Power of Pollinators

Session Time:
50 minutes

Number of Participants: any

Materials Needed:
- 10 (or more) of the following foods:
  - apples
  - pears
  - avocados
  - grapes
  - blueberries
  - mangos
  - cashews
  - melons
  - chocolate
  - nutmeg
  - coffee
  - tomatoes
  - raspberries
  - pumpkins
  - strawberries
  - almonds
  - bananas
  - cherries
- Two signs - "NEEDS a Pollinator" and "DOES NOT NEED a Pollinator"

Objectives:
Participants will:
1. Learn about foods that require pollinators for production.

Background:
The next time you sit down for a meal or snack, take a look at your plate. There is a good chance that many of the foods you are eating are produced with help from a pollinator. In fact, the United State Department of Agriculture estimates that 1 in 3 bites of food requires a pollinator for production. That's a lot of food... and some of the best foods, too! Chocolate, coffee, raspberries and bananas all require the help of a pollinator to be produced. In the United States alone, it is estimated that pollinators help produce over $20 billion in food products annually.

And this food production is not just for humans. Many wildlife species depend on the fruit and seeds produced by plants with the help of pollinators.

Check out these foods and their pollinator helper:

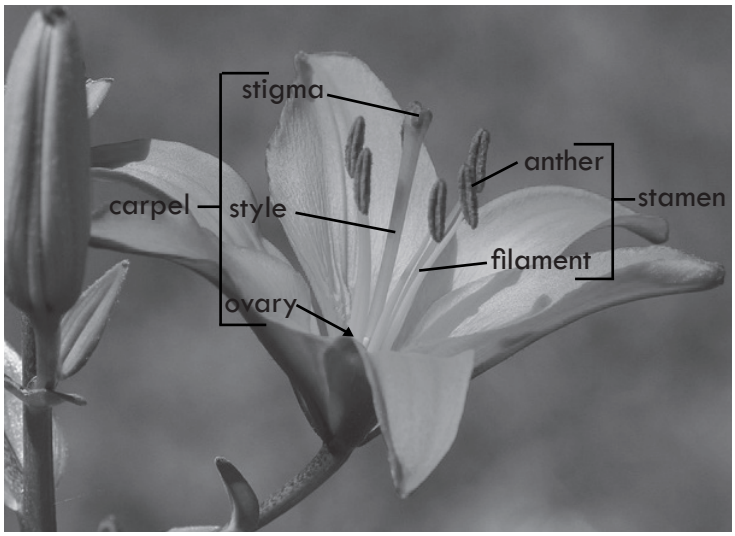
Food	Pollinator
apples	honey bees, blue mason bees, orchard bees
avocado	bees, flies bats
bananas	birds, fruit bats
blueberries	over 115 kinds of bees including bumblebees, mason, and leafcutter
cashews	bees, moths, fruit bats
cherries	honey bees, bumblebees, flies
chocolate	midges (flies), stingless bees
coffee	stingless bees, other bees, flies
pear	honeybees, flies, mason bees
pumpkins	squash and gourd bees, bumblebees
raspberries	honey bees, bumblebees, solitary bees, hover flies
strawberries	bees
tomatoes	bumblebees
grapes	bees
mango	bees, flies, wasps
melons	bees
nutmeg	honey bee, birds

Plus, alfalfa requires a pollinator to grow. Don't eat alfalfa? Well, cows do and cows produce milk, dairy products and meat... all things people do eat!

So, how does pollination work?
It is really a fairly simple process. Plants produce flowers. These flowers are often bright and showy to attract pollinators. Within the flower's structure

there are several different parts - the stamen and the carpel. The stamen contains the anthers which have the pollen. Pollen contains the genetic material for the plant. The carpel contains the stigma, style and ovary. The stigma is extremely sticks so the pollen will stick to it. Once pollen is deposited on the stigma, the pollen move down the style to the ovary. Once the pollen meets the ovary, the flower has been fertilized and a seed will begin to grow.

For pollination to work, pollen from one flower must be moved to another flower of the same kind. For example, pollen from a butterfly milkweed flower must be moved to another butterfly milkweed flower. This requires either wind or a pollinator to move the pollen. Approximately 80 percent of flowering plants require a pollinator for pollination. The other 10 percent rely on wind for pollination.



So, who are these pollinator superheroes?

Bees

There are over 20,000 different species of bees worldwide. In North America, we have about 4,000 different species of bees. Bees are one of the most efficient pollinators because their body is designed to carry pollen. They have hairy legs and pollen sacks on their legs to help carry pollen to their hive to eat (and spread it from flower to flower).

Types of bees include bumblebee, honey bee (not native to North America, imported centuries ago for agriculture), mason bees, carpenter bees, leafcutter bees, digger bees. Many species of bees do not have a large hive but rather live a solitary life. Solitary bees do not have a hive to protect so they are not aggressive.

Butterflies

Butterflies visit flowers mainly for the sweet nectar produced by the flowers to attract pollinators. Butterflies use their long mouth called a proboscis. It is shaped like a long straw and is great for lapping up the nectar. When butterflies visit flowers, they often inadvertently get pollen stuck to their legs, wings, and bodies. Then, when the move to another flower, the pollen is spread.

Butterflies taste with their feet. They have taste buds not on their proboscis, but rather on their feet so when they land on a flower they can taste it. They smell with their antennae.

Ants & Beetles

Ants and beetles are not incredibly efficient pollinators. They do not have sticky hairs on their bodies like bees. But there are millions (trillions!) of them. So, because there are so many of them, they become important pollinators. Ants can't fly so they often pollinate flowers close to the ground such as strawberries.

Bats

Most bats in North America are insectivores meaning they eat insects (a really important service bats provide!). But this means that most North American bats do not visit flowers and thus are not pollinators. In warmer climates bats are incredibly important pollinators. Many fruit bat species pollinate avocados, bananas, cashews, coconuts and agave (for making tequila).

<u>Procedure</u>:

Before the Activity

• Gather 10 (or more) of the following items:

- apple	- pears
- avocado	- grapes
- blueberries	- mangos
- cashews	- melons
- chocolate	- nutmeg
- coffee	- tomatoes
- raspberries	- pumpkins
- strawberries	- almonds
- bananas	- cherries

• On the front of a large table or two desks put the "NEEDS a Pollinator" sign on one end and the "DOES NOT NEED a Pollinator" sign on the other end.

Doing the Activity

1. Explain that pollination is the process by which pollen from one plant is moved to another plant of the same kind. When this happens, the plant is able to make new seeds. Pollination can take place through several means - wind and animals.

Explain that pollinators are the animals which move pollen from one plant to another plant of the same kind. Some plants produce a lot of tiny, light weight pollen. These plants rely on wind to spread their pollen. But, most plants have larger, heaver, sticky pollen which require an animal to move pollen.

Pollinators can be many different kinds of animals, but most often they are insects. Some of the most common pollinators are bees, wasps, butterflies, ants, and beetles. In some areas of the world, birds and bats are also important pollinators.

2. Bring out the foods you have gathered. Put the foods on a large table for all students to see. Ask students which of these foods they think were produced with the help of a pollinator? Which of these foods needed a pollinator to help the plant spread it pollen to be able to create fruit/seeds?

3. Ask students to volunteer to come forward to place one food item on the "NEEDS a pollinator" area or the "DOES NOT need a pollinator" area. Ask the student to justify their choice. If a child is wrong, don't tell them... just let the group discuss for a few minutes.

4. Continue this process until all foods are placed in one of the two areas ("NEEDS" or "DOES NOT NEED").

5. In the end, move all foods to the "NEEDS a pollinator" area. Explain that ALL of these foods required a pollinator to be produced. Point out the foods that are pollinated by bees, flies, wasps and bats (remind participants that those foods pollinated by bats likely come from southern areas as North America's bats are insectivores and thus not pollinators).

6. Explain to participants that many insect pollinators are not doing so well. They need lots of flowers to get food, but there are fewer and fewer flowers. Plus, many insect pollinators are effected from pesticides which are designed to kill harmful insects, but often also kill beneficial insects like pollinators.

7. Explain that there is something that everyone can do to help pollinators: plant flowers, use less pesticides, provide pollinator nesting sites, donate to conservation organizations!

Extensions

1. Have students work together to plant a pollinator garden. Include both native wildflowers as well as vegetables which require pollinators for food production.

2. Ask students to create advocacy posters encouraging people to help pollinators. This can include signs or posters focusing on using less pesticides, planting native wildflowers that bloom at all times of the growing season, donating to a conservation organization.

3. Have students record what they eat for one week - breakfast, lunch, dinner, snacks, desserts, drinks, etc. Ask students to review their list and determine what percentage of their food requires a pollinator (directly or indirectly).

Websites

Pollinator Partnership
www.pollinator.org

U.S. Department of Agriculture - Insects & Pollinators
www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/pollinate

U.S. Forest Service
www.fs.fed.us/wildflowers/pollinators/

NEEDS
a Pollinator

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DOES NOT
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