Crop Product Supply Chains

Introduction (~10 minutes)

When you're hungry for a peanut butter and jelly sandwich, you may head to your cupboard, or you may have to go to the store. Fortunately, you won't need to find a peanut plant and start the process from the beginning!

On the right half of this page, write steps you can think of in the process of making a jar of peanut butter. A first and last step have been included. As you can see, you can write your ideas in any order.

Don't forget about the steps described in earlier modules of this project book, like planting and harvesting. Think as well about those steps that may take place more than once, like shipping. There are many possible answers!

When you are finished, re-order the steps from start to finish. There are blank spaces on the next page. You can cut out the steps on this page if it would help you rearrange them.

What happens to a crop after harvest?

Farmer buys peanut seeds
Customer buys jar of peanut butter

(This panel is left blank to allow cutting and re-arranging the steps on the front page.)

Steps to make & buy a jar of peanut butter
1. Farmer buys peanut seeds
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
Customer buys jar of peanut butter

Explore (~15–25 minutes)

You have listed the most important steps of making peanut butter, but it is always fun to go through the steps yourself. Let's make some sunflower butter!

With an adult's help, read the instructions for your food processor or blender. They contain sharp parts, and they can only be run for a certain amount of time before their motors need to cool off.

When you are ready, pour the sunflower seed kernels into the machine. With an adult's help, start it at a low speed or pulse the device (turn it on and off) to reduce motor stress.

Explore Materials List

- Sunflower seed kernels, salted (~2 cups)
- Food processor or high-powered blender
- Silicone spatula

Run the machine according to its instructions. At times, you will need to scrape the walls of the container with your spatula. Keep blending until the sunflower seed butter becomes a smooth, oily spread (like creamy peanut butter!). This may take 10 minutes or more.

Your sunflower butter is delicious with bread, crackers, rice cakes, or a variety of other foods. Store it in an airtight container.

Explain (~10 minutes)

Sunflower kernels are rich in protein and oil. This is true of many seeds, but crops that are valued most for their oil are called oilseed crops.

Pennycress (*Thlaspi arvense*) is one such oilseed crop. Its seeds are heated and crushed to extract the oil. About 35% of the seed is oil.

What do we do with the rest of the seed? About 10% is of the seeds are other materials like vitamins and minerals. About 23% of the whole seed is protein. The remainder is carbohydrates (carbs).

Subtract each number to find the amount of carbs in a pennycress seed.

100% - 35% Oil - 23% Protein – 10% Other =

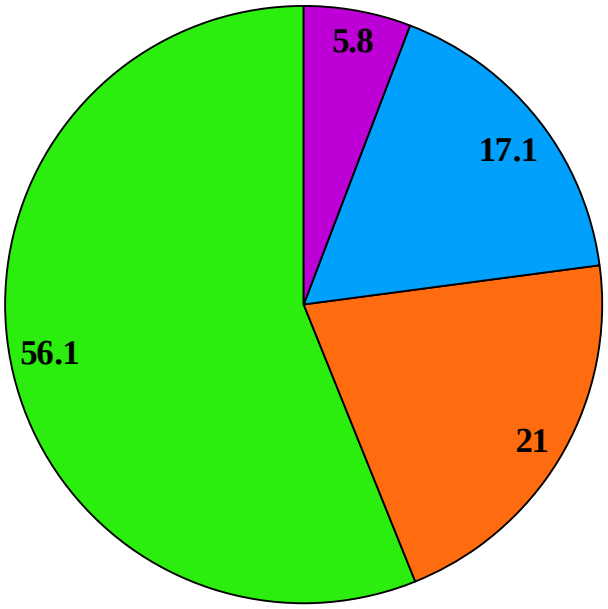
____% Carbs

Use this information to complete the pie graph on the right.

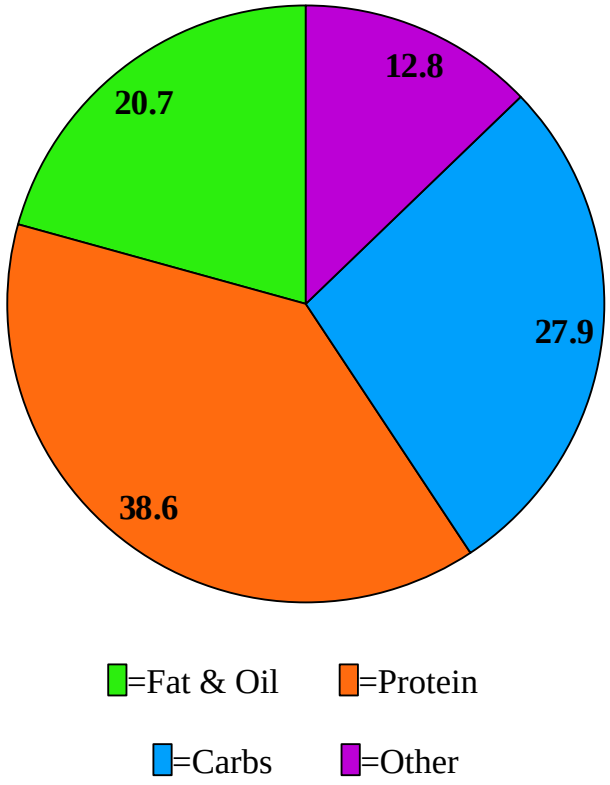
Label your pie graph sections with the percent.

Compare this to the nutrients in sunflower and soy seeds. These are graphed below.

Sunflower Seed Kernel Nutrient Content



Ground Soy Nutrient Content



What are these nutrients used for when they come from sunflowers or soybeans? Do a little research. Can the nutrients be used to make biodiesel, cooking oil, or animal feed?

Fat & Oil: _____

Protein: _____

Carbs: _____

Look back at the amount of nutrients in each seed. For each crop, what is an ideal use of that plant's seed?

Pennycress: _____

Sunflower: _____

Soy: _____

Extend (~25 minutes)

Look back at the list of tasks you made in the *Introduction* activity. Each of these tasks are likely critical—without that task, peanut butter would not exist, or it would not reach the store.

Now consider the cost of peanut butter. If a jar of peanut butter costs $5.00, why is it worth $5?

Every time work is done to plant, harvest, move, grind, or package, value is added to the product.

This added value is not free. It costs the farmer money to plant, it costs truckers money to move materials, and it costs factories money to make the peanut butter.

Complete the table below, estimating the cost of each step and the value at each stage.

A few hints before you get started:

- Buying enough peanuts to make a 12 oz. jar of peanut butter only costs about $0.55.
- About half the cost of a jar of peanut butter is spent on the steps requiring shipping (seed to the farm, peanuts from the farm, jars to the factory, jars from the factory, and from the warehouse to the store).
- A grocery store will pay about $3 for a jar of peanut butter. The $2 the store adds to wholesale price is used to pay employees at the store, keep the lights on, and make a profit.

Step	Additional cost	Reason for cost	Total value
1. Farmer buys peanut seeds	$0.05	Seeds are bought from a dealer or saved from a previous harvest.	$0.05
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			$5.00
Customer buys jar of peanut butter			

Reflect (~10 minutes)

Look back at the steps you developed in the *Introduction* one last time. What kind of jobs must be done for each step to be completed?

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

Which of these jobs do you think you might want to do? Why?

_____

_____

_____

You've probably spent more time thinking about peanut butter today than ever before. What is something you'll remember from now on when you eat peanut butter, sunflower butter, or another seed butter?

_____

_____

_____

This project was developed as part of the IPREFER project (Integrated Pennycress Research Enabling Farm and Energy Resilience) at Illinois State University.

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Career Connection: Logistics Specialist

Logistics specialists oversee shipping, warehousing, and receiving. They often have offices in the warehouse. They manage tasks, schedules, and workers. They ensure that everything arrives and leaves their company on time. To do so, they sometimes do manual work like moving boxes.

Logistics specialists can complete a high school education and rise through the ranks at a company. They can also earn certificates or degrees.