

Bee Healthy Farms

Creating gardens that are nutritious for bees

When bees are feeding from flowers, they are eating either nectar or pollen. **Nectar** provides bees with **carbohydrates**, or sugar. **Pollen** provides bees with **protein** and **lipids**, or fats. Similar to us, the right ratios of carbohydrates, protein, and lipids, collectively known as **macronutrients** is essential to a healthy diet. From these macronutrients, bees have the energy to fly, grow, and reproduce.

Like bees, humans need to have a healthy and nutritional diet to thrive. Eating a variety of foods can help you receive a full range of macronutrients and micronutrients, like vitamins and minerals. For a well balanced diet, it is important to eat different types of veggies, fruits, dairy, meats, and carbohydrates. Just like bees, these macronutrients will help you maintain a healthy lifestyle.



How can you make healthy choices when picking out foods to eat?

Not all flowers have the same macronutrients. For example, some pollen has more protein than lipids, while others have more lipids than protein. We call this the **protein-lipid ratio**, written as P:L. To calculate it, it becomes a fraction, written as P/L. All species of flowers have different protein-lipid ratios.

Try it! Determine this flower's protein-lipid ratio. Then, write the protein-lipid ratio as a **fraction**, and solve.

Protein: 171
Lipids: 95

Fraction **Notes**

Protein = ?	=
Lipids = ?	





Can bees choose pollen to eat based on the protein-lipid ratio?

There is evidence that bees may select the flowers they feed from based on the amount of protein in the pollen. However, it is also possible that bees select flowers in other ways such as visual cues, including flower size, color, and shape. Researchers at Penn State University wanted to explore this theory.

If we can understand the flower preferences of wild bees, then we can plant gardens that are the best for bees. As bees face numerous threats including pesticides, habitat loss, and climate change, pollinator-friendly gardens are more important than ever.

Researchers at Penn State University used Eastern Common Bumble Bees (*Bombus impatiens*) in a recent study. Only worker bees were used, as they are the bees that collect pollen for the hive. The following table is data collected from observations of the worker bees visiting flower species in the wild.

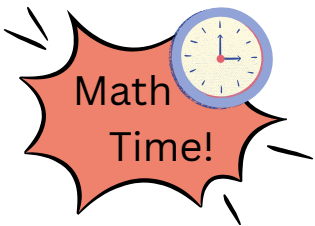


What observations can you make from looking at this table?

Flower Name	Carbohydrate	Protein	Lipids
American senna	118.47	237.28	51.72
Spiderwort	70.43	358.25	103.74
Culver's root	55.32	186.72	83.71
Purple coneflower	101.76	171.43	95.03
New England aster	91.35	91.04	84.03
Joe-Pye weed	112.66	146.48	158.76
Boneset	87.20	78.00	108.01

The flower with the lowest amount of protein: _____.

The flower with the highest amount of lipids: _____.



Directions: Read the following scenario and answer the questions below.

You own a shop in town and have a garden bed in the front of your business. Knowing how important bees are, you want to plant flowers that are good for them. You only have room for three different flower species.

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Using the same table from page 2, select three plant species.


1 _____

2 _____

3 _____



Below is a small garden bed. Use the **three flower species** you chose and plant them in the empty garden bed. Use different colors to represent different species in the bed. Then, calculate and find the **area** and **perimeter** of the whole garden bed.

1 planted flower = 1 square unit. 

Area = Length X Width
A = L X W

A= _____

Perimeter = Sum of all sides
P = L + L + L + L

P= _____

10 Units

