You could be a grain trader and buy and sell soybeans. That's just one of the many jobs you can do in the soybean industry.
IT'S A SOY WORLD

Draw a happy face on the soybean. Color the soybean.
EARTH’S GIFTS

These are Earth’s natural resources.

This is what I breathe.
I can not see it, but I can feel it.

This gives me light and heat.
Color the dotted line orange.

This is where
my food grows.
Color the dotted lines brown.

This washes me and is good to drink.
Color the dotted lines blue.
You could be a plant scientist and develop healthier soybean plants that produce more beans.
IT'S A **SOY** WORLD

Look across and down to find words that are related to soybeans.

---

**Growing Soybeans**  **Soy Things We Can Eat**  **Soy Products We Use**

- Sunlight
- Water
- Soil
- Combine
- Planter
- Farmer
- Flour
- Tofu
- Margarine
- Cereal
- Oil
- Ink
- Lotion
- Crayon
- Plastic
- Glue

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Illinois Soybean Association
1605 Commerce Parkway, Bloomington, Illinois 61704
(309) 663-7692 telephone • (309) 663-6981 fax
www.ilsoy.org
GET GROWING!

What natural resources does a plant need to grow? Write the four words and you'll see! Color the pictures.

1. ______________________

2. ______________________

(You can't see this one.)

3. ______________________

4. ______________________

Draw a star by each natural resource YOU need, too.

Word Box

- sunlight
- air
- water
- soil

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IT'S A SOY WORLD

Answer the questions and write the answers in the crossword.

Across
1. This makes the ground wet and gives the soybean plant a drink.
2. Some of these are made with soybeans, kids make pictures colorful with them.
3. A small, round vegetable that has many uses.
4. This holds the soybean's roots. It sticks to your shoes when it's wet.

Down
1. This is normally a breakfast food that can be made with soy ingredients.
2. This machine harvests the soybeans.
3. This gives the soybean plant light.
4. This product can be made with soybeans. It keeps our hands smooth.
5. This product can be made from soybeans. It makes things stick together.

Answers
Lotion
Soybean
Combine
Crayons
Glue
Cereal
Sunshine
Soil
Water
Bennie needs help. Can you help him find his way from Soytown back to the farm?
THE “RIPPLE EFFECT”

When Illinois farmers grow crops and livestock, they do more than just produce food. Other things happen as a result of agriculture. That's called a “ripple effect.” Agriculture creates food that must be transported, processed and sold. Any many things are necessary to raise food.

It's a good estimate that one Illinois farmer creates three to four jobs OFF the farm. (Maybe you have a friend who works in a fast-food restaurant. How's that a “ripple effect” of agriculture?)

Look at the items on the left. Then try to guess the “ripple effect” (something that happened because of what the farmer did). Write the letter of the ripple effect by its matching statement.

_____ 1. Mary Duncanson grows corn on her farm in Mapleton and needs to buy seed.

_____ 2. Dan Hunter has a dairy farm and needs someone to pick up his milk every day.

_____ 3. American farmers produce more food than what Americans need.

_____ 4. Jeff Wilson has a hog farm and needs a new software program for his computer to help market hogs.

_____ 5. To plant her soybean crop, Nancy Kelly needs to get a loan to buy seed.


RIPPLE EFFECT

A. A computer company develops software programs especially for the farm.

B. A city bank has a special department for handling agricultural loans.

C. A truck driver picks up farm products from the farm.

D. A new store opened in town so farmers can buy seed, feed and other supplies.

E. Lawmakers work with farm groups to pass special laws for agriculture.

F. The U.S. ships food to other countries in the world.

What “ripple effect” does agriculture create in your town?
HELP WANTED

Ag is much more than farming. Take a look at the ag-related careers below. Write the answers in the blank... and think about these careers for your future!

1. Specializes in crop production and soil management: ____________________________
2. Provides a service by transporting products and materials: ______________________
3. Raises livestock including horses, cattle, sheep: ________________________________
4. Tends hive of insects that produce honey: _______________________________________
5. Studies the production and distribution of goods and services: __________________
6. Studies insects: ____________________________________________________________
7. Predicts weather conditions that help farmers plan: _____________________________
8. Maintains financial records: _________________________________________________
9. Specializes in the medical care of animals: ____________________________________
10. Repairs farm machinery and equipment: ______________________________________
11. Writes newspaper and magazine articles about agriculture: _____________________
12. Manages forests to benefit wildlife, people and the environment: _______________
13. Uses plants and other natural resources to create beauty, sound barriers, energy savings and more: ____________________________

WORD BANK
rancher       beekeeper       accountant
agronomist    meteorologist    mechanic
economist     truck driver     forester
entomologist  landscape architect
veterinarian
ag journalist

Many of the jobs in agriculture are going unfilled...GO FOR IT!

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Farmers do many things to protect their valuable soil and groundwater resources. They make their living farming the soil, so it is only natural that they undertake conservation practices to protect and enrich their valuable farmland. Most farm families live on or near the land they till, so farmers understand how important it is to keep groundwater clean and free of pollutants.

This word find contains 19 practices and inputs farmers use to protect and enrich their soil and water. Can you help Sunny Soybean find them? (Tip: Some are spelled backwards.) Here are the words and phrases to locate:

<table>
<thead>
<tr>
<th>WATER AND SEDIMENT CONTROL BASINS</th>
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</thead>
<tbody>
<tr>
<td>ISHGIZOGWBFARMPOINDSVNMEGOREN</td>
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<td>LEARDHTQLHEEACTRVWHYUDUONEPOO</td>
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<td>TPASTUREPLANTINGSOPWXWQJCJRTC</td>
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Careful Chemical Application        Mulch Till        Residue Management
Contour Buffer Strips                Nitrogen          Terraces
Contour Farming                      No Till           Water and Sediment Control Basins
Cover Crops                         Pasture Plantings  Wildlife Habitat
Crop Rotations                       Phosphorus        Wind Breaks
Farm Ponds                          Potassium
Grassed Waterways                    Ridge Tillage

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Q: Why does a soybean farmer use herbicides?
A: To maximize soybean production (yield in bushels per acre) farmers use herbicides to kill weeds that compete with the soybean plant for sun, water and soil nutrients. A weed-free field also makes it easier to harvest the crop.

Q: Why does a soybean farmer use conservation tillage practices such as ridge-, mulch- or no-till planting?
A: Dried plant residue from the previous crop not only holds the soil in place and prevents erosion, it also acts as a mulch – helping to keep the soil moist and providing a barrier to weed growth. Farmers refer to use of this dead plant material as residue management. In fact, many farmers specifically plant certain crops on a rotational basis to secure the benefits of plant residue from one crop for production of another. While many of these practices involve the use of expensive equipment, soybean farmers benefit in the long run because they increase production, save time and fuel, reduce soil erosion and protect groundwater.

Q: Why do soybean farmers rotate their crops?
A: Continually planting one crop year after year depletes the soil of certain nutrients. Soybeans are a popular candidate for crop rotation systems because, as nitrogen-fixing legumes, they improve soil fertility. Other advantages of crop rotation include erosion control, weed and plant disease control, convenience and efficiency, and spreading financial risks by planting more than one crop.

Q: Why do farmers apply fertilizer to their crops?
A: A fertilizer is a material that supplies nutrients to plants. Plants, like humans, need a "balanced diet" in order to thrive. Farmers supplement the nutrients present in the soil with fertilizer to achieve a "balanced diet" for optimum plant production. As a cost and environmental consideration, farmers use only enough fertilizer to supplement available soil nutrients and raise soil fertility to the level actually required by the crop. Fertilizers most commonly used are comprised of nitrogen, potassium and phosphorous – in varying amounts dependent upon crop needs. In addition to these three nutrients, the essential elements of plant nutrition are calcium, magnesium, sulfur, iron, boron, manganese, zinc, molybdenum, copper and chlorine.

Q: Why do farmers with rolling, hilly ground use practices such as grassed waterways, contour buffer strips, terraces and pasture plantings?
A: Farmers whose land is not flat have to employ different means of conservation tillage practices to protect their land from erosion by wind and water. With practices such as grassed waterways, contour buffer strips and pasture plantings, farmers hold high-risk hilly soil in place by planting grasses that tightly hold the soil and minimize soil loss due to water runoff.
PLANTING
Most soybeans are planted in May or June, in rows that are 7 to 30 inches apart. Seeds are planted 1 to 1-1/2 inches apart and 1 to 2 inches deep. Fertilizers are used to provide additional nutrients to those of the soil. Herbicides and pesticides are also used to control weeds and bugs that could harm the tender seedlings. Farmers use fertilizer, herbicides and pesticides sparingly due to their expense and the risk excess application of these chemicals pose to the environment.

CULTIVATION
Soybean sprouts need fertile soil and plenty of rain alternating with periods of sun. The American heartland provides ideal conditions for soybean cultivation. The United States produces over half of the world’s soybeans. Most of the soybeans are grown in the heartland – Iowa, Nebraska, Minnesota, Missouri, Illinois, Indiana and Ohio. Other countries in South America, Asia and Europe also produce soybeans.

MATURATION
It takes about 75 to 80 days for soybeans to fully mature. At maturity the soybean plant may reach a height of three feet or more. Flowers appear six to eight weeks after planting and develop for two weeks before producing pods. These flowers can be pink, purple or white. Beans take 30 to 40 days to develop and mature as the plant’s leaves turn yellow and drop to the ground. The beans are found in hairy pods that grow in clusters of three to five. Each pod contains two or three beans.

HARVESTING
In the Midwest, soybeans are generally ready to harvest in September or October. When the seeds are mature, the upright vine and foliage begin to shrivel and the leaves fall away. Harvest must be completed before the pods shatter and “spill the beans.” All harvesting is done by machine. Farmers use a combine that cuts the stalk, threshes the plant residue and separates and cleans the beans in one operation.

FROM THE FARM TO THE MARKET
After harvesting the beans, farmers either sell their crop directly to a commercial elevator or store the crop in their own bins until they are ready to sell them. After the soybeans are sold, they are transported to a processing plant or they are exported to another country.

PROCESSING AND PRODUCTS
Soybeans are processed through several steps. First the hulls of the beans are removed. The hulls are used as additives for breads, cereals, snacks and livestock feed. The dehulled beans are then flattened into flakes, which makes it easier to remove their oil. The flakes can be used for livestock feed or various other commercial uses.

The crude soybean oil is extracted by immersing the flakes in a solvent bath. The crude oil then goes through a “degumming” process to separate crude lecithin from the oil. The lecithin is used in baked goods, dairy products and instant foods. The oil is used in cooking oil, margarine and shortening.

After the oil has been removed from the flakes, the flakes are processed into soy flour, soy concentrates and soy isolates. Soy flour is high in protein and improves the shelf life of baked goods. Soy concentrates are found in protein drinks, soups and gravies. Soy isolates are found in cheese, milk and nondairy frozen desserts.

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5th
HOW FARMERS FIGHT WEEDS AND PESTS

Weeds compete with soybeans for soil nutrients and make harvest difficult. Insects can seriously damage soybean plants. Illinois soybean growers have to control these pests to produce as high of a quality crop as possible. They have several options.

CULTIVATION POPULAR FOR WEED CONTROL
One of the best ways to control weeds is to remove their roots from the soil, just as you would pull weeds in a vegetable garden. But with fields spanning several hundred acres, this is not a viable option. Soybean growers use tillage equipment to cultivate the field – loosening the soil surface while removing weeds. This practice not only kills the weeds, but it helps break up the hard crust that forms on the soil surface so moisture from rains can be more readily absorbed by the plants. According to a 1990 survey by Iowa State University, 84 percent of soybean growers cultivate their fields to control weeds.

CROP ROTATIONS HELP
Rotating a field from the production of one crop, to another helps control both weeds and pests. According to the 1990 Iowa State University study, 63 percent of Iowa soybean growers say they use crop rotation as a weed control measure, while more than 50 percent use it as a pest control strategy.

Although farmers try many natural or “alternative” pest control strategies, sometimes they must use herbicides and insecticides to control weeds or insects that could hamper their crop’s production.

One popular application method is to incorporate herbicides pre-emergence; that is, apply them at planting or before the seed has germinated and the plant has broken through the soil. This method of early weed control kills weeds that would compete with the fragile soybean seedlings before a farmer could cultivate the field.

The Iowa State University study found that less than 1 percent of the state’s soybean acres were treated with an insecticide in 1990. The survey also showed that 97 percent of Iowa’s soybean acres received at least one herbicide application.

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IT'S A SoyWORLD
Soybean History at a Glance

1. An ancient Chinese legend tells that the wild soybean's nutritious properties were first discovered by a band of:
   a. Sailors
   b. Traveling merchants
   c. Nomads

2. Soybeans were first introduced in Germany in 1712 by Engelbert Kaempfer, a German botanist who had studied in Japan. TRUE / FALSE

3. The first mention of soybean cultivation in the New World appeared in 1804, when James Mease published literature promoting the soybean as an adaptable crop for Pennsylvania. TRUE / FALSE

4. In 1896, noted botanist and chemist __________________________ researched new crops for the depleted soils of the South. This research led to the extensive experimentation with soybeans and other nitrogen-producing legumes.

5. George Washington Carver's work led to the development of what would become soybeans' two main uses on the American continent – edible __________________________ and __________________________.

6. In 1919, the American Soybean Association was formed with __________________________ as president.

7. In 1920, the first time, soybeans were harvested by:
   a. Women
   b. Immigrants
   c. Combines

8. What year did soybean meal become available as a low-cost, high protein feed ingredient?
   a. 1920s
   b. 1950s
   c. 1980s

9. By 1992, the United States accounted for _____% of the world's soybean production, and soybeans were America's second-largest crop in cash sales.

10. In your opinion, what is the most interesting soy history fact?

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6th
THE HISTORY OF THE SOYBEAN
SOYBEAN HISTORY AT A GLANCE

A historical chronology of the soybean's migration from Asia to modern-day use in America:

- An ancient Chinese legend tells that the wild soybean's nutritious properties were first discovered by a band of traveling merchants.

- 2838 B.C. Chinese emperor Sheng-Nung writes Materia Medica – the first written record of soybean cultivation. In that record, soybeans were noted as being valued for their medicinal properties.

- Soybeans were first cultivated in northern China. From there, use spread into Japan, Korea and the rest of Southeast Asia.

- The soybean is mentioned in medical records from China, Egypt and Mesopotamia that date from 1500 B.C. or earlier. In ancient times, moldy and fermented substances from soybeans were commonly used as primitive antibiotics to treat wounds and reduce swelling.

- Soybeans were introduced to Europe in 1712 by Englebert Kaempfer, a German botanist who had studied in Japan.

- Swedish botanist Carl von Linne made the first scientific study of the soybean in the West. He named it Glycine max because of the unusually large nitrogen-producing nodules on its roots. Unfortunately, poor climate and soil conditions in Europe limited attempts to produce soybeans as a crop there.

- Soybeans were first brought to America in the early 19th century by trading ships returning from the East.

- The first mention of soybean cultivation in the New World appeared in 1804, when James Mease published literature promoting the soybean as an adaptable crop for Pennsylvania.

- In 1829, a brown-seeded soybean variety was shown in the Botany Garden at Cambridge, Massachusetts. But it wasn’t until later in the century that interest in the soybean as a crop began to take root.

- In 1879, soybean crops were harvested at two agricultural experiment stations in New Jersey from seeds obtained in Europe. By 1889, several more agricultural experiment stations in the United States were working with soybeans using seed varieties brought from Japan.

- A significant breakthrough for the soybean in America occurred in 1898, when noted botanist and chemist George Washington Carver became head of the department of agriculture at Tuskegee Institute in Alabama. Carver’s research into new crops for the depleted soils of the South led to extensive experimentation with soybeans and other nitrogen-producing legumes. To find new uses for these crops, he developed more than 300 by-products, including oils and food substitutes. Carver’s work led to the development of what would become soybeans’ two main uses on the American continent – edible oil and meal.

- By 1898 the United States Department of Agriculture began introducing new varieties of soybeans from Asia, and research into the beans’ potential began in earnest. By 1907, there were 23 varieties of the plant in the United States, including 15 based upon USDA research.

- William Morse, director of forage crop investigations at the Arlington Experimental Farm in Virginia, led the USDA’s efforts to gain acceptance of the soybean as a potentially major agricultural crop in America. Morse went on to help form the American Soybean Association in 1919, becoming its first president.

- In 1920, combines were first used to harvest soybeans, making them as easy to harvest as they were to grow.

- In 1922, the first soybean processing plant opened.

- In 1929, U.S. soybean production grew to 9 million bushels. By 1939, production had increased tenfold to 91 million bushels.

- The 1940s were a major turning point for soybeans in the United States. American farmers and soybean processors were ready to fill the gap when revolution in China and World War II disrupted soybean production and put traditional sources of protein and oils in short supply.
In the early 1950s, soybean meal became available as a low-cost, high-protein feed ingredient, triggering an explosion in U.S. livestock and poultry production and assuring a vast and continuing market for soybean farmers' output.

In 1952, efforts began to expand export markets by promoting American soybeans and soybean products with Japan and around the world.

By 1992, the United States accounted for 51 percent of the world's soybean production, and soybeans were America's second largest crop in cash sales.