

# A Field of Beans



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## P.A.S.S

### Grade 1

Reading-2.1

Math Process-1.3; 2.3;  
3.1,3; 4.4; 5.1,2

Math Concept- 1.1; 2.4;  
3.1a; 5.2

Science Process-1.1,2;  
2.1; 3.1,2; 4.1

Life Science-2.1,2

Social Studies-1.2; 2.4;  
4.1,2; 5.1

### Grade 2

Math Process-1.3; 2.3;  
3.1,3; 4.4; 5.1,2

Math Concept-1.1; 2.3;  
4.2ab; 5.1

Science Process-1.1,2;  
2.1; 3.1,2; 4.3

Life Science-2.1

Social Studies-1.2; 2.3

### Grade 3

Reading-4.2c; 6.2abc  
Writing-2.1; 3.1

Math Process-1.3; 2.3;  
3.1,3; 4.4; 5.1,2

Math Concept-4.3;  
5.1ac,2b

Science Process-1.1,2;

2.1; 3.1,2; 4.3

Life Science-2.1,2

Social Studies-1.2; 3.1;  
4.4

### Grade 4

Reading-5.2a

Writing-2.2; 3.1

Math Process-1.3; 2.3;  
3.1,3; 4.4; 5.1,2

Math Concept-1.1;  
3.3b; 4.4b; 5.1b

Science Process-1.1,2;  
2.1; 3.3

Life Science-3.1,2

Social Studies-2.2; 4.2

### Grade 5

Reading-5.1ab,2ad  
Writing-2.1; 3.1

Math Process-1.3; 2.3;  
3.1,3; 4.4; 5.1,2

Math Concept-4.3;  
5.1d,2b

Science Process-1.1,2;  
2.1; 3.3

Life Science-2.1

Social Studies-7.1,2,5

### Grade 6

Social Studies-1.2; 3.2

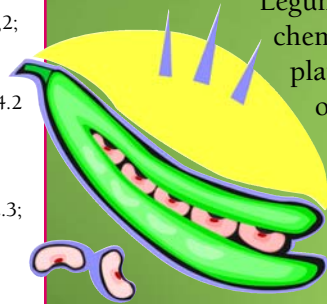
# COOL BEANS.....

Peas, beans and lentils are known as pulses and also as legumes. They are the seeds of plants belonging to the family Leguminosae, which gets its name from the characteristic pod, or legume, that protects the seeds while they are forming and ripening. With approximately 13,000 species, the family Leguminosae is the second largest in the plant kingdom.

Legumes provide us with food, medicines, oils, chemicals, timber, dyes and ornamental garden plants. Everywhere in the world people depend on legumes for food - and have for thousands of years.

In Oklahoma we grow an amazing assortment of beans - soybeans, mung beans, cow peas (also known as blackeyed or southern peas), lima beans and more. In our gardens we grow snap beans and garden peas.

Use the information and activities that follow to introduce your students to the wonderful world of legumes. Some of the Oklahoma Priority Academic Student Skills covered by these activities are listed at left.



# OKLAHOMA-GROWN LEGUMES.....

In Oklahoma we grow several varieties of legumes - some in our gardens, some in our fields, some to feed our animals and some to feed ourselves. Farmed legumes fall into two classes: forage and grain. Forage legumes, like alfalfa, clover and vetch, are sown in pasture and grazed by livestock. Grain legumes are cultivated for their seeds and are also called "pulses." The seeds are used for humans and animals to eat, for producing oils or for other industrial uses. Grain legumes include beans, lentils, lupins, peas and peanuts.



**Black-eyed peas** are a minor commodity in Oklahoma, with more than 40,000 bushels produced in 2002. Also called cowpea or southern pea, they have been Oklahoma's number one vegetable crop for several years.

**Garden peas** are usually the first vegetable to be planted in home gardens, very early in the spring or late in the winter.

**Green peas** are usually one of the first vegetables to be planted in the home garden in the early spring or in fall when the weather begins to cool. Peas also are called English peas, sugar snap peas and snow pod peas. Peas and pod can be eaten in the latter two.

**Green beans** are also called snap beans because of the snapping noise they make when you snap off the ends. Green beans are available fresh, canned and frozen.

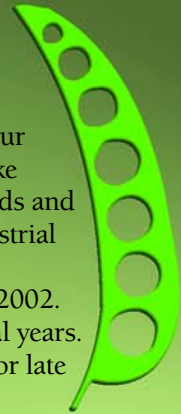
**Lima beans** are sometimes available fresh from farmer's markets. Most lima beans are sold dried, canned or frozen.

**Mung beans** are another minor commodity in Oklahoma, with more than 935,000 pounds produced in 2002. They are grown mostly for livestock feed in Oklahoma, but they are also the bean most commonly used for making bean sprouts.

**Soybeans** are considered the world's most important legume because of their nutritional value. In the US, they are produced more for feeding animals than for human consumption. In 2005, they ranked number 9 among all Oklahoma commodities.

**Peanuts** were called groundnuts by the people in South America who were eating them 4,000 years ago. In 2005 peanuts ranked number 13 among all Oklahoma commodities.

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# BEANS AROUND THE WORLD.....



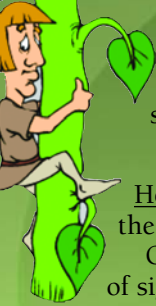
Divide the room into continents (except Antarctica). Divide the class into teams, and provide each team with a world map or globe. As you read out the legume fact, have one student from each team move to the part of the room representing the continent where the legume originated.

- ☞ Cowpea is another name for black-eyed peas or southern peas. They originated in Ethiopia, but have been cultivated since ancient times in China. (Africa)
- ☞ The lima bean is named after the capital city of Peru - the country where it originated. Lima beans are also called "butter beans." (South America)
- ☞ Snap beans originated in southern Mexico (North America), Guatemala (Central America), Honduras (Central America), and Costa Rica (Central America). They grew on vines and were planted with corn, which served as a prop for the vines.
- ☞ Lentils, peas, chick peas and fava beans were brought into cultivation by Neolithic people in the Fertile Crescent of the Near and Middle East (present-day Syria, Iran, Iraq, Turkey, Jordan, Israel). (Asia)
- ☞ Australian aborigines ground the seeds of the wattle plant between stones to form a flour which was then baked. (Australia)

Provide a sample of each of these legumes, and have students glue them to a world map. For those legumes for which a sample is not available, use a representation. (Australian wattles are in the acacia family, the same family as mimosa.)



# JANET AND THE BEANSTALK . . . . .



Provide copies of the story below. For each word that is underlined, have students name the part of speech and replace it with a different word to create a different story. Have students work in groups and act out their stories.

Janet was a poor Oklahoma girl from Bigsby. One day her mother sent her to the cattle auction to sell their Hereford cow. Along the way, Janet met a man who offered to buy the cow for five "magic lima beans." Janet made the deal. Her mother was not happy. She threw the beans out the window and sent Janet to bed without dinner.

Overnight, the beans grew into a gigantic beanstalk. It reached so far into the sky that the top was completely out of sight. Janet decided to climb the beanstalk. She arrived in a land high up in the clouds, the home of a scary giant. When she broke into the giant's home, the giant quickly sensed someone was near.

"Fee! Fie! Fo! Fum! I smell the blood of an Oklahoma farm girl. Be she 'live, or be she dead, I'll grind her bones to make my bread."

Janet was saved by the giant's assistant, a former Oklahoman, and she escaped from the giant's home. On her way out, she grabbed some gold coins. Back home, Janet and her mother celebrated, but the coins did not last. Janet climbed the beanstalk again. This time she stole a hen which laid golden eggs. Again she was saved by the giant's assistant. She went down the ladder and showed the chicken to her mother, and the two lived happily on the proceeds from the hen's eggs. Eventually, Janet grew bored and decided to climb the beanstalk a third time. This time, she stole a magic guitar that sung to itself. The instrument did not appreciate being stolen and called out to the giant for help. The giant chased Janet down the beanstalk, but luckily she got to the ground before the giant did. Janet immediately chopped it down with an axe. The giant fell to the earth, pulling the beanstalk down with him.

Read the original Jack and the Beanstalk story and discuss how it reflects a culture different from our own. Change the story to reflect what you know of another culture.

Did you know that "Beanstalk" is another name for the space elevators used by NASA in space flight?

# USING THE OLD BEAN .....

Match the bean expression with its meaning. Discuss.

- |                           |       |                                      |
|---------------------------|-------|--------------------------------------|
| full of beans             | ----- | Using your intelligence              |
| spill the beans           | ----- | Energetic; frisky; or badly mistaken |
| bean counter              | ----- | To disclose a secret                 |
| cool beans                | ----- | Knows very little                    |
| doesn't know beans        | ----- | Accountant                           |
| using the old bean        | ----- | Great!                               |
| not worth a hill of beans | ----- | Worthless; little value              |



Circle the words that rhyme with bean:

- |       |      |       |      |
|-------|------|-------|------|
| mean  | main | green | gain |
| jeans | bang | seen  |      |

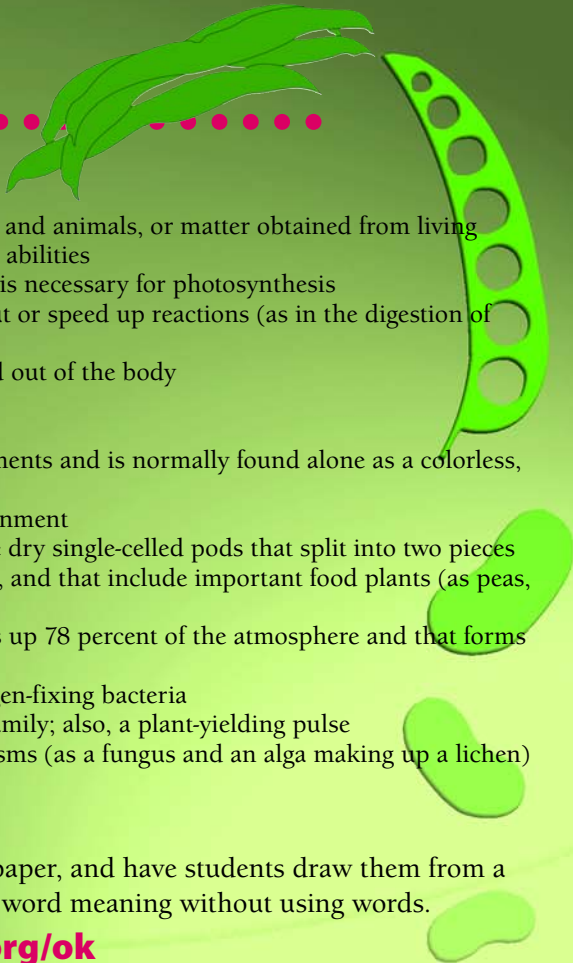
Circle the words that rhyme with pea

- |     |        |      |    |
|-----|--------|------|----|
| see | pan    | knee | we |
| pay | please | me   |    |

Write a sentence using at least three of these words along with the word "bean" or "pea."



# LEGUME VOCABULARY.....

- 
- ammonia** - a colorless gas that is a compound of nitrogen and hydrogen
- bacteria** - single-celled microorganisms that live in soil, water, the bodies of plants and animals, or matter obtained from living things and are important because of their chemical effects and disease-causing abilities
- chlorophyll** - the green coloring matter of plants that is found in chloroplasts and is necessary for photosynthesis
- enzyme** - any of various complex proteins produced by living cells that bring about or speed up reactions (as in the digestion of food) without being permanently altered
- flatulence** - the presence of too much gas or air in the stomach or intestine, passed out of the body
- forage** - food (as pasture) for browsing or grazing animals
- grain** - the threshed seed or fruits of various food plants
- hydrogen** - a chemical element that is the simplest and lightest of all chemical elements and is normally found alone as a colorless, odorless highly flammable gas having two atoms per molecule
- indigenous** - produced, growing or living naturally in a particular region or environment
- legume** - any of a large family of herbs, shrubs and trees that have fruits which are dry single-celled pods that split into two pieces when ripe, that bear nodules on the roots that contain nitrogen-fixing bacteria, and that include important food plants (as peas, beans or clovers)
- nitrogen** - a colorless, tasteless, odorless element that occurs as a gas which makes up 78 percent of the atmosphere and that forms a part of all living tissue
- nodule** - a swelling on the root of a plant of the legume family that contains nitrogen-fixing bacteria
- pulse** - the edible seeds of several crops (as peas, beans or lentils) of the legume family; also, a plant-yielding pulse
- symbiotic** - the living together in close association of two different kinds of organisms (as a fungus and an alga making up a lichen) especially when such an association is of benefit to both
- valve** - one of the pieces into which a ripe seed capsule or pod separates

Provide this list to students. Write each word on a bean-shaped piece of paper, and have students draw them from a "bean pot." See how quickly each student can draw a picture conveying the word meaning without using words.

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# GOOD FOR YOU; GOOD FOR THE SOIL.....

Farmers love legumes because they fix nitrogen in the soil. This reduces fertilizer costs and means that legumes can be used in a crop rotation to replenish soil that has been depleted of nitrogen.

## The Nitrogen Cycle:

Air is about 78% nitrogen, making it the largest pool of nitrogen. Nitrogen is essential for many biological processes. In plants, much of the nitrogen is used in chlorophyll molecules essential for photosynthesis and further growth.

Fixation converts gaseous nitrogen into forms usable by living organisms. Some fixation occurs in lightning strikes, but most fixation is done by free-living or symbiotic bacteria. These bacteria have the enzyme that combines gaseous nitrogen with hydrogen to produce ammonia, which is then further converted by the bacteria to make its own organic compounds. Some nitrogen-fixing bacteria, such as rhizobia, live in the root nodules of legumes (such as peas or beans). Here they form a symbiotic relationship with the plant, producing ammonia in exchange for carbohydrates.

## Super Beans

Beans are strong growers. Try this experiment to see just how strong.

Mix plaster of paris with water. Pour into a styrofoam cup. Place a dry lima bean in the middle of the mixture. When the plaster of paris is dry, peel the cup from around it. Set it on a table and watch what happens. (The lima bean should swell from the moisture in the plaster of paris and crack the plaster.)



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# LEGUMES GROW IN PODS.....

All legumes grow in pods. That's where the word "legume" came from. Legume is the name for the pod covering the peas or beans. It splits into two valves with the seeds attached to the lower edge of one of the valves.

Bring fresh green garden peas or green beans to class for students to examine and shell. Have students estimate the number of peas in the pods before shelling them.

Which of these Oklahoma vegetables are legumes? (Remember, legumes grow in pods.)

green beans

squash

black-eyed peas

spinach

tomatoes

potatoes

lettuce

garden peas

okra

pinto beans

lima beans

broccoli

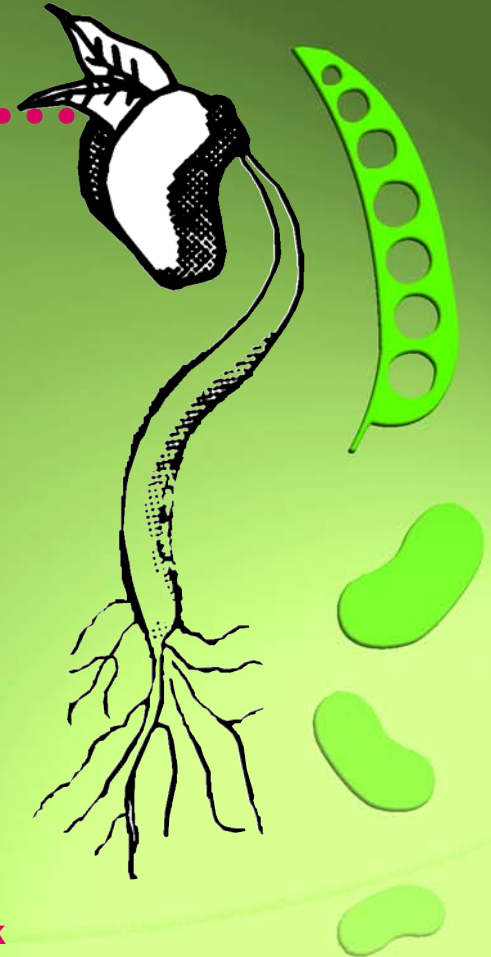
(Answers: green beans, garden peas, blackeyed peas, pinto beans, lima beans)



# BEAN SPROUTS.....

Many whole beans and peas (e.g. aduki, chickpeas, whole lentils, marrowfat peas, mung and soybeans) can be sprouted to increase their nutritional value.

- Measure one cup of chickpeas, whole lentils or mung beans in a container, and measure two cups of water to cover.
- Ask students to predict what will happen, and record their predictions.
- Next day have students look at the beans and discuss their observations.
- Have students carefully remove the beans with a slotted spoon and measure them again.
- Measure the water that remains.
- Rinse the beans and return them to the container.
- Rinse daily and keep the beans moist until they begin to sprout.
- Have students draw pictures of the beans each day to record their progress.
- After beans have sprouted, place them near a sunny window for one day, just until they are green.
- Discuss observations.
- Enjoy your nutritious sprouts on a salad or in stir fry.





## WHY DO BEANS GIVE YOU GAS.....

Beans have complex sugars in them that can't be digested by human digestive enzymes. These sugars sail untouched through the upper intestine, only to be met in the lower intestine by hungry bacteria. The bacteria eat the sugar, and they give off gas.

As with many vegetables, the more beans you eat, the more your body will become adapted to them. Dietitians recommend introducing these foods to your diet a little at a time to give your body a chance to get used to them. You can also reduce gas by soaking and rinsing dry beans before cooking them. Fresh beans produce less gas.

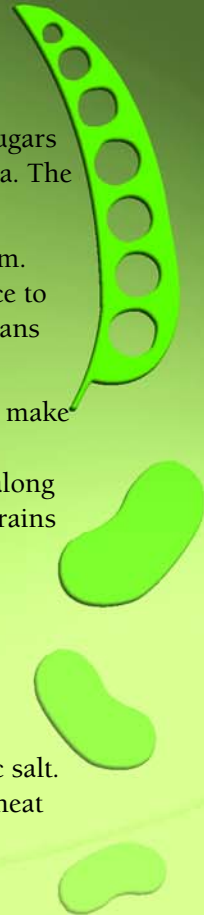
Beans contain a higher percentage of protein than most other plant foods, but they need whole grains to make them complete. Whole grains contribute different amino acids than beans, but in combination they make complete proteins. Ancient people must have known this, since they always grew whole grains like wheat along with their legumes. The US Food and Drug Administration recommends that we include plenty of whole grains and legumes in our diets.

### Black-Eyed Pea Spread

- 1 can (16 ounces) black-eyed peas, drained
- 1/2 cup sour cream
- 1/2 cup salsa

- 3 green onions, chopped with tops
- 1 teaspoon garlic salt
- 4 slices bacon, cooked and crumbled

Reserving 1/3 cup, place peas in a blender. Process until smooth. Blend in onions, sour cream and garlic salt. Transfer to a bowl and stir in salsa, reserved peas and bacon. Serve with whole wheat crackers or whole wheat pita chips.



# Who Spilled the Beans?.....

Bring assorted dried beans and peas to class.



- ☞ Divide students into groups and have groups sit in circles on the floor. Pour a bag of mixed beans on the floor in the center of each group, and have them race to see which group can get the beans sorted quickest.
- ☞ Have students use the bean assortment to create patterns.
- ☞ Have student count out eight beans. Place eight beans in your hand, and hide them behind your back. While they are behind your back, put some in each hand (e.g. three in one, five in another.) Show the student the beans you have in one hand, and have him/her tell you how many are in the other hand. Use different combinations and different numbers of beans.
- ☞ Take advantage of the variety of legume colors and shapes to make mosaics using geometric patterns. Have students count the beans within the shapes to find volume.
- ☞ Use small paper plates and beans to develop multiplication algorithms. (Place three beans each on four plates to show multiplication as repeated addition.)

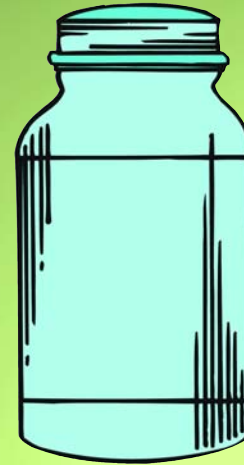
# BEAN COUNTING .....

The Greeks and Romans used the broad bean for balloting. Black beans signified opposition, and white beans signified agreement. This custom carried over into England in the election of the king and queen for Twelfth Night and other celebrations and was taken to the New World colony at Massachusetts Bay, where Indian beans were used.

In the South, people eat black-eyed peas on New Year's Day for good luck. Take a poll to find how many students eat black-eyed peas for New Year's Day.

- Use beans to keep count, white beans meaning "yes" and black beans meaning "no."
- Keep the beans in the jar throughout the week.
- Have students add a dried black-eyed pea to the jar if they believe eating black-eyed peas really bring good luck.
- Have students estimate before counting and graph the results.

Research and discuss other New Year's traditions around the world.





## BEANS AND PEAS.....

Dry beans are produced in pods and belong to the family of plants called “legumes.” The shape of the bean distinguishes it from other legumes like peas and lentils. Usually beans are kidney-shaped or oval, while peas are round, and lentils possess a flat, disk-like shape.



Have students sort a mixture of dried beans according to shape to determine if they are peas (round) or beans.(kidney-shaped), then play this game:

Divide players into two equal lines, one called “Beans” and the other called “Peas.”

Have players stand about five feet apart, facing each other, on opposite sides of a center line.

Behind each group of players and about 25 feet away, designate a goal line.

When the game leader calls out “Beans!” that group turns and runs toward its own goal line, with the Peas in pursuit.

Any Bean tagged before crossing the line joins the other side. The action continues with the leader giving each side a fairly even number of chances to chase its opponents.



# WHERE DO THEY GROW?.....



Color in the counties where the various legumes grow as crops in Oklahoma

- black-eyed peas - LeFlore
- dry edible beans - Custer, Payne
- dry edible peas - Kingfisher, LeFlore, Noble and Tillman
- green peas - Pottawatomie
- lima beans - Logan
- mung beans - Kingfisher
- peanuts - Caddo, Beckham and Washita
- snap beans - LeFlore
- soybeans - Wagoner, Kay, Muskogee and Ottawa

\*Based on most recent US Census in 2002

**Oklahoma Ag in the Classroom is a joint project of the Oklahoma Department of Agriculture, Food & Forestry; the Oklahoma State Department of Education and the Oklahoma Cooperative Extension Service.**



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