

**Outline of Lesson
Growing with Protein
Unit 2, Lesson 2
Grade 1-3**

Lesson Time: 55 – 65 Minutes

Lesson Outline:

- 1. Introduction to Protein**
- 2. All About Protein**
 - Food sources
 - Serving sizes and recommended daily intake
 - Function of protein in the body
- 3. Beans as a Source of Protein**
 - Bean overhead
 - Bean Bag activity
- 4. Experiential Learning: Gardening**
 - Planting a lettuce garden
- 5. Critical Thinking Activity and Healthy Snack**
 - Draw foods that are high in protein
 - Healthy Snack: Pumpkin Seeds

Student Learning Objectives:

By the end of this lesson students will:

- Know that protein is an essential nutrient in food.
- Identify at least 3 sources of protein.
- Understand the role of seeds in producing healthy plants, and as a source of protein.

References:

- Teachers College, Columbia University. LIFE Curriculum: Linking Food and the Environment (Module 3, Lesson 16). 2002.
- University of California Cooperative Extension, San Mateo County. TWIGS: Teams with Intergenerational Support Gardening and Nutrition curriculum. 1997

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Growing with Protein

Overview (for Teacher)

Pre-Class Preparation

⊗ *Items marked with this symbol may not be purchased using FSNE funding, nor included as part of cost share.*

- ⊗ Make a watering jug for your plants: a 16 oz plastic water bottle works best. Poke 5-8 holes in the plastic lid with a push-pin (poke from INSIDE of the lid), replace the lid, and you have a great kid-sized watering jug.
- ⊗ Collect a 1-gallon jug (such as a milk container) for each learning team in your class. Cut off the top half of each jug off to make a planting container. Poke 6 holes in the bottom of each jug (from the inside) with a push pin for drainage.

Teacher Involvement During Class



- Divide students into groups of 4 to 5.
- Assist student groups with indoor planting activity.
- Assist in behavior management of students.

Post-Class Teacher Responsibilities

- Make sure that students begin and continue documenting the growth of plants sown in this lesson on the **Plant Growth Log**.
- Serve healthy snack: Green pumpkin seeds.

Vocabulary

Germination – the time when a sprout and a root begin to emerge from your seed.
Protein - a nutrient found in food that is made up of amino acids.
Furrow– a shallow little row in the soil for planting seeds.
Indent– to make a shallow dent in something.
To plant– to put a plant or a seed in the ground so it will grow.

Critical Thinking Activity

Draw two foods you like that are high in protein.

Supplementary Activities

Student Assessment

Web Resources

- MyPyramid Food Guidance system: www.mypyramid.gov
- MyPyramid for kids summary: www.kidshealth.org/kid/stay_healthy/food/pyramid.html

Suggested Books for Reading in the Classroom

- Jennings, Terry J. Beans. Garrett Educational Corporation, 1995.
- Rushing, Felder. Dig, Plant, Grow: A Kid's Guide to Gardening. Cool Springs Press, 2004.
- Carle, Eric. Seed. Aladdin, Reprint 2001.
- Cole, Joanna. The Magic School Bus Plants Seeds. Scholastic Paperback, 1995.

- Gibbons, Gail. From Seed to Plant. Holiday House Inc., 1993.
- Lobb, Janice. Dig and Sow, How Do Plants Grow. Kingfisher, 2000.
- Moor, Jo Ellen. Plants: Grades 1-3. Evan-Moor Educational Publishers, 1998.
- Robbins, Ken. Seeds. Atheneum Books, 2005.

Growing with Protein

EALR & GLE Alignment

EALR	GLE	Lesson Applications
<p>Science</p> <p>1.1 Understand how properties are used to identify, describe, and categorize substances, materials, and objects and how characteristics are used to categorize living things</p> <p>1.2 Understand how components, structures, organizations, and interconnections describe systems</p> <p>1.3 Understand how interactions within and among systems cause changes in matter and energy</p>	<p>1.1.1 Understand simple properties of common natural and manufactured materials and objects</p> <p>1.2.1 Understand that things are made of parts that go together</p> <p>1.3.8 Understand that most living things need food, water, and air</p>	<ul style="list-style-type: none"> • All About Proteins • Beans as a Source of Protein • Experiential Learning: Gardening and Maintaining the Indoor Classroom Garden
<p>Health and Fitness</p> <p>3.2 Gather and analyze health information</p>	<p>3.2.1.c Demonstrate the ability to practice health enhancing behaviors and reduce risks</p>	<ul style="list-style-type: none"> • All About Proteins • Beans as a Source of Protein
<p>Reading</p> <p>2.1 Demonstrate evidence of reading comprehension</p> <p>3.2 Read to perform a task</p>	<p>2.1.3 Understand and identify main ideas and important details in text</p> <p>3.2.1 Understand information gained from reading to perform a specific task</p>	<ul style="list-style-type: none"> • Read all overheads with teacher • Beans as a source of Protein: Bean Bag Activity • Experiential Learning: Plant Growth Log
<p>Writing</p> <p>2.2 Write for different purposes</p> <p>2.3 Write in a variety of forms</p>	<p>*GLE not available at this time</p>	<ul style="list-style-type: none"> • Experiential Learning: Plant Growth Log • Critical Thinking Activity
<p>Mathematics</p> <p>1.2 Understand and apply concepts and procedures from measurement</p>	<p>1.2.1 Understand and apply procedures to measure with non-standard and standard units</p>	<ul style="list-style-type: none"> • Review & Reflection: Indoor Gardens Monitoring Food Plant Growth

Growing with Protein

Preparation Outline

Activity Supplies

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Protein Demonstration

- Plastic baggie with 1 serving size of nuts or seeds (1 oz) for demo
- Food model of meat or fish to show serving size
- Purple meat and bean group label (from lesson 1)

What's In Your Bean Bag? Activity

- 6-1/2 cup bags of mixed beans (1 per learning team)

Gardening Activity

- ⊗ 6-1 gallon jugs with tops cut off (1 per learning team)
- ⊗ Soil – enough to fill the jugs
- ⊗ Small trowel (or use hands)
- ⊗ Popsicle sticks for labeling
- ⊗ A variety of lettuce seeds
- ⊗ Small paper cups each one labeled with a seed name (it is easier for small fingers to grab little seeds from a paper cup than the seed packets)
- ⊗ 2 open seed flats to put under jugs to catch water

Healthy Snack

- 1 ½ cups of green pumpkins seeds (1 tablespoon per student)

Review

- Classroom Tasting Challenge checklist
- Healthy Person Contract
- Protein pictures for Healthy Person Contract

Overheads

- Diagram of a Seed
- What's in Your Bean Bag?
- Plant Growth Log

Student Handouts

What's in Your Bean Bag? (1 per learning team)

Teacher Handouts

- Plant Growth Log (1 per classroom)
- Student Assessment and Answer Key

Changes for K and ELL Classes

Omit Plant Growth Log -or- Omit Bean Bag Activity and go straight to planting.

Rainy Day Activity Supplies

None

Growing with Protein

Outline

Content

Introduction and Lesson Overview (4 Min)

- Who can tell me what protein is? Why is it important for people to eat protein? Write answers on the board.
- In this lesson we will learn why protein is important, learn about foods that have protein, and plant a lettuce garden in the classroom.

All about Protein (10 Min)

- **List foods that are high in protein**

Protein Visuals:

A bag of nuts or seeds that is one average adult serving size.

A food model of meat or fish to show one serving size.

What is protein & Why is it Important?

- Explain that protein is a nutrient found in food. Protein is important because it helps us to grow, heal cuts, and build strong muscles.
- Our hair, skin, blood and fingernails are also made up of protein.
- We also use protein as a source of energy.

Which foods have protein?

- Lots of foods have protein. Animal based foods like fish, chicken, eggs, and beef are good sources of protein.
- Plant foods like beans, seeds, and nuts are good sources of protein.
- Put purple protein label on board and list protein foods underneath the label.

How much protein do we need every day?

- Have the students raise their hands.
- A serving size of protein is the same size as one of your palms. The amount of protein that each of us needs is based on how big we are, that is why you can use your hand as a measure- it grows with you!
- Have each student hold out their hands. It is recommended that you eat 2-3 servings of protein each day.
- One serving of animal protein from meat is the size of one of your palms, or a deck of cards (2 oz).
- One serving of plant protein from nuts, seeds or cooked beans is approximately the amount you can fit into both palms (1 oz nuts or seeds, ½ Cup beans).
- Have students trace the palm one of their hands to encourage kinesthetic learning.
- It is recommended that you eat one serving of a food that is high in protein at each meal.
- Show serving size visuals and have students compare this to the size of their palm that they just traced.

- *Additional Information for Educator: For the purposes of this lesson, 1 serving = 2 ounce equivalents. According to the MyPyramid Food Guidance system, children should eat 5 ounce equivalents of protein each day. Examples of 1 ounce equivalents include:*
 - 1 Tablespoon peanut butter
 - ½ Ounce nuts or seeds (~12 almonds, ~4 walnuts)
 - ¼ Cup cooked beans
 - ¼ Cup tofu
 - 1 Ounce meat (3 thin slices deli meat)
 - 1 egg

Beans as a Source of Protein (15 Min)

- **Diagram of a Seed**
- **Activity: What's In Your Bean Bag?**

- Put Diagram of a Seed on overhead.
- Did you know that beans are seeds? If we plant a bean, it will grow into a plant. Seeds have more protein than most other plant parts because their job in the plant is to grow into a new plant when planted. Why do you think this part of the plant would have more protein? (Because they store all of the energy a new plant needs to grow.)

What's In Your Bean Bag?

- Teacher divides students into pairs.
- Read directions for **What's In Your Bean Bag?** aloud to students.
- Walk around and help students complete the activity.
- When students have identified 3 beans, they may begin planting.

Experiential Learning: Gardening (20-25 Min)



- As we start to plant seeds, reinforce the concept that seeds are high in plant protein. A seed has all the protein a new plant needs to grow.

Planting Introduction

- **Spacing of Seeds:** Explain that when we plant inside, the plants are not going to grow to full maturity, so we can plant them closer together than we would if we were planting outside. For example, how much space do you think lettuce needs to grow big? We'll be snacking on the "baby-sized" versions of the plants (leaves will be harvested when they are about the size of baby spinach or lettuce mix that you can buy in bags at the grocery store). Explain that we will be planting our seeds very close together.
- **Planning:** From a selection of various lettuce seed packets, each learning team will design a garden to be planted in a gallon jug container. Students will choose 2-4 different kinds of lettuce to plant.
- **Explain Planting procedures:** Each student will plant

6 seeds, 2 seeds in each furrow. Demonstrate each job in front of the class, but let each learning team decide how they will split up the jobs.

- **Planting Indoors**

Planting Jobs:

- **Spacing of Seeds:** Explain that when we plant inside, the plants are not going to grow to full maturity, so we can plant them closer together than we would if we were planting outside. For example how much space do you think lettuce needs to grow big? We'll be snacking on the "baby-sized" versions of the plants. Explain that we will be planting our seeds very close together.
- **Explain Planting procedures:** Each team will plant 24-36 seeds (depending on how many students are in each team.) Demonstrate each job in front of the class.
- Give each child a number corresponding to a job, and model each job before planting with students.
- **Fill the jug with soil:** Have a student come up to the soil bucket and scoop potting soil into the jug, tapping its base on the desk in order it to settle the soil. Return to the team.
- **Make furrows in the soil:** Have a student gently smooth the top of the surface of the soil with one hand. With the edge of their hand, have them push, or indent the surface of the soil approximately $\frac{1}{4}$ ". This is as tall as a pinky finger laying sideways in the soil. The student makes 3 furrows, one for each type of seed. Do not make furrows too deep or the seeds will get buried too deeply and not be able to sprout.
- **Pass out seeds:** one student puts two seeds into his or her own palm, and with thumb and forefinger, gives 2 seeds to each student. Repeat for all three types of seeds.
- **Each student plants seeds:** Each student plants 6 seeds, 2 in each row.
- **Cover up seeds with soil**
- **Label each row:** One student makes labels on popsicle sticks of vegetable names and places the stick in the appropriate row.

- Have students complete the first section of the **Plant Growth Log**. Ask students to continue recording growth as they see their lettuces emerge. The log sheet will track the progress of their plants.

- **Plant Growth Log**

Maintaining the Indoor Garden (5 Min)

Grow Lamps

- Explain that we are using lamps - which only approximate the sun. They need to hang very low, just

one inch from the leaves of the plant.

Watering indoors

- Make sure to keep plants watered, but not over-watered. Seeds are very small, and they need to stay moist in order to sprout, but they also could get lost in the soil if they get too much water.
- Demonstrate in front of class that water can be seen trickling down through the plastic jug, turn jug around so class can see all sides and see water flowing down to the bottom of the jug.
- We should water each jug until it is wet all the way to the bottom.
- Tips: When pouring water, count to three and stop in between watering, use a circular motion while pouring water from watering can.
- Demonstrate to each team at their table how to water with the watering container that the teacher has made for the class.

- **Wash Hands**

Hand Washing

Remind students that they need to wash their hands after gardening. Each student should wash his or her hands with warm water and soap for 20-25 seconds.

Critical Thinking Activity (5 Min)



If there is any extra time have students draw two foods that they like that are high in protein.

Healthy Snack

Give the healthy snack of green pumpkin seeds “pepitos” to the classroom teacher (in front of the students). After class the teacher will give approximately one handful (about 1 Tablespoon) to each student as a protein-rich snack. Students should wash their hands before eating the snack.

Review and Reflection

- Have students remind you what one serving size of protein looks like (the size of one or two of their palms). Ask students to list some sources of protein (beans, seeds, nuts, eggs, meat). Ask students why protein is important for our health – what does it do? (helps us grow, heal and build muscles)
- **Healthy Person Contract:** In this lesson we learned all about protein. We learned that there are many plant-based proteins like dry beans and seeds that have a lot of protein, and having enough protein keeps our muscles healthy and strong.
 - Have students think of foods they have eaten today

that are high in protein. Select students to tape pictures of protein onto a muscle of the Healthy Person Contract.

- **Indoor Gardens: Monitoring Food Plant Growth:** How are your bean plants growing? Have they received the water they need? Let's look at this chart and measure their growth.
- **Conduct the Classroom Tasting Challenge:** After tasting the green pumpkin seed snack, ask students to raise their hands to show you how many students tasted, liked or did not like the snack. Record the number of students who raise their hands in the appropriate column on your Classroom Tasting Challenge checklist, out of the total number of students in class that day.

Lesson Materials

Growing with Protein

- **Protein Pictures for Healthy Person Contract**
- **Diagram of a Seed**
- **What's in Your Bean Bag?**
- **Plant Growth Log**

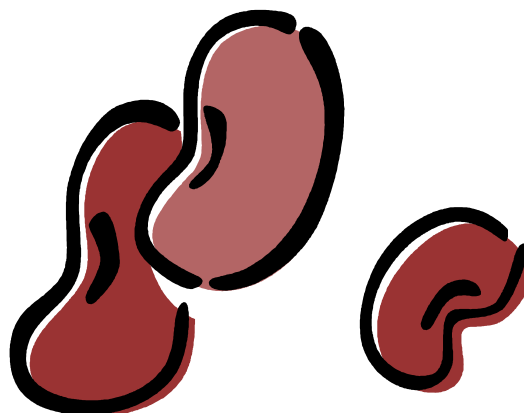
Supplementary Activities

- **Student Assessment grades K-1**
- **Assessment Answer Key**
- **Student Assessment grades 2-3**
- **Assessment Answer Key**

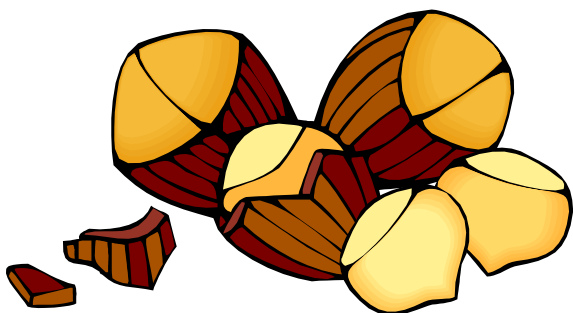
Pictures for Healthy Person Contract



Eggs
Protein



Beans
Protein

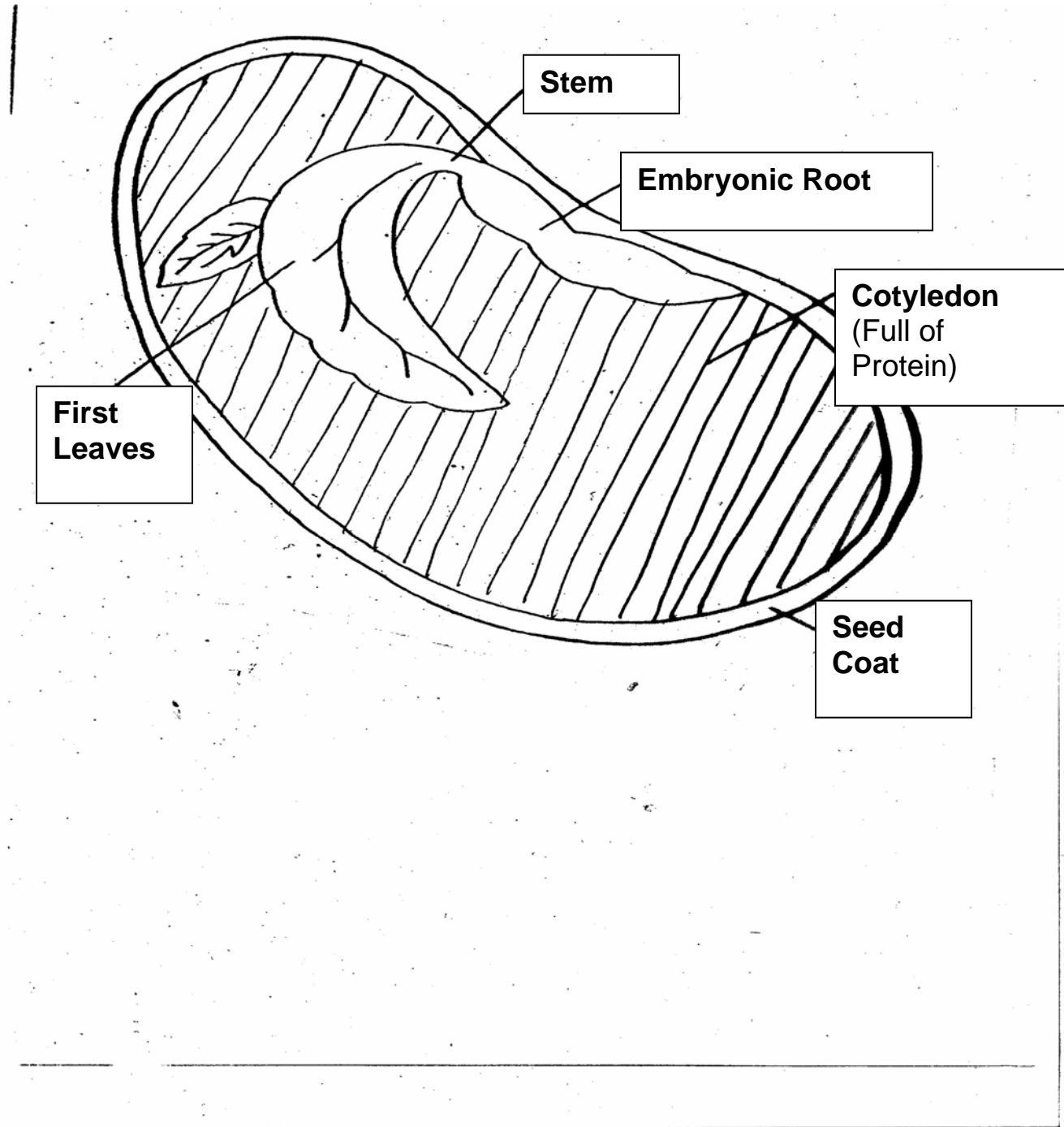


Nuts
Protein



Fish and Meat
Protein




Diagram of a Seed



Adapted from: University of California Cooperative Extension, San Mateo County. TWIGS: Teams with Intergenerational Support Gardening and Nutrition curriculum, 1997.

What's in Your Bean Bag?

1. Each learning team gets 1/2 cup of mixed beans (seeds). Find at least 3 different seeds.
2. Use the seed name and description to help you match the beans with their correct name.
3. Put an **X** under small, medium, or large on the chart to show the size of your bean.
4. Draw your beans in the last column; some have been filled in for you!

	Seed Name	Description	size			draw here
			small	med	large	
1	Pinto	Brown with tan spots		X		
2	Blackeye	White w/black eye	X			
3	Garbanzo	Tan and round (looks a little like a brain)				
4	Kidney	Brownish Red		X		
5	Cranberry bean	Pink with red spots				
6	Pink bean	Light Pink				
7	Lentil	Tan, round and flat				
8	Black bean	Black				

Date Planted: _____

Classroom Plant Growth Log

Directions: Use this form to record the growth of all the lettuce plants in your class.

1. Write down the date you planted the seeds (today's date).
2. Write the name of each learning team (or name of each member) under "Learning Team Name(s)".
3. Write the name of the 3 bean seeds that each learning team planted under "Lettuce Names".
3. For each learning team and each type of lettuce, write down the date you see the first sprout.
4. For each learning team, once a week for 4 weeks, measure the height of the tallest plant in each row, and record your measurement in centimeters.

Learning Team Name(s)	Lettuce Names	Sprout Date				Measurements			
		1	2	3	4	1	2	3	4
1.	1.								
	2.								
	3.								
2.	1.								
	2.								
	3.								
3.	1.								
	2.								
	3.								
4.	1.								
	2.								
	3.								
5.	1.								
	2.								
	3.								
6.	1.								
	2.								
	3.								

Growing with Protein

Name: _____ Date: _____

1. Draw two foods that you like that have lots of protein.

2. Why do beans have a lot of protein?

Beans have a lot of protein because _____

Growing with Protein

1. Draw two foods that you like that have lots of protein.

Any two protein foods such as: meat, fish, eggs, nuts, seeds, beans

2. Why do beans have a lot of protein?

Beans have a lot of protein because_____

They store all of the energy a new plant needs to grow.

Growing with Protein

Name: _____ Date: _____

1. Name three of your favorite foods that are sources of animal protein.

1. _____

2. _____

3. _____

2. Explain why beans are a good source of protein.

Growing with Protein

1. Name three of your favorite foods that are sources of animal protein.

Any three animal proteins such as: chicken, beef, pork, eggs

2. Explain why beans are a good source of protein.

_____ Because they store all of the energy a new plant needs to grow.