

SOYBEANS

Shape the World



Soybeans are small beans with a big impact! Originally from Asia, soybeans are now a top crop in the United States. Nebraska farmers grow over 300 million bushels each year! Many are shipped to other countries, making soybeans a major export. This connects Nebraska farmers to global markets and helps feed animals, power machines, and support jobs around the world.

Soybeans are also super versatile. They are turned into food, fuel, animal feed, and more. Plus, they help the soil by adding nutrients as they grow.



Lance Atwater Blue Hill, NE

"Soybeans are one of the most versatile crops we grow in Nebraska. From livestock feed and cooking oil to biodiesel and everyday products like crayons and plastics, soybeans fuel our economy and our daily lives. Growing soybeans gives Nebraska farmers, like myself, the chance to meet a wide variety of needs, both here at home and around the world."



Get to Know the Language of Soybeans and Global Trade!

As you read the following pages, see if you can spot and circle these key words. They will help you better understand how soybeans connect to science, economics, and the world around you!

Crushing

The process of grinding and pressing soybeans to separate the oil from the solid parts.

Legume

A plant that grows seeds in pods and naturally adds nitrogen to the soil, improving its health.

Co-product

A valuable secondary product made during the creation of something else, like soybean meal, which is produced when oil is extracted from soybeans.

Emulsifier

A substance that helps mix things that normally do not combine, like oil and water. Soy lecithin is a common soybean-based emulsifier.

Biofuel

A type of fuel made from plants like soybeans that is used as an alternative to fossil fuels.

Commodity

A basic good that can be bought and sold, like soybeans, corn, or wheat.

Interdependence

When people or countries rely on each other for goods, services, or resources.

Division of Labor

When people or groups specialize in different tasks to work more efficiently.

Exports

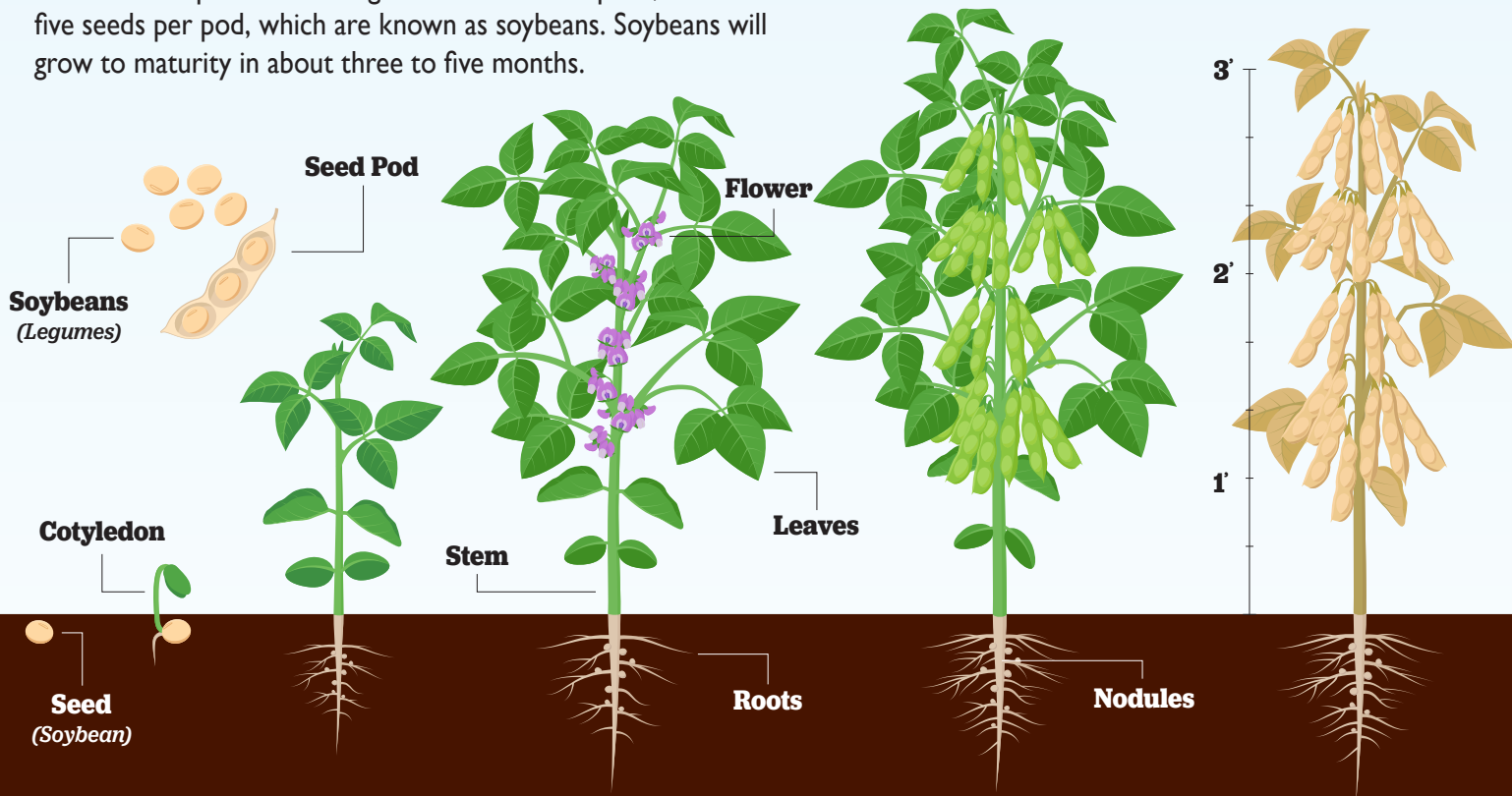
Goods sold and shipped to other countries.

Symbiotic

A relationship between two living things in which both benefit, like soybean plants and soil microbes.

Mighty Miracle Bean

Soybean plants are great for the soil! The soybean plant is called a legume because it collects nitrogen from the air and releases it back into the soil in a form plants can use during photosynthesis. Soybeans on average grow about two to three feet tall. Each plant can average around 60 to 80 pods, with three to five seeds per pod, which are known as soybeans. Soybeans will grow to maturity in about three to five months.



A Helpful Partnership

Soybeans need help to change nitrogen from the air into a usable form. This is where a bacterium called rhizobia steps in. The rhizobia live in special organs called nodules on a soybean's roots, and in return, the plant uses the nitrogen that the bacteria convert from the air. Since both the plant and the bacteria benefit from working together, this is called a symbiotic relationship.

Gage Hoegermeyer, a farmer in Herman, Nebraska, rotates his crops — planting corn one year and soybeans the next. This practice, called crop rotation, helps improve soil health because soybeans add nitrogen to the soil. Healthy soil means better crops and bigger yields for Gage.

Marissa Mann is a soil scientist in Nebraska. She works directly with farmers to test and improve soil health, check for pests and plant diseases, and provide helpful recommendations so farmers can grow the best crops possible.

WORD BANK

Fill in the blanks using the word bank.

leaves	seed pods	seeds	three feet
stem	roots	nodules	legume

1. Seeds are held inside the _____.
2. Soybean plants can grow over _____ tall.
3. The _____ of the soybean plant grow underground.
4. Roots in the ground bring water from the soil into the central _____, then up to the many _____ at the top of the plant to collect sunlight.
5. On the roots are _____, a plant organ where rhizobia bacteria live.
6. The pod holds three to five _____ inside.
7. Because it collects nitrogen from the air and releases it back into the soil, the soybean is classified as a _____.

Tasty and Nutritious Soy Foods

Soybeans show up in all kinds of food! Sometimes we eat the whole bean, and other times we use just part of it. Soybean oil is used in things like mayonnaise and salad dressing. Soybean meal is packed with protein, which our bodies need to grow and repair. Soybean meal is used to make foods like veggie burgers, tofu, and soy milk.

Have you tried edamame? These are whole soybeans steamed and salted in their pods and served as a finger-food appetizer. You can also use shelled edamame to add a protein boost to salads. Whole dry soybeans can be soaked, blended, and boiled into soy milk and tofu, or fermented into soy sauce or miso paste.

Soy milk is a non-dairy drink made using soybeans and water. It is available in sweetened or unsweetened options and is often enriched with added nutrients like vitamins and minerals.



Dorothy Lynch is more than just a salad dressing! It is a beloved Nebraska icon. From bean to bottle, its story highlights how Nebraska-grown soybeans help create the dressing's famously smooth texture and one-of-a-kind flavor. Soybean oil, made from soybeans, is a key ingredient.



Bakers Candies is another Nebraska product that uses soybeans. Bakers Candies chocolates get their velvety smoothness from soy lecithin, which helps create the renowned melt-in-your-mouth experience. Without it, chocolate would look chalky white. Keep reading to discover other ways soy lecithin enhances your favorite foods.



Take a look at the ingredient list on chocolate bars, peanut butter, bread, or salad dressing. You'll probably find soy lecithin (LEH-si-thin). This natural fat is an emulsifier, a fancy way of saying it helps mix things together that normally would not mix, like oil and water. It keeps your favorite foods smooth, creamy, and well-blended.

DID YOU KNOW?

One bushel of soybeans (60 pounds) can make about **90 gallons of soy milk.**

Soybeans are a powerful plant with big potential in the kitchen and beyond!



A Multi-Tool in One Bean!

Soybeans do not stay beans for long — they are incredibly versatile!

After harvest in the fall, soybeans go through several steps of processing. Processing in various ways helps maximize value by using all the soybean's parts. You may hear soybean marketers talking about "crush." Soybean crushing is a multi-step process that separates the two valuable parts of the soybean: the oil and the meal. A 60-pound bushel of soybeans yields about 48 pounds of protein rich meal, 11 pounds of oil, and a small portion of soybean hulls.



Most soybean oil is used for food products, but about 31% is used to make biodiesel to power machinery and buses. Even recycled cooking oil can be used to help make biodiesel fuel! Beyond food and fuel, soybean oil is also used in a variety of industrial products.

The soybean meal, a co-product of crushing, contains the bean's protein. It is primarily used as animal feed, but it can also be processed for human consumption. It can serve as the basis for soy milk, plant based proteins, and soy flour. When ground even further, soy flour becomes one component of the glues that hold plywood together.

SOY PRODUCT MATCH

Draw lines to show which soybean parts make each product. Some parts are used more than once.

Wax	Potato Salad	Animal Feed	Tofu

There is a growing demand to develop soybean oil into alternatives to petroleum-based products, like cushions and mattresses, which can be made from soy-based foam with the same durability, comfort, and quality as petroleum-based foam. Soy is used in furniture polish, paint, bio-based shoe materials, adhesives, plastics, and even artificial turf for parks and ball fields!

Soy biodiesel is a cleaner fuel that helps power trucks, tractors, and buses while producing fewer emissions, contributing to cleaner air. Biodiesel is also safer to use and store than petroleum-based fuels, causing less damage if spilled and is less likely to catch on fire.

Benefits of Soy Oil

- Plant-based and renewable
- Biodegradable, breaks down naturally over time
- Low evaporation loss, which helps it maintain its quality longer by losing less water during use
- High lubricity (slipperiness) needed for certain applications



Arrow Stage Lines, a 97-year-old company, now fuels its fleet with soy biodiesel. Switching to soy-based biofuel has cut transportation costs for its riders, including Nebraska athletics, while supporting local soybean growers and processing plants.

DID YOU KNOW?

According to the American Soybean Association, **90% of America's daily newspapers are printed with soy ink made from soybean oil!**



Nebraska soy to the rescue! Firefighters statewide are using SoyFoam™ TF 1122, a soy-based, eco-friendly firefighting foam made from soy flour. It is safer, biodegradable, and helps protect both heroes and the environment — all without changing how they fight fires!

ADM Lincoln is a processing facility that finds a use for every part of the soybean! Crushing nearly 5.5 square miles of soybean fields every day, oil is extracted and refined, meal turned into livestock feed, and hulls are used as fiber additives for animal feed. ADM transforms Nebraska soybeans into food and essential products that people use around the world.



Supporting Livestock and Beyond

Nebraska soybeans play a big role in supporting animal agriculture right here in our state and across the U.S. Livestock producers (farmers who raise animals) depend on high-quality soybeans to feed chickens, pigs, cattle, turkeys, and even fish. Soybeans are processed into soybean meal, a protein-rich feed that helps animals grow strong and healthy. In fact, animal agriculture is the number one consumer of Nebraska-grown soybeans.

Nebraska grows enough soybeans to supply farms here at home and around the world. When soybeans are sold to other countries in the commodity markets, they become an export. A commodity is a raw material, often an agricultural product, that can be bought and sold. From Nebraska fields to farms and fuel across the globe, soybeans play a vital role in producing the food and energy we all depend on.



WHERE DO SOYBEANS GO?

Match each place to the descriptions below.

PLACES

- Egypt
- Mexico
- Southeast Asia
- China
- European Union

ANSWERS

DESCRIPTIONS

1.	This large Asian country is the biggest importer, using soybeans for feeding pigs, cattle, and poultry, and for cooking oil for its large and dense population.
2.	This major importer borders the USA, using soy for food, livestock feed, and industrial applications.
3.	This North African country is a rising importer due to its dairy cows and increasing poultry and aquaculture production.
4.	While this region is famous for its innovative use of renewable fuels, it uses most of its soy imports for livestock feed.
5.	This area between the Indian Ocean and the Pacific Ocean is buying more soybeans for soy-based food and aquaculture – feeding fish that are grown for food.

Nebraska is the

5TH LARGEST

SOYBEAN PRODUCING STATE IN THE U.S. (2024)



Dawn Kucera Madison, NE

“In Nebraska, we grow more soybeans than we can use — so we sell them around the world. After harvest, I take my soybeans to a local grain elevator, where they’re sold and stored. Some are shipped overseas, and others are processed here in the U.S. to make biodiesel, a clean fuel for trucks, tractors, and school buses. Global trade helps farmers like me earn income and feeds people and animals everywhere.”

The value of Nebraska soybean exports in 2023 equated to 49% of the value of all soybean receipts in Nebraska. According to the Nebraska Farm Bureau, about half of the soybeans grown in our state are sent to other countries — like shipping every other row of soybeans around the world!

Many countries import whole soybeans from the United States and then process them in their own country. This creates specialized jobs for their workers and helps keep costs lower when selling their final products. Together, producers and processors enjoy interdependence, meaning we can rely on each other to do work efficiently that we cannot do all on our own. Allowing both countries to specialize and be more efficient is called division of labor. Like the soybean plant and the rhizobia bacteria, countries create symbiotic relationships, too!

DID YOU KNOW?

A Panamax Vessel has seven cargo holds. Each is capable of accommodating 300,000 bushels of soybeans, for a total of 2.1 million bushels.



Selling soybeans, soybean meal, and vegetative oil to other countries helps Nebraska farmers earn money. In 2023, these exports brought more than \$2.385 billion to Nebraska’s economy.

Discover Yourself in Agriculture

Has anyone ever asked what you want to be when you grow up? There are many exciting ways to use your skills in a meaningful career. The most important part of choosing a job in agriculture is knowing yourself: What matters to you? What are you interested in? What might interest you in the careers highlighted below?

CAREERS CONNECTED TO SOYBEANS



1. Dairy Nutritionist



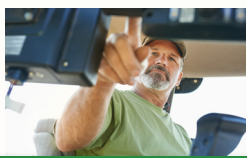
2. Commodities Buyer



3. Plant Technician



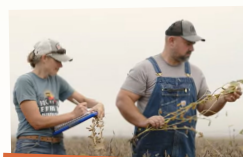
4. Chef



5. Crop Farmer



6. Grain Elevator Operator



7. Agronomist



8. Plant Scientist

Match each description to the correct job title using the word bank. Write the correct number on the line.

I make sure the machines in our plant run properly while we turn soybeans into useful products like oil.

I buy soybeans to make biodiesel fuel and place orders to keep our factory supplied and running.

I grow soybeans, take care of my crops and equipment, and use technology to improve each season.

I cook tasty meals using ingredients made from soybeans like tofu and soy oil. I enjoy making food that surprises people.

I feed our cows a healthy diet, including soybean meal, to help them produce high-quality milk.

I help move soybeans from storage to trucks or trains so they can be sent to places around the world.

I figure out the right mix of nutrients in the soil so soybean plants can grow strong and healthy for farmers.

I study soybeans to help them resist pests, tolerate drought, and grow stronger and healthier in the field.

NEBRASKA
AGRICULTURE
IN THE CLASSROOM
NEBRASKA FARM BUREAU FOUNDATION



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