate, with meat, poultry, fish, eggs, and dried beans.

Pecans are found in candies such as Russell Stover® Pecan Delights and Turtles®.



WALNUTS

Walnuts originated in Persia. They were brought to California by Franciscan (Spanish) Fathers from Spain or Mexico. Today, California grows over 99% of the total U.S. commercial crop. Other top producers include China, Iran, and Turkey. Ideal walnut growing conditions are a mild climate and fertile soils.

After a walnut orchard is planted, it takes 6-8 years to yield nuts. It will bear nuts for almost 100 years. Walnut trees can grow up to 100 feet tall. Walnut trees must be pruned, sprayed, fertilized, and irrigated. Harvesting begins in August when the green husks split. Harvesting machines are used to shake the trees and the walnuts are swept to have the mechanical harvesters pick them up for cleaning and hulling. Next the walnuts are dried and sized. Walnuts are stored in their shells, the shells are only removed when there is demand from the consumer and industrial users. When the shells are removed, the walnuts are separated by size. They are packaged after being hand sorted for quality. Walnuts are used for snacks, bakery items, dairy products, confections, sauces, and dressings. Walnut shells can be used for glues, plastics, and cleaning solutions.

Walnuts can be found in candies such as taffy, fudge, grape walnut candy, yogurt walnut pieces, and chocolate walnut pieces.

SWEETENERS



HONEY

Honey is made by bees. They drink the sweet nectar of flowers and then take it back to their hives and share it with other bees. The bees keep the nectar in their bodies where the sugar in the nectar breaks down into fructose and glucose. Next they deposit the nectar in a honeycomb. Here the water in the nectar evaporates and the nectar becomes honey. North Dakota, South Dakota, Florida, California and Minnesota are the leading states in honey production.

Honey can be found in candies such as Candy Corn, Bit-O-Honey[®], and Tolberone[®].

MAPLE SYRUP

Vermont leads the U.S. in maple syrup production. Soils for growing sugar maples should be deep, moist, and well drained with medium or fine textures. Sugar maple trees average about 1 foot of height growth and 0.2 inch of diameter growth annually for 30-40 years. Sugar maple trees can grow up to 100 feet tall.



Sap comes out of trees in the spring. During warm periods when temperatures rise above freezing, pressure (positive pressure) develops in the tree. This causes the sap to flow out of the tree through a tap hole. During cooler periods when temperatures fall below freezing, suction (negative pressure) develops, drawing water into the tree through the roots. This replenishes the sap in the tree, allowing it to flow again during the next warm period. Sap flows through a portion of the outer tree trunk called sapwood. Power augers are used to tap maple trees. Holes are drilled at an upward slant, 2.5-3 inches beyond the bark.

Sap season is about 6 weeks long in New York. In Iowa, sap collection begins in late February or early March and lasts for 3 weeks. Maple producers used to use buckets hung on trees to collect sap. This was very impractical. In the 50's and 60's, maple producers and scientists experimented with connecting a plastic tube to each tree which led to a central collection tank. Trees have been tapped for over 25 years using vacuum tubing with no apparent damage to the tree.

The sugar house is the point where sap becomes syrup. Maple sap is 2% sugar content, maple syrup is 66% sugar, so it takes many gallons of sap to make one gallon of syrup. Sap is boiled in an evaporator (can be an open pan over heat or more complex systems) to make syrup. Sap is boiled to 219⁰F to make syrup. It can be boiled beyond the syrup stage for maple butter, taffy, or sugar.

Maple syrup can be found in candies such as Brachs[®] Maple Nut Goodies and maple candy.

SWEETENERS (cont.)

MOLASSES

Molasses is made from the juice of sugarcane or sugar beets. It is a by-product in the manufacturing of sugar. (It is the liquid that remains after the sugar crystals are removed.) Molasses can be used for brewing, cooking, candy making, and as livestock feed.



Molasses can be found in candy such as the Butterfinger®.



SUGAR

Two hundred years ago, the average American ate only 2 pounds of sugar a year. Today, the average American consumes 3 pounds of sugar a week! Sugar is made from sugar cane or sugar beets. The United States produces over 31.1 million tons of sugarcane each year and produces over 32 million tons of sugarbeets. Sugar can also be used by nonfood industries: mixing cement, tanning leather, making plastics, and medicines (to disguise or enhance taste).

The word sugar comes from the word sarkara, meaning sand or grain. It is thought that between 325 BC and 325 AD the Indians or the Persians started turning sugarcane juice into a semi-crystalline form. This had a lot of impurities and molasses. Until the 19th century, most sugar consumed had a brownish color because of this. Sugar was brought to America by Columbus on his second voyage.



SUGAR CANE

Sugar cane is a tall grass plant that grows in tropical and semi-tropical climates. The top producers are Brazil, India, China, Thailand, and Mexico. Sugar cane is harvested by chopping down the stems and leaving the roots so that it re-grows for the next harvest. Cane juice must be extracted from the cane. The cane is crushed in a series of large rollers and the juice comes out. Since the juice still has soil, small fibers, and green extracts in it, it must be cleaned with slaked lime. The juice is thickened into syrup by boiling off the water using steam and evaporation. The syrup is put into large pans for boiling. Most water is boiled off until the sugar crystals can grow. This is spun in a centrifuge to separate the crystals and mother liquor. The crystals are dried with hot air before storage. The final raw sugar looks like a sticky brown mountain, so it is usually refined when it gets to the country where it will be used.

SWEETENERS (cont.)

SUGAR BEETS

Sugar beets grow in temperate climates. Top sugar beet growing countries are France, the United States, Germany, Russia and Ukraine. Sucrose is stored in the plant's fleshy root. The tops of sugar beets are fed to livestock or used as fertilizer. Beets are harvested in autumn and early winter by digging them out of the ground. They are taken to the factory, washed, and separated from any beet leaves, stones, or trash materials that were collected with them during harvest. To extract the sucrose, the beets are sliced into thin chips. This increases the surface area so the sugar is easier to extract. The extraction takes place in a diffuser for about an hour with hot water. (Similar to the color and flavor of tea coming out of tea leaves in a teapot.) Next, the sugar beet slices are pressed to squeeze as much juice from them as possible. The pulp leftover from the pressing is sent to a drying plant where it is turned into pellets which are used for some animal feeds. The juice is cleaned before it's used for sugar production. This is done by growing small clumps of chalk in the juice. As the chalk forms, it collects the non-sugars and both are filtered out. The juice is then put in a multi-stage evaporator. As the water is boiled, sugar crystals grow. This mixture is spun in a centrifuge to separate the crystals and mother liquor. The crystals are dried with hot air before being packed or stored. The final sugar is white. Beet molasses is the syrupy left-over liquid from the sugar extraction process. The molasses is used as an additive in livestock feed, during the fermentation of ethanol, and is also mixed with salt and brine and used as a de-icer for roads during the winter months.

Sugar can be found in candies such as Hershey[®]'s bars, Snickers[®], Reese's[®] Peanut Butter Cup, Almond Joy[®], Spree[®], Starburst[®], M&M's[®], 100 Grand[®], Mars[®], Junior[®] Mints, Dots[®], York[®] Peppermint Patties, Pinwheel Mints, Licorice, Werthers[®] Originals, Candy Corn, Brachs[®] Maple Nut Goodies, Whoppers[®], Butterfinger[®], Chocolate Covered Cherries, Peanut Brittle, Gumdrops, Tolberone[®], Chocolate Orange[®], and Peeps[®].



FRUITS



COCONUT

Coconuts are native to Southeast Asia and Melanesia. The world production of coconuts is approximately 61.7 million tons per year. Leaders in coconut production are Indonesia, the Philippines, India, Sri Lanka, and Brazil. Coconut palms can grow up to 100 feet tall and their leaves can be 18 feet long.

The coconut has a thick, fibrous husk. The husk can be used to make ropes, aquarium filters, car seat covers, flower pots, mulch, bristles, mattresses, carpets, and much more. The edible, oily flesh, or kernel, is called copra. It is produced in great quantities mainly for its oil. The copra adheres to the shell of the coconut. Coconuts have a hollow center which contains a liquid during growth. A well tended tree produces about 100 coconuts a year. Each fruit takes about a year to ripen.

About 360,000 tons of coconuts and over 2.1 million tons of coconut oil are imported annually.

Coconut can be found in candies such as Almond Joy[®] and coconut oil can be found in Spree[®], 100 Grand[®], Brachs[®] Maple Nut Goodies, and Gummy Bears.

Fruits such as bananas, raisins, grapes, cranberries, cherries, strawberries, blueberries, and peaches may also be used in candy and candied fruits for breads.

EXTRACTS

COTTONSEED OIL

Cottonseed oil comes from the seeds of cotton plants. The leaders in cotton production are China, the United States, India, Pakistan, and Brazil. Cottonseed oil can be used for shortening, margarine, cooking oil, confections, and salad oil. Cottonseeds are 15-24% oil. To extract the oil from a cottonseed, the hull is removed and the oil is extracted by soaking the seed in a solvent.

Cottonseed oil can be found in candies such as Brachs[®] Maple Nut Goodies and Almond Joy[®].



EXTRACTS (cont.)



MINT

Peppermint and spearmint were grown in Europe and brought to America by English colonists. The U.S. is now the largest producer of mint oil. Mint grows well in Indiana, Michigan, Wisconsin, Oregon, Washington, Idaho, South Dakota, and Montana. Mint in the Pacific Northwest needs irrigation. Mint is also abundant in countries that border the Mediterranean Sea.

Mint is a perennial plant that produces no seed. New fields are planted with root stock or underground runners (stolons) from existing plants. Mint is planted as a row crop, but by the second year it spreads out and creates a solid meadow. Every three to five years, the mint fields are rotated with another field crop and the mint planting cycle begins again.

The oil is stored in the glands on the underside of the peppermint and spearmint leaves. The plant reacts to sun by producing oil, so a very sunny season makes for a higher yield. An acre of land will grow about 76 pounds of oil. Mint is harvested with windrowers. They mow the fields and leave a mounded row of “hay” or cut mint. The hay is left to dry in the field for 24 to 36 hours. Then the hay is picked up by a mechanical mint chopper and blown into a mint tub that holds one acre of mint. Oil is extracted from the mint leaves by distillation. Trucks pull the mint tubs to a still where steam and vapor lines are hooked to the tubs. Steam moves through the mint hay, taking off oil as a vapor. About two hours are required to cook the hay in the tub.

Mint oils are identified by their growing areas. Companies like Wrigley buy an assortment of mint oils, which are combined in specified proportions to create each flavor formula. Mint is used for flavoring in chewing gum, candy, tooth paste, and medicines. There are about 3,500 species of mint. Some popular cooking mints include marjoram, rosemary, and sage. Mints such as white horehound and peppermint add a cool, sharp flavor to candies. Peppermint accounts for 80 percent of the U.S. mint production.

Peppermint oil can be found in candies such as Junior[®] Mints, York[®] Peppermint Patties, and Pinwheel Mints.

VANILLA

The word vanilla comes from the word sarkara which means sand or grain. Vanilla beans are in the pods of an orchid called *Vanilla planifolia*. Vanilla trees grow in countries such as Madagascar, Indonesia, Tahiti, and Mexico as they like hot, humid, tropical climates. Vanilla vines could grow up to 350 feet tall, but they are pruned or looped to keep the beans in easy reach of the workers who pollinate them. Only the Melipone, a tiny bee found in the vanilla districts of Mexico, is uniquely equipped to pollinate the flowers, but will not survive outside of Mexico, so hand-pollination must be used elsewhere. Each vanilla orchid blossoms for only a few hours and must be pollinated by hand during that time. A good vanilla vine can produce 100 pods per year. Each pod is five to ten inches long. The bean is odorless when harvested, becoming fragrant only after it has been fermented and dried. Expert workers can pollinate up to 1,500 blossoms a day. After fertilization, the pods mature in four to nine months. They are picked when their color begins to change from green to yellow. The beans are thick and about five to ten inches long. Sometimes the pods are marked with pinpricks to prevent theft. About five pounds of fresh vanilla pods are used to make one pound of dried beans.

EXTRACTS (cont.)

VANILLA (cont.)

Vanilla is native to the Americas-Central America and possibly northern South America. It was taken to Spain and then everywhere else. It was first introduced to Europeans in 1520 when Diaz, an officer of Cortes, noted its use by the Aztecs in southern Mexico to flavor their chocolatl (a chocolate drink). The Spaniards established factories to manufacture chocolate with vanilla flavoring and for many years the Spaniards had control of vanilla production. At first, vanilla was used only in combination with the cocoa bean. By 1602, vanilla began to be used as a flavoring on its own. In the 1800's, vanilla plants were grown in England, France, Belgium, Indonesia, Mauritius (southwest Indian Ocean), and Madagascar. This started the vanilla industry centered around the Indian Ocean.

Pure vanilla extract is made by hydroalcoholic extraction from the cured whole beans. Alcohol, water, and possibly sugar are added to this. Vanilla is the second most expensive spice in the world, second only to saffron. Natural vanilla flavor is a mix of pure vanilla extract and other natural substances. Imitation vanilla is made from synthetic substances, and artificial vanilla is a by-product of the paper industry chemically treated to taste like vanilla. In the United States, we consume about 60 percent of the world's natural vanilla, but artificial vanillin flavoring still takes up about 90 percent of the market.

Vanilla can be found in candies such as Almond Joy[®], Hershey's[®] bars, 100 Grand[®], Junior[®] Mints, York[®] Peppermint Patties, Werthers[®] Originals, Chocolate Covered Cherries, Tolberone[®], and Chocolate Orange[®].

Other extracts used in candy include orange, lemon, almond, and others.



OTHERS

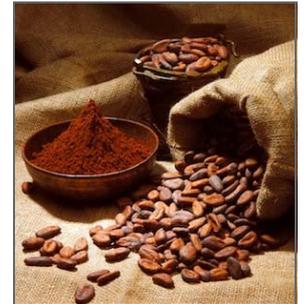
CAROB

Carob trees are native to the Eastern Mediterranean area, probably the Middle East. Most carob used in the U.S. comes from the Mediterranean Region, especially Sicily, Cyprus, Malta, Spain, southern Sardinia, and Italy. Carob trees are medium sized and they have evergreen leaves. The fruit of a carob tree is the fleshy pod. The pods are up to a foot long and an inch wide with three to five seeds. Carob trees bloom and about six to eight months later, they are harvested. The average annual yield per tree is 200-250 pounds of fruit. Carob prefers dry climates that receive more than 30 centimeters of rainfall. Carobs are used mostly for livestock feed, but finely ground pods and seeds make a sweet, nutritious human food.



Carob looks similar to cocoa and is sometimes used as a cocoa substitute. The carob pods are roasted and ground into carob powder. Carob contains vitamin B1, niacin, vitamin A, vitamin B2, calcium, magnesium, and iron.

Carob can be found in Whoppers[®] and some other types of candies.



COCOA

Cacao beans were used in a spicy drink (called chocolatl) by the Ancient Aztecs. Aztec traders got cacao beans from the Mayan lands and hauled it to their capital. Since the beans were used for money, warriors had to accompany the traders to protect them from thieves. When Cortés and his Spanish explorers came to the Aztec capital, they saw Montezuma drinking chocolatl in gold cups. The Spanish explorers took the spicy drink back to Spain and people there loved it. Soon, travelers from other European countries took the chocolate drink back home, people added sugar to the drink, and chocolate became a favorite drink of the upper class. In the late 19th century, Rodolphe Lindt invented a conching machine. It squeezed cacao beans and made a smooth chocolate blend. In 1875, Daniel Peter teamed up with Henri Nestle' and they added milk to their chocolate recipes. The popularity of candy bars grew after World War I. By 1930, there were 40,000 different kinds of candy bars.

Chocolate is a natural product that comes from the cacao beans of cacao trees. Cacao trees can only grow in tropical climates- 20 degrees north or south of the equator. This is referred to as the Cocoa Belt. The Ivory Coast grows more cacao trees than anywhere else; 1.4 million tons per year. Indonesia is second with 410,000 tons per year. Other leading cacao tree growing countries are Ghana, Nigeria, Brazil, Cameroon, Ecuador, Fernando Po (and Rio Muni), Dominican Republic, New Guinea, and Mexico.

Cacao flowers on the cacao trees are pollinated by midges, which are tiny flies. They live and breed in the decaying leaves and pods around cacao trees. The midges are only 2-4 millimeters long, but they beat their wings 1,000 times a second. The cacao trees rely on the midges for pollination and the midges rely on the cacao trees for food and shelter.

OTHERS (cont.)

COCOA (cont.)

Cacao trees have pods, each with 20 to 40 almond-sized beans. It takes almost 400 cacao beans to make a pound of chocolate liquor. The pods are harvested with a machete and then broken apart to retrieve the cacao bean. The beans must then be fermented, dried, and shipped to chocolate factories in burlap bags. At the chocolate factory, cacao seeds are roasted, cracked, fanned, winnowed, and then ground into chocolate liquor. Chocolate liquor is used to make chocolate. Some chocolate liquor is pressed to remove cocoa butter and further processing turns it into cocoa powder. Cocoa butter is the fatty part of the cacao bean and it makes the chocolate smoother. It is extracted from chocolate liquor under high pressure.

To make chocolate, chocolate liquor is mixed with condensed milk, sugar, and extra cocoa butter till it is a coarse, brown powder. Next it is refined with steel rollers by breaking the crumb mixture into tiny cocoa, milk, and sugar particles. Then the mixture is churned into a smooth blend. Lastly, it is tempered (cooled and warmed) for a glossy sheen and to ensure proper melting.

Chocolate manufactures use 40 percent of the world's almonds, 20 percent of the world's peanuts and 8 percent of the world's sugar. Milk is also a key ingredient in chocolate. 3.5 million pounds of whole milk is used every day to make chocolate.

Cocoa butter can be found in candies such as Hershey's® bars, Snickers®, Reese's® Peanut Butter Cups, Mars®, Junior® Mints, York® Peppermint Patties, Almond Joy®, M&M's®, 100 Grand®, Chocolate Covered Cherries, Tolberone®, and Chocolate Orange®.

EGGS

Eggs come from poultry, mainly chickens. A female chicken that is raised for eggs is called a laying hen. They sit on eggs for 21 days until they hatch. In large commercial chick production, large incubators are used to hatch chicks instead of laying hens. Only fertilized eggs will hatch. Male chickens are called roosters. They have larger combs and wattles than hens and their feathers are more colorful. Chickens eat chicken feed. The main ingredient is corn, wheat, sorghum or another grain.

Eggs can be found in candies such as Spree®, Snickers®, Almond Joy®, Mars®, York® Peppermint Patties, and Tolberone®.



OTHERS (cont.)

MILK

Illinois dairy cattle produce close to 2 billion pounds of milk a year. The dairy cow, which must give birth to a calf before beginning to give milk, performs a very important job in our food production industry. Cows change grass and grains, which people can't eat, into milk. The dairy cow is a ruminant, which means it has four compartments to its stomach. Most dairy cows will produce six to seven gallons of milk each day. Most milking today is done by electric machines which guide the flow of milk from the cow to a very clean refrigerated holding tank.



After the cows are milked and the milk is in the refrigerated tank, an insulated truck comes to the farm and hauls the milk to a dairy plant. After the milk is tested for safety, it is homogenized, pasteurized, and packaged. Milk can also be processed into cheese, yogurt, ice cream or other products at the dairy. Milk products are stored in a refrigerated room and then taken to a grocery store for you.

Lactose, also called milk sugar is found in the milk of all mammals. It is obtained commercially from skimmed milk and whey, a liquid by-product of the cheese making process. Lactose can be found in candies such as 100 Grand®, Snickers®, Mars®, York® Peppermint Patties, Reese's® Peanut Butter Cups, Almond Joy®, M&M's® and Tolberone®.

Milk can be found in candies such as Mars®, Hershey's® bars, Snickers®, Almond Joy®, M&M's®, 100 Grand®, Whoppers®, Butterfinger®, Chocolate Covered Cherries, Tolberone®, Reese's® Peanut Butter Cups, Werthers® Originals, and York® Peppermint Patties.



SALT

Salt comes from brine (salty water). Salt from seawater is obtained by moving the seawater through a series of evaporating ponds. Most other minerals evaporate before salt does, so salt is left at the last pond. Salt from the ground is called rock salt. These deposits were left in the ground by the evaporation of oceans long ago. Rock salt is obtained by mining or drilling. The U.S., China, Germany, Canada, India and Mexico are all large salt producing areas. Salt can be used as a deicer, seasoning for food, ceramic glazes, livestock feed, medicines, water softening, and much more.

Salt can be found in candies such as Mars®, Snickers®, Reese's® Peanut Butter Cups, Almond Joy®, M&M's®, 100 Grand®, Licorice, Werthers®, Candy Corn, Brachs® Maple Nut Goodies, Whoppers®, Butterfinger®, and Peanut Brittle.

OTHERS (cont.)

SORGHUM

Sorghum is made from the juice of sorghum cane, a grass with a thick, solid stalk and large clusters of grain at the top. It originated in Africa and is used for syrup, grain, broom fiber, and animal feed. The U.S. grain sorghum production in 2012 totaled 246.9 million bushels. Leading producers around the world include Mexico, the U.S., Nigeria, India and Argentina.

There are grain sorghums, sweet sorghums, grassy sorghums, and broomcorn. Sweet sorghums are used for sorghum syrup by pressing the juice out of the stems with rollers and boiling it. Sorghum molasses was a favorite sweetener, especially in the Southern states, in the 1800s and early 1900s. As refined sugar products became cheaper and more available, there was a decline in the use of sorghum as a sweetener.

Sorghum can be used to make Sorghum Pie, Molasses Popcorn Balls, and Peanut Candy.

Coffee and mocha are also used as candy flavorings.



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