

ALFALFA



Alfalfa

Alfalfa is mainly used as feed for horses and cattle. It is a high-quality hay crop grown widely in the United States and in temperate regions of South America and Asia. It can grow in many different climates and can tolerate a variety of soil conditions.

Planting

Alfalfa is usually planted in April or May using a machine called a drill. The drill places the seed into the ground about a half-inch deep. Each row is about four to five inches apart. Alfalfa is a perennial crop, which means it will grow in the same field four or five years in a row without replanting. Farmers like alfalfa because it is a legume plant which places nitrogen in the soil. The nitrogen is food for the soil and helps feed other plants such as corn that may be grown later in the same field.

Harvest

The alfalfa plant is harvested at least three times each summer. Harvest occurs in June, July and August. The alfalfa plant grows two to three feet tall and is cut before it produces its flowers. When alfalfa is harvested, a machine cuts each plant about four inches from the ground.

Uses

The alfalfa plant may be used as silage or wet feed for cattle. It is chopped into fine pieces and placed in a round building called a silo for storage. Another way to use alfalfa is to cut it like grass, leave it in the field to dry and then use a machine called a baler to make bales of hay for cattle, sheep and horses. People sometimes eat alfalfa, but it is alfalfa sprouts that are used in tossed salads.

On The Front

A. Alfalfa Plant

Alfalfa is a leafy plant, which grows two to three feet tall. More than 33 million acres of alfalfa are planted in the United States each year.

B. Alfalfa Branch

The alfalfa branch has purple flowers where the alfalfa seeds are located. These pods of seeds are twisted to form up to five spirals.

C. Alfalfa Seed

Alfalfa seeds are oval-shaped, very small and normally olive-green in color.



CORN

On The Front

A. Corn Plant

Corn is an annual plant that grows seven to ten feet tall. Strong roots called prop roots help support the cornstalk. A tassel grows at the top of each jointed cornstalk and contains hundreds of small flowers that produce pollen. Long, swordlike leaves grow outward from the stalk and end in a pointed tip.

B. Ear of Corn with Kernels

Ears of corn grow where the leaves join the stalk. A plant normally has one or two ears. Special leaves, called husks, protect each ear. An ear consists of a corncob covered with rows of kernels. An ear may have 12, 14, 16 or more rows of kernels.

C. Single Kernel or Seed

Each corn kernel has what looks like a silk thread that runs from the kernel up the row, and sticks out of the husk at the end of the ear. This thread is called the corn silk. Each silk needs to be pollinated to produce a kernel of corn.

Corn

Most of the corn grown in the United States is produced in the Corn Belt, which includes Illinois, Indiana, Iowa, Minnesota, Missouri, Nebraska, Ohio and South Dakota. Producers in the United States feed the largest part of the corn crop to cattle, hogs, sheep and poultry. The rest is used for processed food or industrial products such as ethanol, cornstarch and plastics. The U.S. exports corn to such countries as Japan and Mexico.

The different types of corn include dent corn, sweet corn, popcorn and food grade corn. Dent corn is commonly called "field corn" because it is fed to livestock. Sweet corn, popcorn and food grade corn are used for human food.

Field Corn

Producers use hybrid seeds to grow crops each year. Hybrid corn is made by crossing two or more corn plants to produce a reliable corn seed. Corn is planted in the early spring using a corn planter. The machine drops the kernels into rows and then presses the soil around each kernel. A producer may cultivate the corn when it is still small. This is similar to hoeing a garden. It helps get rid of the weeds that compete with the corn plants for water and nutrients.

The Growing Factor

Today's producer grows a bushel of corn with only six minutes of labor using tractors and special equipment. Native Americans, by hand-planting, hand-hoeing and hand-picking, required 20 hours of labor to produce the same amount.

Before a producer plants the corn seeds, fertilizer is placed in the soil that helps feed the corn plant. Rain is extremely important because the corn plant needs water to grow. If rain is not adequate, ground or surface water can be applied. This is called irrigation.

Sometime between late September and November the corn will be dry enough to be picked or harvested. Corn is harvested by a large combine. The machine removes the ear of corn and separates the kernels from the corn cob. Parts of the corn plant are left in the field to protect the soil for the next year.

Products

The corn kernels are transported to processing plants to be used in food and industrial products. Corn can be found in more than 3,500 products in a grocery store. Fructose, a liquid sweetener from corn, is used to sweeten soda pop, candy, cake and cookie mixes, to name just a few items.

Ethanol is a renewable fuel made from corn and blended with gasoline for use in cars, small engines, trucks and buses. It reduces pollution emissions and reduces U.S. dependence on foreign oil. Distillers grain is a co-product of ethanol production that is used to feed livestock. Corn, ethanol and distillers grain are important products to producers and consumers.

Polylactic acid (PLA) is derived from the starch of the corn kernel. It is reducing dependence on foreign oil and is being used in the production of packaging materials, plastic cups, plates, table service, golf tees and other plastic products. PLA is used in fibers for clothing and carpet. These products from PLA are friendly to the environment and biodegradable when composted.

DRY EDIBLE BEANS

On The Front

A. Mature Plant

Dry edible beans have viny plants that either grow upright like a bush or spread evenly across the ground. The more upright the plant, the more resistant it is to diseases. The plants typically grow 24 inches tall.

B. Bean Pod

The bean seed grows in a pod.

C. Pinto Beans

Pinto beans are various shades of brown and tan. Nebraska producers grow 60,000 to 70,000 acres of pinto beans in the western portion of the state. Pinto beans are commonly used in Mexican dishes, such as refried beans.

D. Great Northern Beans

Great Northern beans are oblong-shaped, plump and white. Great Northern beans are grown where the climate is cool and dry at harvest time. These beans are used in soups and other bean dishes.

E. Light Red Kidney Beans

The light red kidney bean is large and kidney-shaped. These beans are often used in chili and are commonly sold at grocery stores.

Dry Edible Beans

Dry edible beans were discovered by Christopher Columbus in Cuba during the Sixteenth Century. He took them back to Europe, where they were considered to be a special delicacy. Today we use them because they are an excellent source of protein, fiber and energy. The dry edible bean plant is a legume that has the ability to use soil bacteria to pull nitrogen from the air and use it for its growth. This is important for growing crops and maintaining soil quality.

Planting

Great Northern, pinto and light red kidney beans are planted in late May to mid-June. These varieties are drought-tolerant, meaning they can survive on limited rainfall. Bright, sunny days help develop bean color that is visually more appealing to consumers.

A machine called a planter is used to place the seeds into the soil. The seeds are pushed into the ground about an inch-and-a-half to two inches deep depending on the moisture in the soil.

Harvest

It takes 80 to 90 days for the bean plants to mature. Harvest begins in early September when the plants are dry and the leaves start to fall off of the plants. The bean stems are cut just below the soil surface with a special attachment called a knife and placed into piles called windrows. The best time to cut the bean stem is before dawn, when there is dew on the plants. This prevents the pods from breaking open and spilling the beans on the ground. After four to five days or when the windrows have dried thoroughly, the bean plants are picked up with a machine called a combine and the beans are removed from the pods.

Dry edible bean producers make adjustments to their combines to protect the beans from being damaged. Damaged, split or broken beans are not acceptable to canners or packagers.

Processing

Beans are brought to a processing station where they are cleaned and sorted for size. Keeping the beans clean is very important because these beans are used for human food.

Half of the dry edible bean crop grown in the United States each year is sold to other countries. Great Northerns go to France, Greece and Northern Africa; pintos are shipped to Mexico and Spain.

GRAIN SORGHUM

On The Front

A. Grain Sorghum Head Containing Seeds

There are approximately 750 to 1,250 seeds in one grain sorghum head. Many producers grow grain sorghum to feed their livestock.

B. Grain Sorghum Plant

The common grain sorghum plant grown in the Midwest is called milo. The plant grows half the size of corn, or about four feet tall.

C. Grain Sorghum Flower

The seeds may be white, pink or red and are formed inside the flower.

D. Grain Sorghum Seed

The grain sorghum seed is very small. About 12,000 to 15,000 seeds equal one pound.

Grain Sorghum

Grain sorghum is one of the oldest known grains and has historically been one of the five major cereal crops used for food by humankind. Its origins can be traced to Africa and India. Benjamin Franklin is credited with introducing grain sorghum to the United States. In addition to its use in human food systems, it's used primarily as an animal feed in the U.S. The plant looks a lot like a corn plant but it is shorter and more colorful. The head is white, yellow, red or bronze.

Planting

Planting begins in late May to early June when the soil temperature exceeds 65° F. It is planted in rows in soil that is warm and moist for proper germination. Sorghum doesn't require a lot of water throughout the growing season and it can survive in long, hot summers. This versatile grain is grown in Arkansas, Kansas, Louisiana, Missouri, Nebraska, Oklahoma and Texas.

Harvest

Harvest begins in late September or early October. Grain sorghum is harvested with a combine, a machine that goes through the fields, cuts off the head of the plant and threshes or removes the grain from the head. The grain is loaded into trucks and stored at the farm in a grain bin or sold to a commercial elevator. If the grain is high in moisture, it must be dried before it can be stored.

Uses

Properly processed grain sorghum is nutritionally similar to corn and is used as a feed grain for cattle, hogs and poultry. Pet food manufacturers, recognizing sorghum's value as a highly digestible carbohydrate, are including it in their feed formulations. Sorghum is also consumed as a cereal grain by humans around the world. It can be milled into flour and used as a specialty flour in recipes along with wheat and other flours. Sorghum flour is gluten-free, giving rise to its popularity within the health market among people who cannot eat wheat, barley, oats or rye. Gluten-free recipes using sorghum flour contain xanthan gum or guar gum as a binding agent and are both nutritious and tasty. Industrially, sorghum is valued for its starch content and can be used for ethanol production. Its co-product, distiller's grain, is a valuable and widely accepted feed for both feedlot cattle and dairy cows.

OATS

On The Front

A. Oat Head

The oat head is a cluster of branches called a panicle. Two or more seeds contained in a spikelet are located at the end of each oat branch.

B. Oat Plant

Like other small grain crops, the oat plant is an annual grass; it produces three to five hollow stems. The stems have seed clusters or flowers on their branches. The plant grows two to three feet tall under normal conditions.

C. Oat Seed

Oat seeds can vary in size. Some varieties have short, plump kernels while others look more like rice and are longer and more slender. A leafy tissue called a hull covers each seed.

Oats

Oats are used for animal feed and for human food. Oats were discovered thousands of years ago in Egypt. They were once considered a weed and were sometimes used in medicines. The crop became popular with farmers because it is easy to grow, harvest and feed to animals. In the mid-1800s, oatmeal began to gain importance as a breakfast food. Since then, more oat products have been developed and their nutritional qualities are popular among health-conscious people.

Adaptation

Many producers choose to grow oats because they fit into most crop rotations, do well on a wide range of soil types and help protect land from soil loss. Major oat producing states are lowa, Minnesota, Nebraska, North Dakota, South Dakota and Wisconsin.

Planting

Oats are usually planted after corn or soybeans. A machine called a grain drill is used to plant most oats. The seeds are planted between one-and-a-half to two inches deep. Spring oats are planted as early as March. Fall oats, grown farther south in the United States, are planted between October and December.

Harvest

Most oats grown in the United States are harvested for grain with a machine called a combine. Oats also can be cut at the dough stage for hay and fed to animals. At this stage, the oat seeds feel like dough when they are rolled in the hand. Oats cut at the milk stage are used as a wet feed, or silage, for animals. Oat seeds at the milk stage are filled with a milky fluid.

Milling

Like other grains, oats must go through a process called milling before they can be used for human food products. When oats arrive at the mill, they are cleaned to remove other seeds, weeds and sticks. Next, they are dried and the hulls are removed. Then they are cut, flaked or ground into flour.

POTATOES

On The Front

A. Blossoms

Potato plant blossoms are clustered one-inch wide, five-petaled flowers. These flowers range in color including white, lavender, blue, yellow and purple. The green berries (fruit) form and develop after fertilization and turn yellow as they mature. Each berry may contain 200 or more seeds. These seeds are used by plant breeders, not for commercial production.

B. Potato Plant

The potato plant is bushy, sprawling and dark green. It consists of stems which grow to a length of one to two feet. The potato leaf is slightly hairy, and has one long leaflet in the center with two to four pairs of side leaflets, one to three inches in length.

C. Tubers

The tubers are the portion of the plant used for food and "seed." They are enlarged, fleshy stems which develop below the soil surface. Each tuber contains several "eyes." These are the small dimples on the surface of the tubers from which new plants can develop.

Potatoes

The potato plant is one of the most widely cultivated vegetables in the world. It can be grown under a wide range of environmental conditions. There are primarily three types of potatoes grown in the Midwest. Russet potatoes have rough, brown skin whose appearance is netted when mature. Most russet potatoes are baked or processed to make french fries. White Round potatoes are slightly oblong in shape and have smooth, cream-colored skins. Their major use is in the production of potato chips. Red potatoes are mostly round in shape with very thin, smooth, red skin and are used in potato salad. Most potatoes sold in supermarkets are russet, although other types may be sold as well.

Planting

Planting potatoes is possible from true seed produced in the fruit of the plant. However, better results occur by growing from pieces of a tuber. Planting a successful potato crop begins with selecting the proper seed potatoes. It is important to plant only certified seed potatoes. This ensures that the potatoes will be true to their variety (clone) and will not carry viral diseases. A "seed piece" is a piece of tuber with an eye. Seed potatoes should be cut so that two eyes are included on the surface of each piece. The pieces are planted with the eyes facing upward, three to six inches deep, and seven to 15 inches apart. The fields must receive an even, moderate moisture supply and must be constantly monitored for diseases and insects. Sandy soils with irrigation produce the most uniform potatoes with the least amount of bruising.

Harvest

Potatoes can be harvested either during the season and used as new potatoes or late in the season after plants have matured and vines have died. The potato harvest usually takes place about 120 days after planting. Specialized mechanical harvesters are used to dig the potatoes from underground. A lot of care must be taken in this process as the tubers will damage easily. Damage to tubers can reduce the amount of potatoes that can be sold and may make stored potatoes more susceptible to decay.

Storage

Potatoes that are not sold immediately after they are harvested should be stored properly if they are to be marketed at their full potential value. Potatoes should be stored in a cool, humid place to prevent sprouting. Direct sunlight will cause tubers to turn green and develop a bitter taste. The storage space should have relatively high humidity so the potatoes do not dry out, but it must also have good ventilation so the potatoes do not begin to decay.

SOYBEANS

On The Front

A. Soybean Plant

The soybean plant is called a legume. Legume plants have the ability to use soil bacteria to pull nitrogen from the air and use it for its growth. This is important for growing healthy crops and maintaining soil quality.

B. Soybean Seedpod

Soybeans grow in pods similar to peas. During the summer, the soybean plant flowers and produces 60 to 80 pods. Soybean pods range in color from very light yellow to shades of gray, brown or black.

C. Soybean Seed

Two to four pea-sized beans grow in each soybean pod. The seeds may be yellow, green, brown, black or speckled.

Soybeans

More soybeans are grown in the United States than anywhere else in the world. Soybeans were used primarily to feed livestock until the early 1900s, when scientist George Washington Carver discovered that soybeans provided valuable protein and oil.

The soybean provides many nutrients to both people and animals. It is especially high in protein. Many countries use soybeans as their main source of protein instead of meat, eggs or cheese.

Planting

Farmers plant soybeans in the spring when the soil temperature is above 55°. The soybean plant has nodules that are attached to the root system and contain nitrogen for the next crop. This makes the soybean a valuable plant in crop rotation.

As the soybean plant grows, it branches out in all directions and produces many leaves. The bushy plant grows from two to three-and-a-half feet high. The stems, leaves and pods are covered with short, fine hairs. Small white or purple flowers grow where the leaf joins the stem. At the end of the growing season, the leaves will turn yellow and drop to the ground. Soybeans are harvested in the fall with a combine.

Processing

Soybean oil is a popular vegetable oil in the United States. When crushed and pressed, soybeans produce an oil that is used in margarine, cooking oils, salad dressings, mayonnaise and many prepared foods. Soybean oil contains no cholesterol and is low in saturated fat so it is popular with healthconscious people.

Soybean oil also is used to make paints, varnishes, soaps, cosmetics, plastics and crayons. Soybean oil is even used to make ink for printing newspapers and magazines. Soy biodiesel is another product made from soybean oil. This fuel is used in cars, trucks and buses, which reduces pollution and increases engine performance. Soy biodiesel is a renewable resource and lessens U.S. dependence on foreign oil which is not a renewable resource.

After soybean oil is removed in processing, the remaining flakes are processed into food products or protein meal for animal feed. Soybean meal is an important protein source for livestock and poultry.

SUGAR BEETS

On The Front

A. Sugar Beet Plant

The sugar beet plant is a root crop that grows underground. When fully grown, a sugar beet weighs two to five pounds and produces about three teaspoons of sugar.

B. Sugar Beet Seed

The sugar beet seed is tiny. It is about half the size of a grain of rice. It is a rough, bumpy seed. Most seeds for sugar beet plants are produced in Willamette Valley, Oregon, the destination point of the historic Oregon Trail. It takes two years to produce sugar beet seeds.

Sugar Beets

Sugar beets are planted in early spring. A high altitude and a combination of cool nights and warm days provide ideal conditions for beets to produce a high amount of sugar. The growing season is from April until October. Producers plant about three sugar beet seeds per foot.

The sugar beet plant produces sugar in its leaves by a process called photosynthesis. In photosynthesis, the plant combines water with carbon dioxide from the air and energy from the sun to produce sugar. The sugar is then stored inside the beet.

Harvesting

During harvest in the fall, producers use a machine called a defoliator to cut off the tops of the beets that are left in the field. A sugar beet lifter/loader then lifts the beets out of the soil onto a truck, and the beets are delivered to a receiving station at the sugar beet processing plant. Harvested sugar beets are very heavy. An average pile of beets weighs about 40,000 tons. The average yield is 20.5 tons per acre with 16.7% sugar.

The Factory Process

First, the beets are cleaned in a beet washer. Then, a machine called a slicer is used to cut the beets into long strips that look like shoestring potatoes or noodles. The beet noodles are sent through a machine called a diffuser or extractor. Hot water is mixed with the beets to dissolve and remove the sugar from the beet noodles.

The water and sugar juice are saved and this solution is called "raw juice." The beet noodles, now free of most of their sugar, are dried into beet pulp for livestock feed. The raw juice is treated with lime and carbon dioxide gas to clean the mixture again. It is sent through a big, round filter to clean it and remove other non-sugars. The raw juice goes into a series of big tanks called evaporators where some of the water is boiled off. At this point, the mixture contains more sugar than water. It is a thick syrup and it is filtered again to make sure it is very clean.

Crystallizes Into Sugar

The mixture passes through a big tank called a white pan that allows the thick juice to boil at a low temperature. As the water boils away, the sugar solution becomes a thick mass that is dropped into a centrifuge machine. The machine spins very fast to separate the sugar crystals which drop onto a conveyor belt for further drying and cooling. The finished sugar moves into bulk bins for storage or to the warehouse for packaging. The packaged sugar is distributed to grocery stores to be purchased by the consumer.

SUNFLOWERS

On The Front

A. Sunflower Plant

The sunflower plant is the only annual flowering plant that grows as high as 12 feet. The roots of a sunflower go deep and spread extensively, allowing for some drought resistance.

B. Head

Most cultivated sunflowers have only one head. The head of a sunflower can reach a diameter of six to 12 inches. It is composed of yellow ray flowers and a central disk of either yellow, brown, or purple flowers, depending on the species. The seeds are produced in the disk flowers. Heads are "phototropic" which means they follow the sun during the day.

C. Seeds

Two types of commercial seeds are grown in the United States. The first type, oilseed, is black and very high in oil content. The second type, the edible seed, is larger than the oilseed and it is black-and-white-striped.

Sunflowers

The sunflower is a native North American species dating as far back as 3,000 B.C. A fairly common plant throughout the United States, no other plant has such global significance. Of all the oilseed crops, the sunflower has one of the shortest growing seasons. It can also be grown over a wide range of climates. This plant does fairly well under adverse weather conditions and its deep roots use soil moisture efficiently, adapting well in dry regions. The sunflower is the national flower of Russia, as well as a popular crop among Midwest states including Kansas, Minnesota, Nebraska, North Dakota and South Dakota. Worldwide, more than five million metric tons of sunflower seeds are grown each year. The best oil varieties, developed in Russia, contain about 50% oil and have superior quality for use in cooking.

Planting

Sunflowers are generally quick-growing, undemanding plants. They need full sun and grow well under a wide range of soil and climate conditions. The best growth is in soils with adequate water-holding capacity, internal drainage and proper fertility. It is best to plant after the last frost date in the area. Sunflowers especially need water during the critical time of 20 days before and after flowering. Flowering usually occurs around mid-summer.

Harvest

The harvest usually begins in mid-September and can run through October. The seeds are ready to harvest when the disk flowers in the head are shriveled and the head is turned downward. The backs of the heads will also turn a yellowish brown in color. Most sunflowers are harvested with a combine. Birds may damage the crop by eating the seeds in the heads before harvest.

Uses

The sunflower is produced for a variety of reasons. Oilseed makes up 75% of the sunflower crop. Sunflower oil is light in color, bland in flavor and high in proportion of polyunsaturated fat. It is great for use in not only cooking oils, but also in margarines and shortening, as well as in some candles and soaps. The other 25% of the sunflower crop is the edible seeds. These seeds are produced for human consumption as well as animal feed. Some of the seeds are roasted while others are dehulled and the kernels are sold as "nuts."

WHEAT

On The Front

A. Wheat Plant

Wheat is an annual grass plant that grows two to three feet tall. The plants have long and narrow green leaves that turn golden as harvest nears.

B. Wheat Head and Kernels

The wheat head contains kernels or seeds and is located at the top of the plant. Kernels are the only part of the wheat plant used for human food. Each wheat head contains 50 to 75 kernels.

C. Wheat Kernels

Wheat kernels are very small. A bushel of wheat weighs about 60 pounds and contains about one million kernels. If wheat averages 35 bushels per acre, a baker can make 1,960 loaves of bread. An acre is about the size of a football field.

Wheat

Wheat is used mostly for human food. History shows that the first people to eat wheat probably did so 17,000 years ago by chewing kernels of the wild grain.

There are two major types of wheat planted in the United States. They are winter wheat and spring wheat. Winter wheat is planted in September and harvested the following summer. Spring wheat is planted in April or May and is harvested in August or September.

Two types of winter wheat are used primarily to make breads and hard rolls. These are called Hard Red winter wheat and Hard White winter wheat. The Hard White winter wheat has the same qualities and functionality as Hard Red winter wheat, but white in color. Millers and bakers are able to make a whole wheat product that looks and tastes like an enriched white flour product.

Planting

The soil must be prepared before winter wheat is planted in the fall. First, a disk is used to turn and loosen the soil and to destroy any young weed plants. Pulled behind a tractor, a disk has a set of metal "plates" that dig deep into the soil. An implement called a harrow is used to smooth out the soil for planting.

Wheat is planted by a machine called a grain drill. First, a shovel cuts a trench into the soil so the seeds can fall into the ground. A "notched wheel" feeds the seeds into a tube and drops the seeds one at a time into the trench. Loose soil is pressed over the seeds. Now the seeds are ready to grow.

Growing Cycle

The seed begins to grow when there is enough moisture in the soil. The first signs of growth are tiny root hairs that stretch down into the soil. Eventually, a small shoot pushes upward through the soil.

Tissue within the wheat seed provides the plant with its first nourishment. As the plant grows, it uses the sun to make food in its leaves. Its roots get food from the soil. Winter wheat grows four to eight inches tall in the fall, but stops its growth when winter arrives.

In the spring, the wheat plant grows many leaves and sends up three to 12 stems called tillers. A group of flowers called a spike develop at the top of each tiller and mature into the wheat head. Kernels within the head grow and turn golden before harvest.

Harvest

The wheat must be dry before it can be harvested. A machine called a combine is used to cut, separate and clean the grain with one pass through the wheat field. The producer takes the grain to the nearby elevator. From the elevator, the wheat will be sold to be processed into food for humans or livestock feed.

Wheat is ground into flour at a mill. Most products such as bread, rolls, cookies, pastries and bagels are made from wheat flour. Bran from wheat is added to breakfast cereals for fiber. Other products made from wheat include spaghetti, muffins, crackers, tortillas and macaroni. Wheat products have carbohydrates, protein, minerals and vitamins.