

# Pollen and Plant Development

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## Session Goals:

1. Participants will gain an increased appreciation of the role of pollen and pollinators in agriculture.
2. Participants will learn about key morphological features of seeds and flowers and their roles.

## Activity #1 – How is it pollinated

### Desired Learning outcomes:

1. Visitors will learn how several different plants, many of which are crops, are pollinated.
2. Visitors will gain an appreciation for the role of pollinators in our farms and gardens.

### Materials:

1. Two-sided color printouts, with the name of a plant and a photo on the front and its pollinator, plus some fun facts and one or more photos, on the back.
2. Sheet protectors to protect printouts from rain.

### Lesson:

A volunteer can either lay the cards out on the table or stand with them out in front of the booth asking passers-by to guess the pollinator (this was Taylor's idea and it worked really well for drawing people in). Participants will be shown the side of the card with the plant on it and asked "What do you think pollinates [name of plant]?" After participants make a guess, the volunteer will flip the card, tell them whether they were right or wrong, and highlight some of the interesting facts on the back of the card. Younger participants can be given the opportunity to draw their favorite pollinator (this was Amanda's idea). This could also work as an unsupervised activity, since the instructions are written out on one of the cards.

## Activity #2 – Looking at pollen under a compound microscope

### Desired Learning outcomes:

1. Participants will get the experience of using a compound microscope
2. Participants will see that different pollen has different shapes and sizes.

### Materials:

1. Prepared slides with different types of pollen (tomato, lily)
2. Compound microscope

### Lesson:

Participants will get to look at tomato and/or daylily pollen under a microscope. Volunteer will safeguard the microscope, make sure participant can see the pollen, and highlight the differences between the two types of pollen.



### Activity #3 –Looking at bean seeds under a microscope

Desired Learning outcomes:

1. Participants will get the experience of using a dissection microscope
2. Participants will see and learn to identify key components of a bean seed, and learn their function

Materials:

1. Soaked beans pinto, kidney, lima, and black beans—I also purchased fava beans, but didn't end up bringing them, since a trial run at my house showed that they are harder to cleanly split in two
2. Tooth picks
3. Optional: tweezers
4. Optional: petri dishes to hold dissected beans
5. Dissection microscopes
6. Diagram of bean seed

Lesson:

Participants will be given a soaked bean and a toothpick and/or tweezers, and instructed on how to peel back the softened seed coat and gently split the bean in half. Participants will be given the opportunity to look at their bean or other beans that have been pre-dissected by others under a dissection microscope. Volunteer will safeguard the microscope and point out the

### Activity #4 Looking at flowers under a microscope

Desired Learning outcomes:

1. Participants will get the experience of using a dissection microscope
2. Participants will see and learn to identify key components of a flower and their function
3. Participants will learn about simple v compound flowers

Materials:

1. Assorted simple flowers (lilies are great, I also brought tomato blossoms) and compound flowers (daisies or sunflowers, queen anne's lace)
2. Jars of water
3. Optional: tweezers
4. Optional: petri dishes to hold parts of flowers
5. Dissection microscopes
6. Diagram of flower

Lesson:

Participants will be shown various flowers, starting with simple flowers, and shown their salient features. Participants will be given the opportunity to dissect a flower if there are enough flowers, and shown small flowers and pieces of compound flowers under a dissection



microscope. Volunteer will safeguard the microscope and point out the differences between simple and compound flowers.

## Pre-session trivia:

Q: What proportion of the global food supply requires pollination by insects or other animals?

A: About 35%; while many grains are wind-pollinated, a White House report found that of the 115 most popular crops worldwide, 85 require animal pollinators.

Q: Where did honeybees originate?

A: The Western Honeybee (*Apis mellifera*) was brought over the Atlantic from its native range in Europe. Genetic evidence suggests that it originated in Africa.

Q: How far can pollen be carried by insects?

A: At least 500 miles-- researchers in Oklahoma analyzing pollen carried by the corn earworm moth found pollen from citrus and other plant species from at least 500 miles away in Texas.

Q: How many nuclei does a pollen cell have?

A: It depends on the species-- most plant species produce pollen with two nuclei, while others, such as corn, produce pollen with three nuclei.

Q: What makes rhododendron pollen unusual in shape?

A: Most plants produce pollen in batches of four cells, with all four breaking apart from each other to be released into the environment. However, in rhododendrons the four cells do not break apart, resulting in a four-cell cluster being released.

## Optional Handouts

“How is it Pollinated” :

[https://drive.google.com/open?id=0B1QwOU5a2P\\_QdHgod3lxdHo1MDA](https://drive.google.com/open?id=0B1QwOU5a2P_QdHgod3lxdHo1MDA)

“Guide to the parts of a flower” :

[https://drive.google.com/open?id=0B1QwOU5a2P\\_QbmVyXy1QV2xBUEE](https://drive.google.com/open?id=0B1QwOU5a2P_QbmVyXy1QV2xBUEE)

“Guide to the parts of a seed”:

[https://drive.google.com/open?id=0B1QwOU5a2P\\_QWmd1bjJGcHRSOEk](https://drive.google.com/open?id=0B1QwOU5a2P_QWmd1bjJGcHRSOEk)

## Links to references or background materials

<https://www.whitehouse.gov/the-press-office/2014/06/20/fact-sheet-economic-challenge-posed-declining-pollinator-populations>

<http://www.nature.com/ng/journal/v46/n10/full/ng.3077.html>



<http://www.ars.usda.gov/is/kids/plants/story9/PollenIndex.html>

<http://www.fs.fed.us/wildflowers/pollinators/index.shtml>

<http://www.wired.com/2014/06/tequila-booze-and-bats/>

<http://www.bbc.com/earth/story/20150514-extraordinary-pollinators>

### **Recommended age range**

The guessing game is good for all ages, although some very young (<5 years old) kids might not have heard of pollen or pollinators at all, so you should be prepared to explain it to them.

Young kids might have trouble reaching the microscope eyepiece and might need a step-stool and/or to be held up by parents. Very young kids were also not too impressed by being able to see the pollen.

Kids under 8 or so also don't always have enough fine motor skills to dissect beans. But they can appreciate beans that have been previously dissected by others.

### **Recommended citation for this lesson plan:**

Milsted, Claire. 2016. Pollen and Plant Development. [marketsci.org](http://marketsci.org)

