

ABUNDANT CALIFORNIA

# DESIGNING BEAN SEED PACKETS



## OVERVIEW

In this lesson, students examine dry heirloom beans and develop seed packets to highlight the characteristics of one or more dry bean varieties grown in California. In doing so, they not only learn about the value of dry beans, but also about saving seeds for next year's crop.

GRADE LEVEL: 3-5



CENTER FOR ECOLITERACY



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## CALIFORNIA FOOD FOR CALIFORNIA KIDS® downloadable resource

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**CALIFORNIA FOOD**  
FOR CALIFORNIA KIDS®

# DESIGNING BEAN SEED PACKETS

## LESSON OVERVIEW

Beans may be the ultimate comfort food. Hearty, tasty, and nourishing, dry beans also take us back—way back—to our roots. That’s because dry beans are woven into the fabric of our human history. When hunter-gatherers began tilling the soil and growing plants, dry beans were among the first crops they cultivated. And when agriculture led to permanent settlements, and eventually to cities and civilizations, dry beans provided an important source of protein.

Dry beans remain popular today and are featured in many traditional and innovative foods around the world, from Mexican *frijoles refritos*, to Middle Eastern *hummus*, to South Asian *rajmah*. Heirloom beans are varieties that have been passed down through families or communities for generations.

In this lesson, students examine dry heirloom beans and develop seed packets to highlight the characteristics of one or more dry bean varieties grown in California. In doing so, they not only learn about the value of dry beans, but also about saving seeds for next year’s crop.

This lesson is best done in the fall, when dried bean pods may be available. If you can’t find them, you may use instead California-grown dry beans from a local store.

## FOOD SYSTEM EMPHASIS

Producing Seed

## GRADE LEVEL

3-5

## LENGTH

One to two 50-minute periods

## **LEARNING OBJECTIVES**

Students will:

- Recognize the unique qualities of dry beans.
- Compare the tastes and textures of different dry bean varieties grown in California.
- Create seed packets describing the characteristics of specific dry bean varieties.

## **STANDARDS CONNECTIONS**

### **NEXT GENERATION SCIENCE STANDARDS**

- 3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

### **Science and Engineering Practices**

- Obtaining, Evaluating, and Communicating Information – Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.

### **CA HISTORY-SOCIAL SCIENCE CONTENT STANDARDS FOR CALIFORNIA PUBLIC SCHOOLS. KINDERGARTEN THROUGH GRADE 12**

- 3.5.1. Describe the ways in which local producers have used and are using natural resources, human resources, and capital resources to produce goods and services in the past and the present.

### **COMMON CORE STATE STANDARDS - ENGLISH LANGUAGE ARTS**

- W.3.2, W.4.2, W.5.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- W.3.7. Conduct short research projects that build knowledge about a topic. W.4.7. Conduct short research projects that build knowledge through investigation of different aspects of a topic. W.5.7. Conduct short research

projects that use several sources to build knowledge through investigation of different aspects of a topic.

## VOCABULARY

- **Bean** – large edible seed or seed pod
- **Heirloom** – handed down from one generation to the next
- **Hybrid** – not frozen or canned
- **Legume** – a plant with seeds that grow in pods
- **Ovary** – the female part of a flowering plant that produces eggs
- **Plant variety** – a group of plants within a species that have similar characteristics
- **Pollen** – the male cells of flowering plants that are needed to make seeds
- **Seed** – the part of a flowering plant from which a new plant can grow
- **Yield** – to produce or provide (verb); the amount produced by a farm or an industrial process (noun)

## MATERIALS

- Copies of “10 Fun Facts about Beans” and “Seed Packet Template” student handouts
- Copies of “Taste Test” and “Fruit and Vegetable Adjectives” student handouts from *Savoring California: A Comparative Tasting of California Fruits and Vegetables* (<http://www.ecoliteracy.org/sites/default/files/CEL-CA-Thursdays-Tasting-Lesson.pdf>)
- Several different dry bean varieties (see Preparation)
- Clear cups or other containers for holding dry beans
- Access to internet and equipment to show video

- *The Beneficial Bean* (4:39-minute video), available at <https://www.youtube.com/watch?v=njK-15cUJmo#action=share>

#### **For Taste Test**

- Access to stove for cooking beans
- Large lidded pot(s) for soaking and cooking beans
- Salt, if desired
- Large spoon
- Colander (optional)
- Serving bowls or platters
- Toothpicks
- Napkins

#### **For Seed Packets**

- A variety of sample seed packets
- Access to internet
- Colored pencils or crayons
- Scissors
- Glue

#### **PREPARATION**

- Make copies of the student handouts. For the “Fruit and Vegetable Adjectives” student handout, you may make one copy for each small group or table, or project it onto a screen for the whole class to see.
- Set up equipment to view the video *The Beneficial Bean*, which highlights a California dry bean farm (Mohr-Fry Ranches) and the two farmers, Chip Morris and Jerry Fry.

- Obtain or purchase several different varieties of California-grown dry beans (heirloom varieties, if possible) from the garden, from a local farmers market, or from your local grocer. If you have mature bean plants in your school garden, you may harvest dried seed pods to use for the lesson. Alternatively, your local farmers market may have dry beans in the pod that you can use. Otherwise, select a variety of California-grown dry beans from the bulk section of your local market.
- If the beans are in pods, separate them from the pods, leaving one pod of each kind intact to share with students.
- Set aside a handful of each variety of beans, placing them in clear cups or other containers.

#### **For Taste Test**

- Wash the remaining dry beans. For each variety, cook the beans per the instructions in Background. Place the cooked beans in a bowl or on a serving tray, with the uncooked beans (and bean pod, if you have it) next to it. Provide toothpicks for picking up samples.
- Read over the *Savoring California: A Comparative Tasting of California Fruits and Vegetables* lesson (<http://www.ecoliteracy.org/sites/default/files/CEL-CA-Thursdays-Tasting-Lesson.pdf>).

#### **For Seed Packets**

- Check out websites on California-grown dry beans to identify which links to provide students for their research. See Resources for possibilities.
- Decide what bean varieties students will research. You may have them focus solely on the ones in the taste test, or you might prepare a list of additional dry bean varieties to explore. See the websites listed in Resources for possible variety names.

## SAFETY NOTES

- Have students wash their hands thoroughly before conducting the taste test.

## DIRECTIONS

- 1 Introduce the lesson by leading a discussion about beans, asking questions such as:
  - What is your favorite way to eat beans?
  - Are all beans the same? What are some different kinds or varieties of beans you've heard about?
  - Have you ever heard of saving seeds? What might that mean and why might it be important?
- 2 Explain that students will learn about some of the varieties of beans grown in California by doing a taste test and designing seed packets for different dry beans.
- 3 Direct students to read the "10 Fun Facts about Beans" student handout. Ask them to summarize what they read. Invite students to share any additional facts they know about beans, creating a class list on the board.
- 4 Show the video *The Beneficial Bean* to provide a virtual visit to a California bean farm. Ask students to name some of the reasons the two farmers grow dry beans (such as that the beans are nutritious, they are gluten-free, and they help improve soil). Ask them to name some of the challenges of growing dry beans (such as watering).
- 5 Show students the cooked dry beans you have prepared for the taste test. Conduct a comparison tasting of the beans, following the suggestions in the *Savoring California: A Comparative Tasting of California Fruits and Vegetables* lesson (<http://www.ecoliteracy.org/sites/default/files/CEL-CA-Thursdays-Tasting-Lesson.pdf>). Encourage students to use descriptive terms for the dry beans, with the "Fruit and Vegetable Adjectives" student handout as a guide.



- 6 Distribute sample seed packets for students to examine. Ask them to identify the types of information the seed packets contain (such as plant name and variety, description of variety, and when and where to plant it). Discuss how this information helps the gardener or farmer.
- 7 Have pairs or individual students choose one of the varieties they taste-tested or one from the list you have prepared.
- 8 Give students copies of the “Seed Packet Template” student handout. Point out that they will research their bean variety and then use that information to complete the seed packet template. Provide the web links you have identified for their research.
- 9 Allow time for students to research their bean varieties and to design and make their seed packets.

## **EXTENDED LEARNING**

- Store students’ seed packets in a cool, dry place. In the spring, prepare a garden plot or containers and grow the seeds according to the package suggestions.
- Use Harvest of the Month materials to explore other aspects of dry beans (see Resources).
- Invite students to draw a garden plan using plants that can be suitably grown in the current season. Help them research the growing requirements of different plants and then use this information to create a map of the garden.
- Encourage students to learn about different cultural traditions that use beans by interviewing someone from another culture. See “Food Traditions Interview” at [https://www.ecoliteracy.org/sites/default/files/uploads/CEL\\_Food\\_Traditions\\_Interview\\_Lesson.pdf](https://www.ecoliteracy.org/sites/default/files/uploads/CEL_Food_Traditions_Interview_Lesson.pdf).

## **RESOURCES**

- Websites for seed companies and California dry bean farmers that contain information about different heirloom dry bean varieties include:

## SEED COMPANIES

- o Baker Creek Heirloom Seeds, <http://rareseeds.com>
- o Johnny's Seeds, <http://www.johnnyseeds.com>
- o Native Seeds, <https://shop.nativeseeds.org>
- o Seed Savers Exchange, <http://www.seedsavers.org>
- o Seeds of Change, <http://www.seedsofchange.com>
- o Territorial Seed, <http://www.territorialseed.com>
- o Uprising Seeds, <https://uprisingorganics.com>

## CALIFORNIA DRY BEAN FARMERS

- o Fifth Crow Farm, <http://fifthcrowfarm.com>
  - o Lone Willow Ranch, <http://www.organicheirlooms.com>
  - o Mohr-Fry Ranches, Elegant Beans, <http://shop.elegantbeans.com>
  - o Rancho Gordo Heirloom Beans, <https://www.ranchogordo.com>
- 
- *Harvest of the Month: Dry Beans.* [http://harvestofthemonth.cdph.ca.gov/documents/Winter/021712/ED\\_DryBeans\\_%20Newsletter\\_Final.pdf](http://harvestofthemonth.cdph.ca.gov/documents/Winter/021712/ED_DryBeans_%20Newsletter_Final.pdf).
  - *National Farmers Market Directory.* <https://www.ams.usda.gov/local-food-directories/farmersmarkets>.
  - "Local Dry Beans in California." Agrilicious. <http://www.agrilicious.org/local/dry-beans/california>

## ASSESSMENT

Use a rubric such as the following to assess students' seed packets.

	4	3	2	1
Writing from Research	Writing includes ample, relevant, and accurate evidence from sources.	Writing includes adequate, relevant, and accurate evidence from sources.	Writing has some imprecise, repetitive, vague, or copied evidence from sources.	Writing has irrelevant, missing, incorrectly used, or predominantly copied evidence from sources.
Presentation	Presents all information in a clear and organized way.	Presents most of the information in a clear and organized way.	Presents information in a way that is poorly organized or difficult to understand some of the time.	Presents information in a way that is poorly organized and hard to understand.

## BACKGROUND

Beans are the large, edible seeds or seedpods of the legume, pea, or bean family. They are high in protein and commonly used for human or animal food. The term “dry beans” refers to any edible legume that is harvested when mature for dry seeds.

## THE HISTORY OF DRY BEANS

Many of the dry beans we eat today, including black, white, pinto, kidney, and cranberry beans, are all different varieties of a single species of bean—*Phaseolus vulgaris*, or common bean—that was domesticated several thousand years ago in what is now Mexico and South America. This species proved to be useful for humans because it produces seeds that are high in protein and can also be dried, stored, and used throughout the year.

An heirloom variety of dry beans is a plant variety that has been passed down within a family or community for at least 50 years and has some cultural or historical significance.

## **HOW BEANS GROW**

Beans develop from a plant's flowers after pollen fertilizes the ovules (eggs) contained in their ovaries. Since bean flowers have both male and female parts within the same flower, they are able to self-pollinate and do not need bees, butterflies, or wind.

Bean plants come in either bush or pole varieties. Bush bean plants, as the name suggests, are bushy and just one or two feet tall. Pole beans require trellises or poles for support, since they can grow up to five feet tall.

Bean plants benefit the soil because they are able to take in, or "fix," nitrogen from the air and leave some in the soil after harvest. They do this with the help of a common bacterium called rhizobium, which invades the roots, and converts nitrogen gas into a form useable by the plant.

## **GREEN BEANS VS. DRY BEANS**

Green beans, which are varieties of the common bean, are eaten fresh and contain both the green pod and the immature seeds. The pods of these varieties tend to be fleshy and have little fiber.

Dry beans (or shell beans, as they are sometimes called) tend to have pods that are thin, tough, and inedible. They are left on the plant until they are fully mature. The beans are then shelled and dried.

## **SAVING SEEDS**

Saving bean seeds to plant the following year is an easy, frugal way to keep growing favorite varieties. Store beans in a cool, dry place, such as a refrigerator. They should remain viable for approximately four years after harvest.

Keep in mind that seeds from hybrid varieties (those developed from a deliberate

cross-breeding of two different species or varieties) will not grow reliably into plants like the parents and should not be saved.

## **THE CALIFORNIA DRY BEAN CROP**

In California, dry beans have been an important crop for more than a century, and the state continues to be a major supplier. In 2014, California was the seventh largest bean producer in the U.S., accounting for about 5 percent of the nation's total bean crop and growing over 127 million pounds of dry beans a year.

(Source: California Dry Bean Acreage, Yield, Production Increase. Western Farm Press. April 29, 2017. <http://www.westernfarmpress.com/vegetables/california-dry-bean-acreage-yield-production-increase>)

The primary dry bean growing areas are the Sacramento Valley and northern San Joaquin Valley. Farmers often grow beans as a secondary crop, rotating it among other commercial crops such as corn or alfalfa as a way to increase nitrogen levels in the soil.

## **HEALTH BENEFITS OF DRY BEANS**

Dry beans are excellent sources of protein and dietary fiber, and are rich in iron, potassium, thiamine, vitamin B6, and folic acid. The U.S. Department of Agriculture considers dry beans to be both a vegetable and a protein.

Some people get gas from eating beans, but the gas comes from bacteria in the lower intestines, not from the beans themselves. Beans contain complex sugars called oligosaccharides (oh-lih-go-SACK-uh-rides) that can't be digested because humans don't produce the necessary enzyme. Bacteria in the large intestine break down these sugars through fermentation, releasing gas in the process.

## **SELECTING DRY BEANS**

Look for freshly harvested California dry beans at the farmers market or local grocer. If available in pods, choose ones that are full and plump, but completely dried. Remove beans from their pods to cook or store. Remove any rocks or foreign matter.

When selecting dry beans for this lesson, take advantage of the variety that may be available at farmers markets or your local grocer. Look for farms that grow dry beans by checking out the Agrilicious web page, “Local Dry Beans in California” (see Resources).

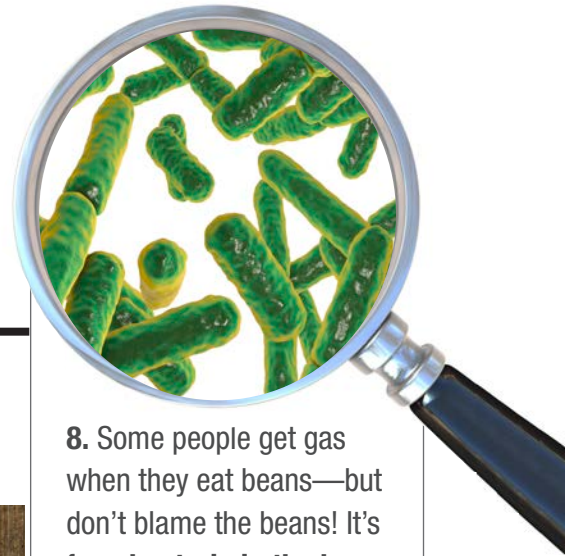
## **HOW TO COOK DRY BEANS**

You will need to both soak and cook the beans before serving them. Do not eat raw dry beans.

To soak the dry beans, first clean and rinse them, and then cover with lots of cool water in a lidded pot. Refrigerate for 8 hours or overnight. Drain and rinse the soaked beans with fresh, cool water.

To cook the soaked beans, place them in a pot, cover with fresh water, add salt as desired, and bring to a boil. Reduce heat, put a lid on the pot, and simmer gently until beans are tender, but firm. Most beans will cook in 45 minutes to 2 hours. Drain the beans. If they will be eaten later, refrigerate them in shallow pans.

# 10 FUN FACTS about beans



## 1. Beans

are **large seeds** that we can eat. They are members of the **legume** (LAY-gyoom) family.

2. There are two main types of beans: **green beans and dry beans**. Green beans are young, tender seed pods that we eat fresh.



Dry beans come from pods that are dried, and must be soaked and cooked before we can eat them.

3. There are more than **40,000 varieties** of beans in the world.

4. Each year, farmers and gardeners set aside beans to grow new plants the next year. This practice is called **seed saving**.



5. **Heirloom bean varieties** have been passed down in families or communities for generations. These varieties may have special flavors, textures, colors, or shapes.

## 6. California

grows over **127 million pounds** of dry beans a year! Most are lima beans, garbanzo beans, pink beans, blackeye beans, and kidney beans.



7. Dry beans are high in **protein, fiber, vitamins, and minerals**.

8. Some people get gas when they eat beans—but don't blame the beans! It's from **bacteria in the lower gut** that help digest the beans, causing gas in the process.

9. People have been growing beans for over **6,000 years!**

10. Legumes are one of the few farm plants that can help fertilize the soil! Soil bacteria take nitrogen from the air and store it in **bumps or nodules in the plant's roots**. When the plant dies, the nitrogen in these nodules is added to the soil, which enriches it.



# SEED PACKET TEMPLATE

**Create a seed packet for your special bean.**

Cut out the template on the following page. Fold on the dotted lines, and glue the side and bottom flaps to the packet back. After filling with dry beans, glue the top flap closed.

**On the front on the packet, include:**

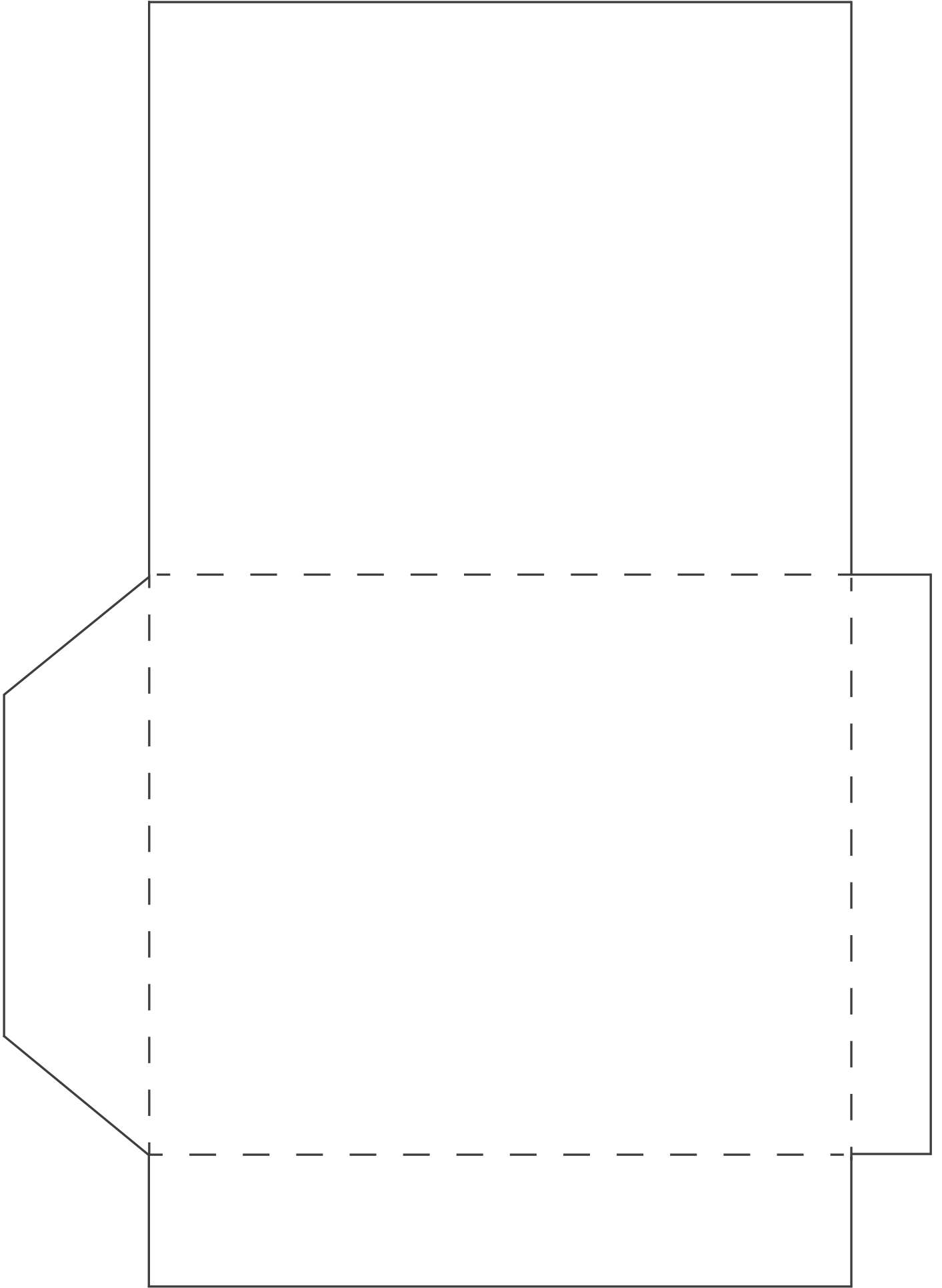
- A picture of the plant, pod, or bean.
- Bean Variety: \_\_\_\_\_

**On the back of the packet, include:**

- Description of Bean Variety: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- Best Time to Plant: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- How to Plant: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- How Many Days until Ready to Eat: \_\_\_\_\_



NAME: \_\_\_\_\_





## ABOUT THE CENTER FOR ECOLITERACY

The Center for Ecoliteracy is an internationally recognized leader in systems change innovations in education for sustainable living. Since 1995, the Center has engaged with thousands of educators from across the United States and six continents. The Center offers publications, seminars, academic program audits, coaching for teaching and learning, in-depth curriculum development, keynote presentations, and technical assistance. Books authored or coauthored by the Center for Ecoliteracy include *Ecoliterate: How Educators Are Cultivating Emotional, Social, and Ecological Intelligence* (Jossey-Bass, 2012); *Smart by Nature: Schooling for Sustainability* (Watershed Media, 2009); and *Ecological Literacy: Educating Our Children for a Sustainable World* (Sierra Club Books, 2005).

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**Student Handouts** shutterstock\_682787392\_green\_beans; shutterstock\_678553963; iStock-499282428\_seed\_saving\_Goldfinch4ever; 874117806\_sugar\_bean\_Vergani\_Fotografia; shutterstock\_147687212\_kidney\_bean; shutterstock\_174530864; shutterstock\_708450334\_garbanzo; shutterstock\_754222744\_blackeyed\_pea; iStock-492853456\_magnifying\_glass\_fatido.psd; iStock-924907188\_bifidobacterium\_Dr\_Microbe; shutterstock\_677912590\_root\_nodules