

# Illinois Ag Mag Soybean

An agricultural magazine for kids

## WATCH IT GROW



About four to seven days after the seeds are planted, the soybean plant begins to grow. As it grows the plant changes.

1. The seed grows a little tail-like root called a radicle.
2. The tail becomes the main root. This is called a taproot. Soon smaller roots, called lateral roots, branch out from the taproot.
3. The plant pops out of the ground. A small round part of the plant called the cotyledon peeks through the topsoil.
4. The leaves grow in groups of three. They are called trifoliate.
5. Small purple or white flowers appear on the plant. Many of these flowers grow into small pods of soybeans.
6. In the fall, the plants turn brown and the leaves drop off.
7. The pods stick to the plant and the beans inside the pods get hard and dry. Each pod contains 3-4 beans. The farmer harvests the soybeans.



# 2011 Illinois Soybean Stats

**Production:** 416.42 million bushels (#2 in the United States!)

**Area Planted:** 8.9 million acres

**Area Harvested:** 8.86 million acres

**Average Crop Yield:** 47 bushels/acre (#4 in the United States!)

**Exports:** 155 million bushels

**Price Paid to Farmers:** \$11.90/bushel

**Soybean Crop Value:** \$4.955 billion

**Top-Producing Counties:**

- 1) McLean
- 2) Livingston
- 3) LaSalle
- 4) Champaign
- 5) Iroquois

Source: [ilsoy.org](http://ilsoy.org)

Illinois plants enough soybeans to cover  
**NINE MILLION FOOTBALL FIELDS.**



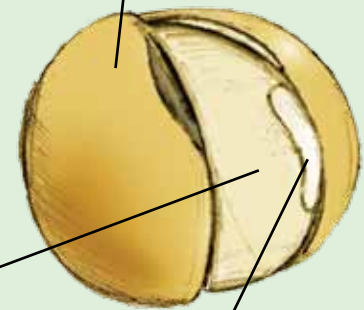
## JUST WHAT ARE SOYBEANS?

Soybeans are small round seeds, each with a tiny, brown spot. They are made up of three basic parts. Make your own soybean book with the Bean Book activity found at [www.agintheclassroom.org](http://www.agintheclassroom.org).

**Hilum** – brown spot.



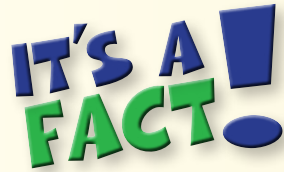
**Seed Coat** – outside cover that protects the seed.



**Cotyledon** – first leaf or pair of leaves within the embryo. A part of the seed that stores food.

**Embryo** – part of a seed that develops into a new plant, including the stem, leaves and roots.

# Production



The United States is one of the leading soybean producers in the world!



Farming is a year long job! Planting and harvesting may only take 4-5 months, but there is a lot more preparation that goes into growing a great crop.



Spring - Prepare the soil and plant seeds.



Summer - Control weeds and insects and irrigate where necessary.



Fall - Harvest, store beans and work the soil.



Winter - Market the crop, order seeds and take care of machinery.

## DID YOU KNOW?

After the crops are harvested the soybeans are stored in grain bins or taken to large storage areas in nearby communities. These storage areas are called grain elevators.

Most soybeans grown in the United States go to processing to make food, livestock feed, oil and fuel. Half of the annual crop is exported. Of the remaining in Illinois, most of the soy is consumed by livestock. They are the Illinois soybean farmer's #1 customer. Of the soybean meal fed to livestock in Illinois, 82% is eaten by pork, 8% by beef and dairy and 5% by poultry.



**Pork**  
**82%**



**Beef & Dairy**  
**8%**



**Poultry**  
**5%**





# Processing

When soybeans are processed, the hull (seed coat) is removed. The beans are crushed and rolled into flakes. The oil and soybean meal is then separated. The hull can be used in pelleted form as animal feed. Soy meal can be used in a variety of foods for humans and animals. You can find soy oil almost anywhere.

**IT'S A  
FACT!**

Soybean oil is the main edible oil used in the United States. Soybeans are the #1 ingredient in vegetable oil. Check your kitchen and read the label on your vegetable oil!

Soybean meal is not only used for farm animals, but also in food for pets, zoo animals and fish.



# Distribution



 [View Episode 4](#)

Distribution is delivering a product from where it is produced or grown to the places where it will be used. Soybeans are transported across the nation and around the world by trucks, trains and barges. Airplanes can be used to transport products made with soybeans.



## DID YOU KNOW?

The Mississippi River is an important route for delivering soybeans to the Port of New Orleans.

In the United States, 78% of our soy exports are whole soybeans which are shipped to countries around the world. The U.S. exported 1,590 million bushels of soybeans in recent years.

# Marketing & Consumerism

Marketing farm crops involves planning and researching to get the best price available for the crops grown. It involves deciding what crops are the most marketable and for what uses. After farmers harvest the grain, it is dried and stored at the grain elevator. When the farmer is ready to sell it, they contact the elevator and tell the manager how much to sell. Some farmers also have contracts with companies that use soybeans. These farmers grow enough soybeans to fill the contracts they made with the companies. Marketing also involves advertising the products made from soybeans, on TV as well as in newspapers and magazines.



New soy products are being developed every day. A few examples include: building materials, plastics at John Deere and foam in the seats of Ford vehicles. Each product is also a renewable resource!

Consumerism is YOU choosing, buying and using the products.

Soybeans and their products are included in all the food groups except fruits. Soybeans are a source of high-quality protein and contain all eight of the essential amino acids. Very few vegetables have all eight amino acids. Soybeans also contain essential vitamins and minerals including calcium, iron, potassium and folic acid.

## DID YOU KNOW?

The average American consumes nearly half a cup of soybeans in some form each day.

READ the labels! Ingredient labels are required on all products we buy. The ingredients on a label are listed by the amount of each ingredient in a product from the MOST to the LEAST. Check out your labels and look for soy oil, soy flour, soy protein isolates and soy lecithin.



## Biodiesel



Biodiesel is a renewable fuel made from soybeans! It is the fastest growing alternative diesel fuel in the United States. It was developed in the 1890's by inventor Rudolph Diesel. The diesel engine has become the engine of choice for power, reliability and high fuel economy worldwide.

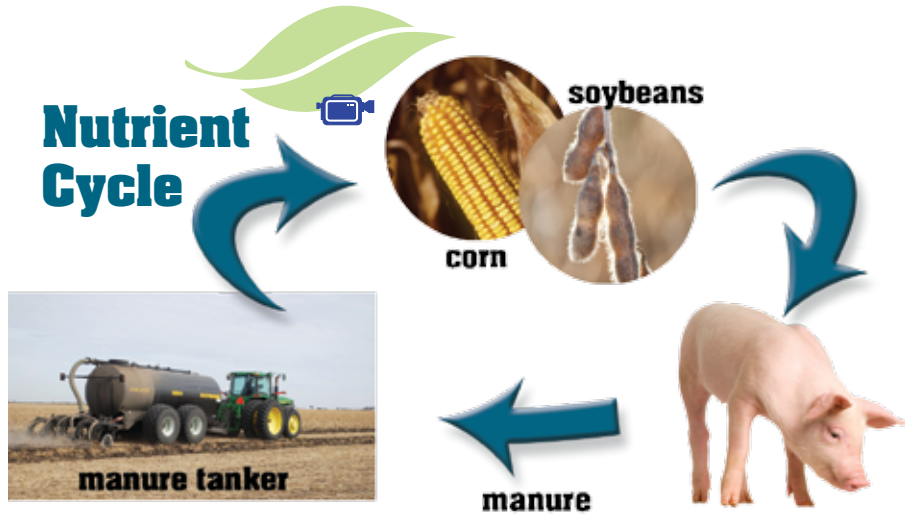


Biodiesel has reduced exhaust emissions compared to petroleum diesel fuel.

Biodiesel is biodegradable and non-toxic.

INGREDIENTS: ENRICHED BLEACHED WHEAT FLOUR, "B" VITAMINS, RIBOFLAVIN, SUGAR, WATER, EGG WHITES, EGGS, GLYCERIN, SOYBEAN OIL, BROWN SUGAR, SOY PROTEIN ISOLATE, CORNSTARCH, SOY LECITHIN, VEGETABLE SHORTENING (MAY CONTAIN SOYBEAN OIL & COTTONSEED OIL), WHEY, CINNAMON, SALT, GUAR GUM, CORN SYRUP, CORN CEREAL, MALT SYRUP, NATURAL FLAVORS. SORBIC ACID (TO RETAIN FRESHNESS) CONTAINS WHEAT, SOYBEANS, EGG AND MILK.

## Nutrient Cycle



Soybeans play an important role in the nutrient cycle. Many crops, such as corn and cotton, remove nitrogen from the soil. Rotating these crops with legumes, such as soybeans, helps add nitrogen back to the soil naturally. This means farmers have to add less commercial fertilizers to the soil. Additionally, Illinois livestock farmers feed their animals a rationed diet which includes soybean meal, corn, hay and other important vitamins and minerals. A ration is the total amount of feed that an animal is given in a 24 hour period. Feed rations for dairy cows include 12% soybean meal, while for pigs they contain 15% soybean meal, and for steers and broiler chickens, the rations consist of 25% soybean meal. These animals also produce manure, which can be used as fertilizer in the field to help produce healthier crops that we will feed to our livestock, and the cycle begins again.



## Uses of Soybeans

### Animal Consumption

Fish Foods  
Cattle Feeds  
Dairy Feeds  
Poultry Feeds  
Swine Feeds  
Pet Food

### Human Consumption

Cooking Oil  
Baby Food  
Mayonnaise  
Batters and Breading  
Candy  
Breads  
Salad Dressing  
Cakes  
Bakery Products  
Cheeses  
Tofu  
Soy Flour  
Margarine  
Grits  
Coffee Creamer  
Noodles  
Cereal  
Peanut Butter  
Soy milk  
Snack Foods

### Consumer & Industrial

All-Purpose Lubricants  
Animal Care Products  
Auto Care Products  
Building Products  
Medicine  
Table Tops  
Car Wax  
Sunscreen Lotion  
Candles  
Carpet Backing  
Cleaning Products  
Crayons  
Paint  
Soap  
Body Lotion  
Glue  
Cosmetics  
Ink  
Rubber  
Engine Oils  
Furniture  
Insulation  
Paint Strippers  
Soy Biodiesel  
Weed and Insect Killer  
Plastics  
Fire Extinguisher Foam



# Soybeans Through History



Farmers in China began growing soybeans more than 5,000 years ago.



**1765**

Soybeans, or "Chinese vetches" as they were known, were introduced to North America.

1700s



**1804** JAMES MEASE, M.D.

James Mease, a physician and amateur horticulturalist, reported that soybeans had adapted to Pennsylvania's growing climate.



**1829**

Soybeans were thriving in Massachusetts.



**1861-1865**

Soybeans were used to brew a hot drink for soldiers during the Civil War.



**1898**

The United States Department of Agriculture (USDA) introduced several varieties of soybeans from Asian countries and set up a system to keep track of the different kinds of seeds.

1800s





**1904**

George Washington Carver began studying soybeans at the Tuskegee Institute in Alabama. Carver discovered a method of extracting soybean oil and also invented a process for making paints and stains from soybeans. Farmers in the South were encouraged to plant soybeans to keep the soil fertile for their cotton crop.

**1907**

William J. "Bill" Morse joined the USDA and devoted his life to studying soybeans. He was also the founder of the American Soybean Association and wrote more than 80 publications about soybeans.



**1950s**

Soybean meal became available to use as a livestock feed ingredient. It is high in protein and low-cost. This prompted a large increase in livestock and poultry production in the United States.



**1920s**

Palemon Howard (P.H.) Dorsett and William Morse traveled to China and Korea collecting varieties of soybeans. Over 10,000 varieties were sent back to the United States from their excursions.

**1940**

Henry Ford took an ax to a car trunk made with soybean plastic to demonstrate its durability. This increased the popularity of soybeans and the United States began to export soybeans and soybean products.



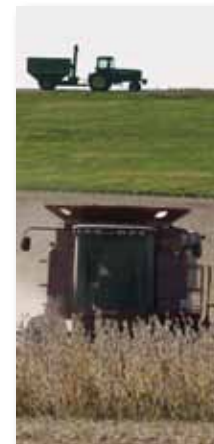
**1990s**

Soybean-based crayons win the first Indiana Soybean Development Council/Purdue University Soybean Utilization Contest.



**2002**

USDA's Agricultural Research Service begins heating its buildings in Beltsville, Maryland, and fueling all its diesel vehicles, generators and equipment sterilizers with B20 made from soybeans.



**Today**

Farmers throughout the United States produce 3.329 billion bushels of soybeans each year. Farmers in Illinois alone produce about 416 million bushels yearly, which puts them second behind Iowa.

1900s

2000s



**One bushel  
of soybeans  
weighs  
60 pounds  
and provides**

**11 lbs.  
of  
crude  
soybean oil**

**+**

**47 lbs.  
of  
soybean  
meal**



# CAREER CORNER

## Rob Shaffer

Illinois Soybean Association Director  
Farmer, El Paso, IL



[View Episode 1](#)



### *Describe how you got involved in farming.*

I have been involved in farming since I was old enough to carry a bucket. Currently, my brother and I operate the family farm in El Paso, Illinois. I attended Illinois State University to study agriculture. My major was Animal Sciences. I have two young sons that like being in the tractor, feeding the cows and helping around the farm. As they grow, I would like to give them the opportunity to come back to the farm if they want to.

### *What kinds of new technology do you use on your farm?*

One of the latest technologies is auto steer. This technology uses a Global Positioning System (GPS) signal tied into a computer that assists in driving the tractor. We also use computers to monitor yield at harvest time as well as rate of fertilizer and pesticide application during the growing season.

### *What are some ways farmers use the soybeans they grow?*

Once the soybeans are taken to the grain elevator, they will be made into soybean meal and oil. The hulls will be pressed into pellets that can be used to feed the cows. The soybean meal is used to feed the farm animals, while the soybean oil is made into biodiesel. The farmers can use the biodiesel in their combines, tractors, trucks and semis to grow and harvest more soybeans.

## Jesse Trushenski

Assistant Professor with the Fisheries and  
Illinois Aquaculture Center  
Southern Illinois University, Carbondale, IL



### *What is ahead for soybean farmers?*

The soybean farmer will continue to provide resources that are used in traditional livestock production, human foods and industry applications. Soy also plays a significant role in feeding aquatic livestock (fish). Many of the feedstuffs that we currently rely on for aquafeed manufacturing are becoming limiting resources, specifically fish meal and fish oil. If we are to grow as an aquaculture industry to meet the protein needs of a growing human population, we need to find ways to use soy as part of the solution of limited fish food.

### *Describe your job.*

As an assistant professor with the Fisheries and Illinois Aquaculture Center at SIUC, I teach courses in fish physiology and aquaculture, but my primary responsibility is leading a research team. We investigate the effects of diet and environmental influences on processes of growth, stress tolerance and disease resistance, and reproduction in aquatic species. Our goal is to make aquaculture -in all its forms- economically and environmentally sustainable to provide protein sources to the growing world population.

### *How has the research done at Southern Illinois University improved the use of soybeans?*

We are improving the use of soybeans by increasing the market for soy-derived ingredients in aquafeeds. There are limits to using soy proteins and lipids in aquafeeds—our research is focused on identifying the limits and the roadblocks, and most importantly, finding ways around those limitations.

# CAREER CORNER



## Khalid Meksem

Professor with the Department of Plant Soil and Agricultural Systems  
Professor and Researcher with the University's Soybean Center of Excellence  
for Research, Training and Outreach  
Southern Illinois University, Carbondale, IL

### *Describe your job.*

I use genetic information to develop better soybeans with durable resistance and more value added traits such as higher oil/protein composition and higher yields.

### *Where do you see the soybean industry headed in the future?*

Soybeans will continue to be a major player in the ag industry. Use of soybeans for food, biofuel and feed will continue to increase and researchers will keep finding new and innovative ways to incorporate soybeans into our daily lives.

### *How has research improved the use of soybeans?*

Soybeans are now securing higher yields in stress environments, and have become more resistant to disease, insects and parasites.

This issue of Ag Mag has been provided by



Funded in part by the Soybean Checkoff

## BEANIE BABY

Now that you know how a soybean grows, why not grow your own!

### Materials needed:

- Jewelry size resealable bag (found in craft stores)
- Crystal Soil (Found in nursery or from Flinn Scientific 800-452-1261)
- Hole Punch
- Water
- Measuring spoons
- Soybeans
- Yarn
- 

1. Punch a hole in the top of your bag, above the zipper seal.
2. Place ¼ teaspoon of Crystal Soil into the bag.
3. Drop 1-2 soybeans into the bag.
4. Add 1 tablespoon of water.
5. Seal your bag.
6. Insert the yarn in the hole to make a necklace.
7. Use the yarn to hang your Beanie Baby around the room to chart the effect of various exposures to light and heat. You might want to wear it around your neck, under your shirt to provide constant heat for your Beanie Baby!
8. Check your Beanie Baby several times a day to watch the process of germination.
9. Record the growth on a chart.



Information in this Ag Mag may be linked to the following Illinois Learning Standards: 1.B.2d; 1.C.2f; 10.A.2c; 10.B.2d; 11.A.2b; 11.A.2d; 12.A.2a; 13.B.2a; 13.B.2b; 13.B.2c; 14.E.2; 15.A.2a; 15.C.2c; 15.D.2a; 17.A.2b; 17.B.2a; 17.C.2b; 18.C.2; 22.A.2b; 23.C.2a

Information in this Ag Mag may be linked to the following Illinois Assessment Framework: 1.4.09; 1.4.11; 1.4.24; 10.4.01; 11.4.02; 12.4.04; 13.4.09; 13.4.11