Learning Objectives:
- To learn about the importance of bees in the food system, looking specifically at pollinating apple blossoms.
- To build respect and awareness of the important role that bees have in growing our food.

Workshop Materials:
- Bee Costumes – head bands, baskets, tongs, yellow sparkly sponges, glasses, nylons, brushes, tubes, wings, lint brushes, toilet roll (see table page 6)
- Paper cut-outs of Apple Blossoms (1 per student)
- Pollen Pick-Up Relay - 4 blossom cut outs, 2 baskets, 16 pollen “pellets” (8 per basket), 2 sets of antennae (head bands)

See Supporting Documents For:
- Pictures: Pollinators Hard at Work
- Picture: Bee Anatomy
- Picture: Flower Anatomy
- Picture: Apple Tree in Bloom
- Picture: Apple Blossom
- Picture: Bee (for stick)
- Sample Tasting Graph
- Bee Worksheet
- Apple Chronology Cards

Workshop updated November 2016

If you require this information in an accessible format, please contact brooke@foodshare.net.
**Introduction to Pollination: (5-10 mins)**

Spend some time talking with students about what they already know about bees and some of the reasons why bees are important for helping to grow our food.

**Sample Dialogue:** “What do we already know about bees?” “Why are bees important?” “Sometimes bees can seem unfriendly, like when they sting, but really they’re just very busy with a very important job - they don’t actually want to sting you!”

“What special job are they doing?” (answers might include):

- Making honey - honeybees have to visit LOTS of flowers to make honey
- Collecting pollen
- Feeding on nectar from flowers
- Pollinating flowers to make food
- A lot of our food depends on the pollination from bees. (For teachers, one third of the human food supply)

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**Key Words:**

- Pollination
- Bees
- Worker Bees
- Drones
- Queen Bee
- Honey
- Pollen
- Nectar
- Flower
- Fertilize
- Food Supply
- Waggle Dance

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**Equity, Diversity & Social Justice Notes:**

- Ensure inclusive programming when tasting honey. Some students may not have tried honey before as it is one of the more expensive condiments in the supermarket. Explain that honey is a very precious resource and that we’re very lucky to be able to taste some today!

- Some of these activities are very physically active. For students unable to participate in these active games, find other, meaningful roles they can play (e.g. judge, time keeper, costume designer, relay course designer) or modify the activities so they can physically participate (e.g. reduce the size of the relay course, have a bee-buddy to carry the pollen while both buddies navigate the course).
“Poll-in-a-tion” (practice saying together)

...It’s certainly a fun word to say, but what does it mean?

Pollination is the carrying of pollen (the yellow powdery stuff in flowers) from flower to flower or within the same flower (show flower anatomy picture). Pollination helps fertilize (practice saying that together) the flower, creating a fruit!

A “Poll-in-a-tor” is an insect that transports pollen – like a bee! (Show the picture of Pollinators Hard At Work) but also include things like butterflies, moths and beetles.

So, without bees, the flowers wouldn’t be pollinated or fertilized. “What do you think would happen to our food if we didn’t have bees?”

Educator Notes: How Is Honey Made?

The flower that a honey bee visits must contain nectar, otherwise it will move on. Nectar is like sugar water, and this is what bees like! They suck it up using their tongue which is hollow like a straw—it’s proper name is a proboscis.

Now the nectar is inside the bee’s tummy, and its little body then turns the sugar part of nectar (called sucrose) into different kinds of sugar (glucose and fructose). Some of the glucose then gets turned into an acid. By turning some of the nectar into acid, any bacteria is killed so it doesn’t get into the honey. This is why honey can last for years and years.

The bee then moves this watery honey mix from its tummy, into its mouth, and then into the honeycombs of the hive.

But this new nectar mix is still quite watery, so the clever bees get rid of most of the water by fanning the mix with their wings. The mixture is now thicker and resembles what we know as honey. To protect their honey, the bees will seal the honeycombs with wax.

(From: miniyummers.com)
Introduction to Apple Blossoms: (5 mins)

Sample Dialogue: “How does fruit grow?” “Are there fruits you know that are flowers first? What are they - let’s make a list!”

“How do apples come from?” “What do we already know about apple trees?” “Who here has seen an apple tree in bloom?” “Apple flowers are called blossoms.” “Did you know…apple blossoms become apples? How does one become the other?”

Show the picture of the Apple Tree in Bloom

For a flower to become an apple, the pollen that is produced by the flowers on one apple tree must be carried to the flowers on another tree (“cross-pollination”). The pollen is moved between trees by bees and other pollinators like butterflies and birds, that visit the flowers to collect nectar (sweet liquid) and pollen.

Ask two volunteers to be the trees with flowers, use the Bee on a Stick to show how the bee would go between the two flowers to pollinate them (you could use powder or glitter in the palms of your two volunteers for extra effect).

“What do we call the transfer of pollen from flower to flower again?” Pollination!

So, even if you’re scared of getting stung by a bee, they are sooo important to us, we can’t live without them! They need our protection.

Show what ‘not’ to do when you see a bee (screaming, jumping, waving arms in the air) and then practice being calm and cool, in preparation for when they next see a bee.

Modifications:

You don’t have to use apple blossoms as your example in this activity. You can use any culturally-appropriate flowering tree, plant or bush that depends on pollination in order to produce fruit.
Pollination Party:

Sample Dialogue: “Who here can show me what a bee looks like? Show me your very best bee impressions! Get your wings flapping, your bodies buzzzzzzzing, maybe some antennae on the top of your head!”

Ask the students:

- “Show me your bee… legs!” (too easy!)
- “Point to your bee... eyes!” (simple!)
- “Show me your bee... mandible!” (Wait, what? A bee mandible?)
- “Maybe that one was too hard, how about we try your bee... proboscis!” (ha ha ha!)

“Those are funny words! Let’s learn about all of these different bee parts!”

Show the bee anatomy picture

You can either ask for two volunteers at a time to come up to the front to talk about each bee part separately, or keep the same 1-2 volunteers up the front the whole time and dress them from head-to-toe as bees.

Starting with the antennae, ask students whether they know what it is, if not introduce the body part, have the students wear the part and ask questions about what students think it might be used for before explaining what it does.

Work your way through the entire bee body, using the table on the next page to guide you.

A Lifetime’s Work:

An average worker bee makes only 1/12 of a teaspoon of honey in it’s lifetime.

That’s one precious resource!

To make 1 pound of honey, 2 million flowers must be visited.
## Bee Dress-Up: Body Parts (15mins)

<table>
<thead>
<tr>
<th>Bee Part</th>
<th>Description</th>
<th>Costume Piece Suggestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antennae</td>
<td>These help the bees to smell and touch</td>
<td>Head band with pipe cleaners sticking up</td>
</tr>
<tr>
<td>Fuzzy Hair</td>
<td>This hair acts like a magnet for pollen. <em>Kind of like when you stick a magnet to the fridge.</em></td>
<td>Lint brushes or a strip of fuzzy fabric (e.g. soft velcro)</td>
</tr>
<tr>
<td>Eyes</td>
<td>Bees cannot see all the same colours we see - for example, they can’t see red. But, they can see other colours we can’t see!</td>
<td>Oversized glasses</td>
</tr>
<tr>
<td>Legs</td>
<td>Bees have 6 legs</td>
<td>Black nylons stuffed with newspaper</td>
</tr>
<tr>
<td>Pollen Baskets</td>
<td>Located on the back leg, to hold the pollen in place as they fly around</td>
<td>Small baskets</td>
</tr>
<tr>
<td>Pollen Press</td>
<td>The hind legs press the pollen they've collected into pellets (hard balls)</td>
<td>Yellow dish sponges (you could cut into circles)</td>
</tr>
<tr>
<td>Stinger</td>
<td>Only on the female “worker” bees. Stingers are used to protect themselves and are like tiny needles that fill with venom/poison. Once the bee uses it's stinger, it will die… so it really doesn't want to use it!</td>
<td>Toilet roll cut length-ways and rolled and taped into a point. You can attach string to the cone to tie around students' waists</td>
</tr>
<tr>
<td>Mandibles</td>
<td>Next to the head and used for cutting, grasping, and releasing pollen, and also to protect themselves</td>
<td>Tongs</td>
</tr>
<tr>
<td>Proboscis</td>
<td>Long tongue used to bring liquid food to their mouth, including nectar, honey and water</td>
<td>Long tube (like the inner tube of wrapping paper) or pool noodle</td>
</tr>
<tr>
<td>Wings</td>
<td>Two sets used for flying</td>
<td>Toy wings, paper cut-outs or wire clothes hanger and nylons</td>
</tr>
</tbody>
</table>

### Additional Activity Idea:

Draw an anatomically correct bee up on the board. Write each vocabulary word (body part) on sticky notes or on paper with tape and as students learn them, ask them to come and stick them onto the proper place on the bee. This is also a good way to get more students involved in the activity.
Waggle Dance! (10mins)

Sample Dialogue: “There are lots of different ways we can communicate ideas, actions or feelings with each other - without using words.

For example, what do these different actions mean?

- Waving hand towards yourself = “Come here”
- Standing and tapping one food with hands on your hips = “I’m waiting…” or “You’re late”
- Wagging pointer finger from side to side = “No, no, no” or “Don’t do that”

Now, what about these feelings?

- Mouth wide open, eyes wide and hands on both cheeks = “Surprised”
- Mouth in a frown, eyes closed and two fists over each eye = “Sad”
- Big smile and hands in a clapping motion = “Excited”

Waggle dances are how bees communicate to one another. They use speed and angles to show where the nearest or best food source is (i.e. the best flowers!)

Lead a waggle dance in a figure 8 (Conga line-style) with the students.

Educator Notes: Waggle Dances Are Specific

“The longer the waggle dance, the farther the nectar source lies from the colony. Typically, dances last between 1 - 100 waggles, but with every 75 milliseconds it appears the bee is communicating that the nectar source lies an additional 330 feet away. The dancer even indicates the direction of the source from the angle she positions herself on the hive from the sun!”

(Text and Image From: www.beeinformed.org)

Musical Notes:

A simple keyword search on YouTube will bring up some super fun waggle dancing tunes. Really, anything will work, but you could try these ones:

- 🎵 Flight of the Bumblebee
- 🎵 Phineas and Ferb - Waggle Dance
- 🎵 Green Balloon Club - Waggle Dance Song
**Musical Flowers: (10mins)**

Play a round (or two or three) of musical chairs, using paper cut outs in the shape of apple blossoms instead of chairs! Buzzing bees can waggle their way around the outside of the blossom circle in time to the music, and when it stops – find a flower to land on, quick!

This game can be played in a cooperative way, having bees help others to find a flower when the music stops. Instead of having “winners and losers”, multiple bees can land on the one flower. This way, students can problem solve together as the game gets more difficult (i.e. less flowers are available to land on).

**Pass The Pollen: (10mins)**

In a circle, have students help each other get the “pollen” from one flower to another… Or, in other words, Pollinate! Have a pile of yellow sponges (pollen) on top of one flower cut out, and then another flower cut out at the end of the circle with none (so, the flowers are actually beside one another - you can leave a small gap).

This is team effort, where students are to carefully pass the pollen along - encouraging each other as they go. If a student drops the pollen, start at the beginning of the circle again. The game ends when all the pollen has been safely transported from one flower to the next. You could see if students are able to pick up the pace after a few rounds.

Sample Dialogue: “How can we help each other?” “How are we going to get all the pollen into the other flower without dropping them?”

*An adaptation idea would be to stop the music randomly (like “Pass-The-Parcel”). The student holding the pollen when the music stops lines up at the door for recess...etc.*

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**Educator Notes: The Stats on Bees**

- More than half (58%) of all wild Ontario honeybee colonies died this winter. Known threats include the parasitic varroa mite, malnutrition from habitat loss and pesticides.

- Pollinators including hummingbirds, flies, beetles and moths help in the production of nearly 75 percent of crops and an equal proportion of flowering plants.

- It’s not just fresh produce that will be affected without pollinators. Foods like chocolate, vanilla, coffee and almonds also wouldn’t be available without pollinators.

(Adapted from: www.beeinformed.org and www.xerces.org)
Pollen Pick-Up Relay Race: (15mins)

1. Using an open space, set up a relay course that has the pollen and baskets at one end, the students at the other and blossoms they must race around or touch in between.

2. Divide students into two teams, giving each team a pair of antennae. One at a time, students will put on the antennae and follow the bee path and race to collect the pollen at the end of the course.

3. When they get the pollen, they must put the pollen between their legs just like the bee does, and race back (or hop/wiggle/shuffle) to the group.

4. On return to the ‘hive’ (their team), students have to do a quick Waggle Dance (i.e. wiggling their butt) before handing over the antennae to the next player.

5. The next student puts the antennae on before taking their turn.

If there is time after the first run, ask students what they might do differently (hold the pollen a different way, skip instead of run) and have a second race.

You can also introduce different “obstacles” to make their journey all the more difficult. For example, the bees get disorientated due to increased:

- Air pollution
- Destruction of habitat
- Pesticide usage in the garden

Let these modifications lead into your discussion about the decline in bee colonies and the importance of their protection.

Relay Modification Ideas:

- Bees v.s. Butterflies! Wasps v.s. Birds! (you get the idea)
- Try the cooperative approach and have one big team instead of two. Students can problem solve together to get the fastest time possible. Time keeper needed!
Honey Tasting

Set up three mystery taste testing stations:

- A local, raw, unpasteurized honey (from Ontario or the province where you live)
- Commercial honey (blended, pasteurized honey, usually from Canada/Australia/Argentina)
- Simple Syrup (from sugar cane)

Students are to become honey judges for this activity!

Ask students what they think makes good honey. Brainstorm ways they can judge the honey and guide them towards ideas like the following:

- Colour
- Sweetness
- Stickiness
- Origin (where it was collected from)
- Texture
- Appearance…

“We have 3 types of “honey”, how will we know which one the class likes the best?” Get ideas on how to record the information. Guide students to the Tasting Graph idea. “How should we organize our graph? How will we collect our data?”

If appropriate for your group, write your chosen criteria on the tasting graph included (around the petals). You could also design your own graph.

You’ll need three identical tasting graphs (with the same criteria) for each of the three tasting stations.

1. Have students compare the different “honeys” by tasting each on a clean spoon or popsicle stick.
2. They can have their say by placing a sticker or “X” on the graph, 1 being the least and 5 being the most (e.g. 1 would be not sweet at all, 5 would be very, very sweet).
3. Talk about where each of the products has come from, and which require bees to produce them.
4. Reflect: “Did our graph help us find out which “honey” the class liked better? If not, what do we need to do differently?” Re-organize information as needed.
5. You can also graph class averages on the board and show the different shapes between the three different kinds of “honey”.

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Conclusion & Consolidation Ideas:

What would our environment be like without bees? Although bees are so important, we have a problem: The number of bee colonies (families) are getting smaller and smaller. Guide students back to the previous list of what bees do and why they are important.

Fill in the Bee Worksheet. Have each student draw or write down three reasons why they think bees are important. Students can use the worksheet to create a colourful display about bees. This is a quick assessment for the teacher and makes for a wonderful pollination display in the classroom.

Sort the Apple Chronology Cards into the correct order. The blossom won’t become an apple until it’s been visited by a pollinator! Where does the cycle “begin” and “end”?

What can we do to help bees? As a group, brainstorm and make a list of the ways in which we could help protect bees and other pollinators. Examples could include: plant flowers, grasses or shrubs in a pollinator garden. Project them with you see them. Spread the word.

The Take Home Messages:

Our bees and pollinators are precious!

We need to protect pollinators by looking after their habitat, the environment and being calm and staying away when we see them. They’re busy doing very important work!

Bees work extremely hard to make honey - so enjoy it and don’t waste it!
Follow On Activities, Suggested Workshops and Additional Resources:

Learning for a Sustainable Future:
LSF is transforming Canada’s education system through innovative programs that empower youth and educators to create more sustainable communities.
More here: http://www.lsf-lst.ca

Environmental Action as a Class: Follow up on some of the ideas your group brainstormed as ways to protect our pollinators. Might be time for a small pollinator garden at your school!

Seeds of Diversity: Pollination for Students and Teachers
“Imagine you wake up one day and you go into the kitchen for breakfast before going to school. Your mum looks at you and says that there is no blueberry, raspberry, or strawberry jam for you to put on your toast! She also says that you can’t have your favourite peanut butter and honey sandwich for lunch because there is no more honey!”… Learn more and find loads of pollination-related resources for teachers here: www.seeds.ca/pollination


With funding support from:
# Ontario Curriculum Connections:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Subject Area</th>
<th>Connections</th>
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<tbody>
<tr>
<td>JK/SK</td>
<td>4 Frames</td>
<td>Belonging and Contributing, Demonstrating Literacy and Mathematical Behaviours, Problem Solving and Innovating</td>
</tr>
<tr>
<td></td>
<td>Specific Expectations</td>
<td>#4- demonstrate an ability to use problem-solving skills in a variety of contexts, including social contexts. (Belonging and Contributing, Demonstrating Literacy and Mathematical Behaviours, Self-regulation and Well being, Problem Solving and Innovating).</td>
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<td>#14- demonstrate an awareness of the natural and built environment through hands-on investigations, observations, questions, and representations of their findings. Demonstrating Literacy and Mathematical Behaviours, Problem Solving and Innovating)</td>
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<td>#29 - demonstrate an understanding of the natural world and the need to care for and respect the environment (Belonging and Contributing)</td>
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<tr>
<td>Gr 1</td>
<td>Science and Technology</td>
<td>Assess the role of humans in maintaining a healthy environment.</td>
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<tr>
<td></td>
<td></td>
<td>1.1 identify personal action that they themselves can take to help maintain a healthy environment for living things, including humans (e.g., walk to school instead of being driven in the car; be careful what they put down the drain at home)</td>
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<td></td>
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<td>1.2 describe changes or problems that could result from the loss of some kinds of living things that are part of everyday life (e.g., if we lost all the cows, all the insects, all the bats, all the trees, all the grasses), taking different points of view into consideration (e.g., the point of view of farmers, children, parents)</td>
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<tr>
<td>Gr 2</td>
<td>Science and Technology</td>
<td>Understanding Life Systems: Assess ways in which animals have an impact on society and the environment, and ways in which humans have an impact on animals and the places where they live;</td>
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<td></td>
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<td>1.1 identify positive and negative impacts that animals have on humans (society) and the environment, form an opinion about one of them, and suggest ways in which the impact can be minimized or enhanced</td>
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<td></td>
<td></td>
<td>1.2 identify positive and negative impacts that different kinds of human activity have on animals and where they live (e.g., actions of animal lovers and groups that protect animals and their rights, the home owner who wants a nice lawn, people who visit zoos and wildlife parks, pet owners), form an opinion about one of them, and suggest ways in which the impact can be minimized or enhanced</td>
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<td>Demonstrate an understanding that animals grow and change and have distinct characteristics</td>
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<td>3.3 Identify ways in which animals are helpful to, and ways in which they meet the needs of, living things, including humans, to explain why humans should protect animals and the places where they live</td>
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<td></td>
<td>Math</td>
<td>• gather data to answer a question, using a simple survey with a limited number of responses;</td>
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<td>• collect and organize primary data (e.g., data collected by the class) that is categorical or discrete (i.e., that can be counted, such as the number of students absent), and display the data using one-to-one correspondence in concrete graphs, pictographs, line plots, simple bar graphs, and other graphic organizers (e.g., tally charts, diagrams), with appropriate titles and labels and with labels ordered appropriately along horizontal axes, as needed</td>
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<td>• demonstrate an understanding of data displayed in a graph (e.g., by telling a story, by drawing a picture), by comparing different parts of the data and by making statements about the data as a whole</td>
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</tbody>
</table>