



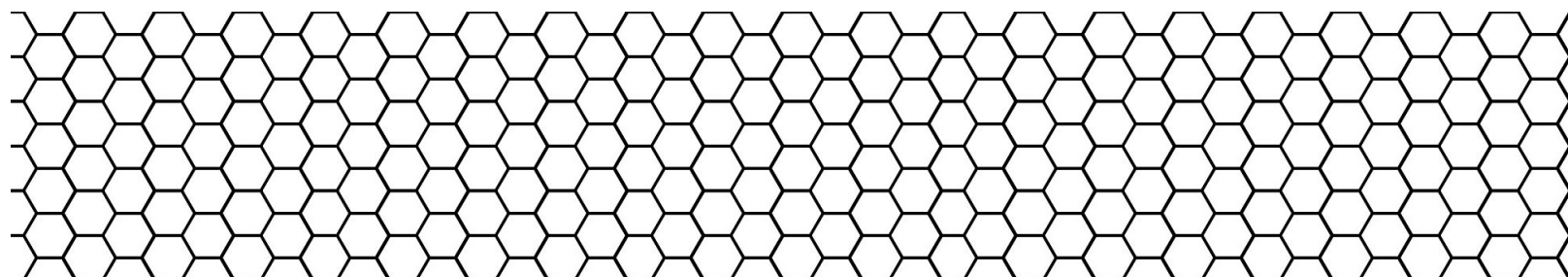
Educator's Guide

The Wisconsin Farm Bureau Foundation and Ag in the Classroom Program presents a companion lesson and activity booklet for the 2015 Book of the Year. Order forms can be found at wisagclassroom.org.

**Wisconsin Ag in the Classroom
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Standards Alignment

Activity	Common Core Standards	Next Generation Science Standards	Agriculture, Food and Natural Resource Standards
It's All About the Bees	RI.4.2 RI.4.7 RI.5.3 W.5.2b	4.LS1.1 5.PS1.3	AFNR.NR1.b.3.e
Get the Buzz on Beekeeping	RI.4.1 RI.4.3 RI.4.7 RI.5.1	4.LS1.2 5.LS1.C	AFNR.ABS2.d.1.e AFNR.ABS6.d.1.e
Oh, Honey, Honey	RI.4.1 RI.4.5 RI.4.7 RI.5.3 RI.5.5 W.4.2b W.5.9a	4.LS1.2 5.LS2.A	AFNR.ABS6.a.2.e AFNR.AS4.a.1.e
Pollen Here, Pollen There	RI.4.3 RI.4.7 W.5.2c	4.LS1.A 4.LS1.D 5.LS2.A	AFNR.BT2.f.1.e AFNR.PS2.a.1.e AFNR.PS3.e.2.e



About *The Beeman*

***The Beeman* by Laurie Krebs introduces students to honeybees and pollinators. This educator's guide provides background information and instructional lessons to teacher students about bees.**



Bee Vocabulary

Antennae: the moveable, sensitive feelers on an insect's head which detect odor and movement.

Bee Dances: a way honeybees communicate to find nectar sources.

Drone bee: a bee who mates with the queen so she can lay eggs

Hive: where bees live and keep their honey

Honey: a golden-colored sweet food produced by honeybees from nectar

Honeycomb Cells: the six-sided cells where bees store their honey in the hive

Legs: a honeybee has three pairs of segmented legs used not only for walking but also to dust off antennae, brush pollen out of the thousands of branched hairs that cover the body, and to store pollen.

Nectar: the sweet liquid that the worker bees collect from flowers and the basis for honey.

Pollen: the fine, powder-like material produced by flowering plants.

Pollen Basket: an area on the hind legs of honeybees used to transport pollen.

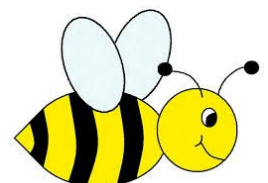
Pollination: process by which pollen is transferred from the anther (male part) to the stigma (female part) of the plant, thereby enabling fertilization and reproduction.

Queen bee: the one bee who lays eggs for the colony.

Worker bee: the bee who is responsible for leaving the hive to find the nectar, that is brought back to the hive to be made into honey.

DID YOU KNOW?

In 1977, the third grade class of Holy Family School in Marinette was studying the legislative process, hands-on. With encouragement from the Wisconsin Honey Producers Association, they asked the Legislature to select the honey bee as the state insect. The news got the school community abuzz. Attempts to get other elementary school students to help choose a state bug by popular ballot failed. The monarch butterfly, dragonfly, ladybug and mosquito were contenders for the title, but the honey bee won out.



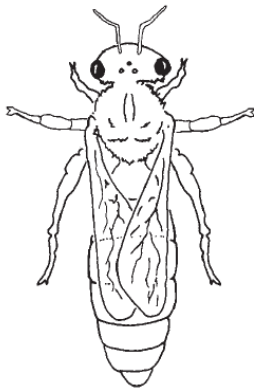
Name: _____

It's All About the Bees

Directions: Complete the chart below identifying the characteristics of each type of bee. Put a (+) in the box if the characteristic fits that type of bee and a (-) in the box if the characteristic does not.

	male bee	female bee	creates wax	grooms queen	protects the hive	lives inside the hive	gather nectar, pollen or water	lays eggs
Drone Bee								
Queen Bee								
Worker Bee								

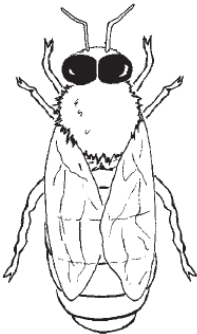
Queen



Worker



Drone

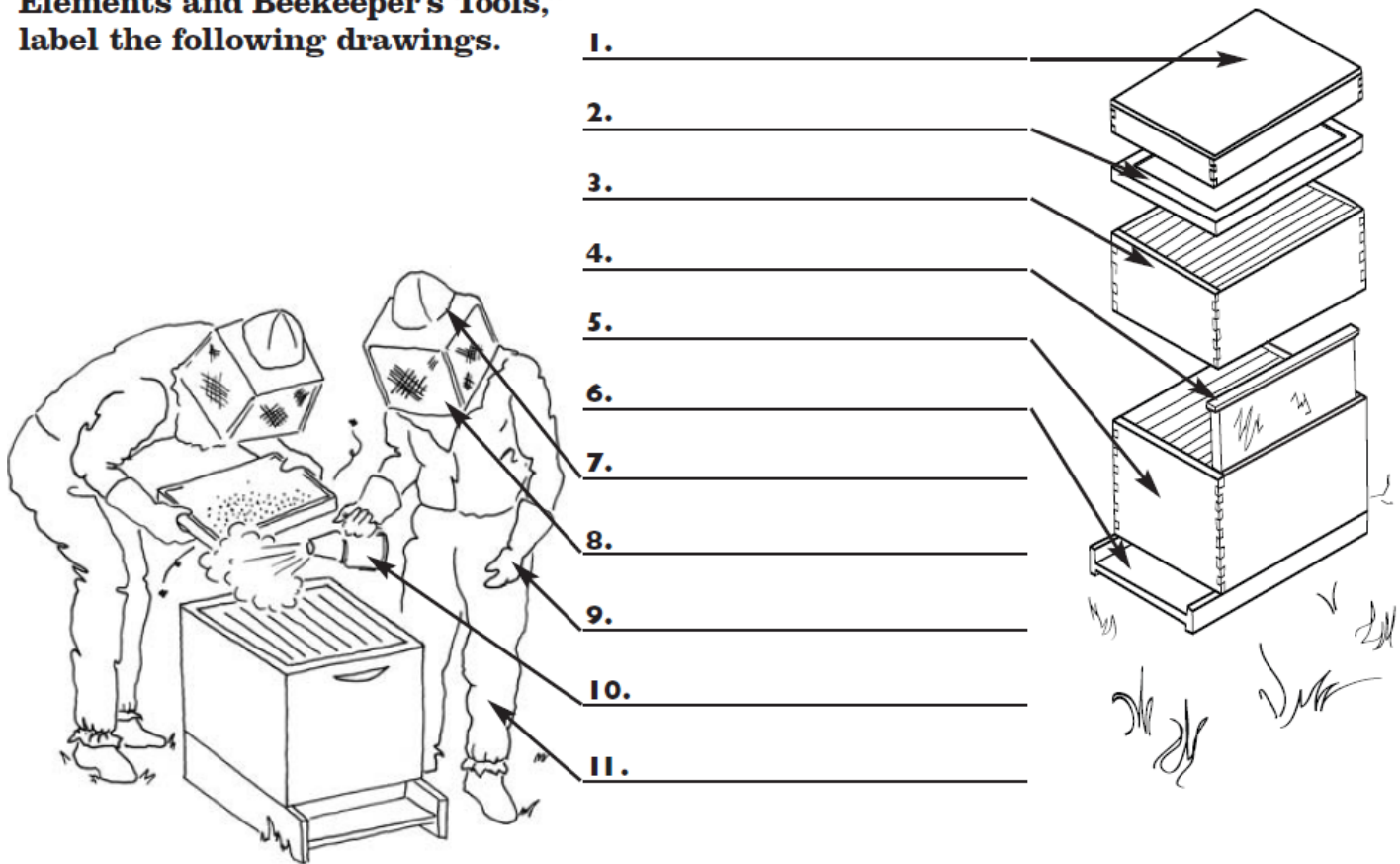


Looking at the bees' bodies up above, identify the similarities. Identify the differences.

Get the Buzz on Beekeeping

Modern beekeeping hives consist of wooden box-like sections stacked on top of each other. Each box holds 8-10 wooden frames, and each frame contains a thin sheet of wax foundation. The bees build their combs on these foundations. Honey is stored in the combs in the upper parts of the hive. When the bees have filled the combs in this upper section with honey and covered them with wax caps, the beekeeper takes them away to extract the honey and sell the wax for many products.

Using the “Glossary of Hive Elements and Beekeeper’s Tools,” label the following drawings.



Glossary of Hive Elements and Beekeeper's Tools

Bottom board—wooden stand on which the hive rests; is usually set on blocks or bricks to keep it off the ground.

Coveralls—light colored suit with elastic at the ankles and wrists.

Frame—a wood and/or plastic rectangle used to hold beeswax comb.

Gloves—protect hands from stings.

Helmet—used to drape the veil and to protect the head.

Hive body or brood chamber—a large wooden box found just above the bottom board.

Honey super—frames of comb in which bees store surplus honey that is then harvested.

Inner cover—may be used to prevent bees from attaching comb to outer cover and provides insulating air space.

Outer cover—provides weather protection.

Smoker—a tool used to calm the bees; the smoke masks the bees' alarm pheromone and when bees smell smoke, they gorge themselves on honey and are less likely to sting. Pine, straw, grass and burlap make good smoker fuel.

Veil—a fine fabric or screen worn to protect the face and neck.

Oh, Honey, Honey

Objective: Students will learn that the source of nectar influences the color and flavor of honey.

Preparation: Speak with local beekeepers, honey distributors or the National Honey Board for information about honey in your area. Gather materials. Prepare student samples: spoon small amounts of each kind of honey onto waxed paper. Prepare small glasses of water for rinsing between tastings.

Materials: Information from local beekeepers or the National Honey Board about honey sources in your state, different kinds of liquid honey (at least three), waxed paper and small glasses of water.

Discussion: The color and flavor of honeys differ depending of the nectar source visited by the honey bees. There are more than 300 unique types of honey available in the United States. Honey is produced in every state, but depending on the floral source location, certain types of honey are only produced in a few regions. Ask students if they know what type(s) of honey might be produced in your state. See if they are familiar with regional crops in your area and whether or not those crops are pollinated primarily by honey bees. Share the following information about some common honeys and their floral sources.

ALFALFA—Alfalfa honey, produced extensively throughout the United States, is light colored and pleasingly mild in flavor and aroma.

BASSWOOD—Basswood honey is often characterized by its distinctive “biting” flavor. Basswood honey is generally light colored and strong in flavor.

BUCKWHEAT—Buckwheat honey is dark and full-bodied.

CLOVER—Clover honey has a pleasing, mild taste. Depending on the location and type of clover, clover honey varies in color from almost clear to light amber to amber.

ORANGE BLOSSOM—Orange blossom honey, often a combination of citrus sources, is usually light in color and mild in flavor with a fresh scent and light taste reminiscent of the blossom.

TUPELO—Tupelo honey is a honey produced in northwest Florida. It is heavy bodied and is usually light golden amber with a greenish cast and has a mild taste.

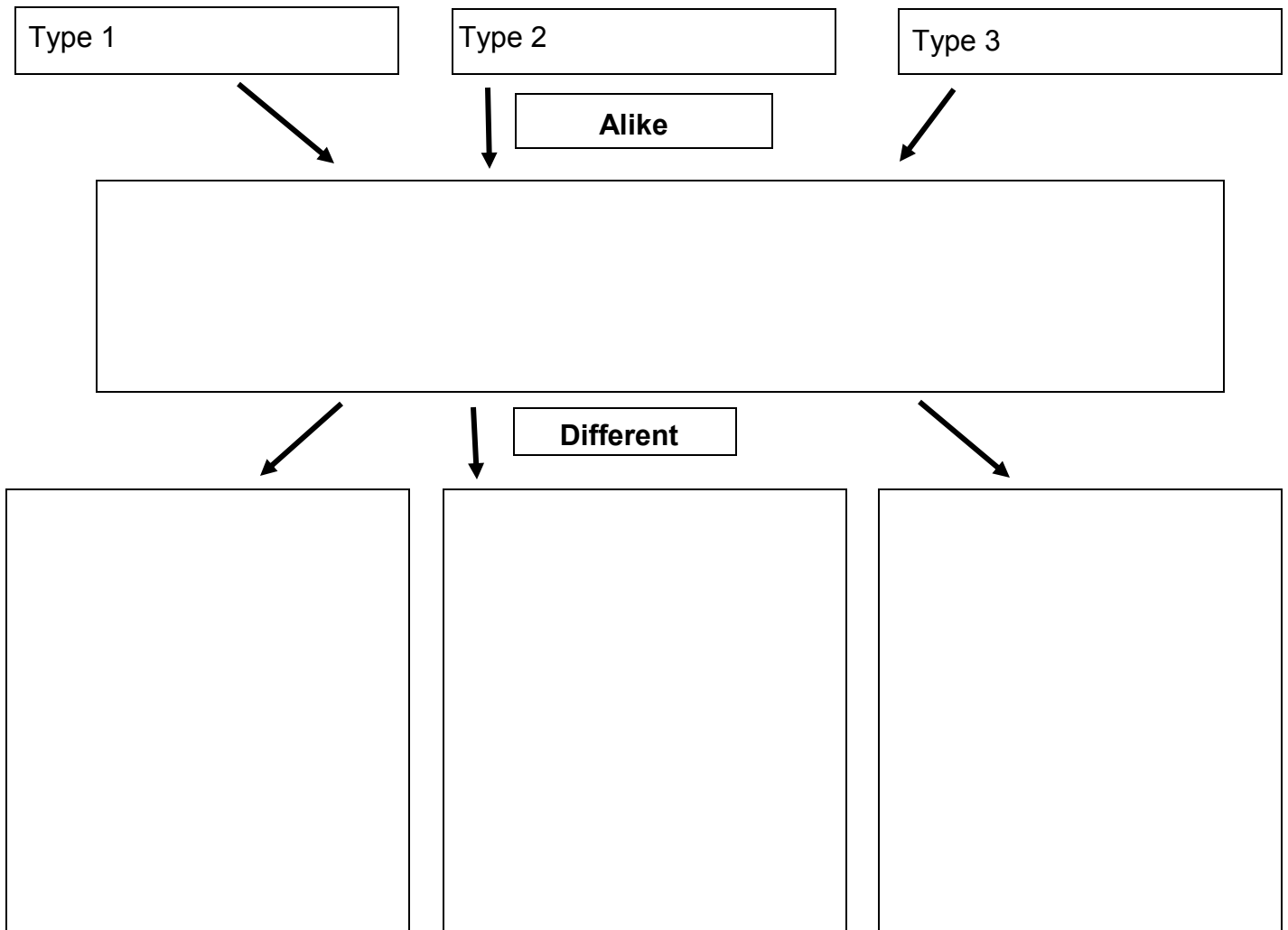
WILDFLOWER—Wildflower honey is often used to describe honey from miscellaneous and undefined flower sources.

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Oh, Honey, Honey (cont.)

Procedure:

1. Have students research local honeys.
2. Distribute honey samples to students.
3. Have students examine the samples for color and fragrance differences. Ask if they can determine the nectar source simply by look and smell. (see compare/contrast chart below)
4. Have students taste each sample. Can they determine the nectar source from the honey's flavor? Ask students if they can make a correlation between color and taste. As a general rule, light-colored honey is milder in taste and dark-colored honey is stronger.



Looking for more information about honey? Check out these sites!

Wisconsin Honey Producers

www.wihoney.org

American Honey Producers

www.ahpanet.com

National Honey Board

www.honey.com





Pollen Here, Pollen There...



Supplies:

- Brown paper bag with flower glued or taped to the front
- Cheetos

Directions:

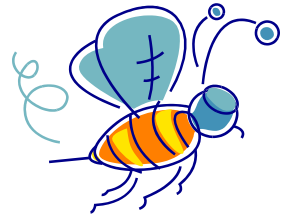
1. Each student should be given a brown paper bag with a flower on it and Cheetos inside.
2. Students will go around and take one Cheeto out of each classmate's bag and eat the Cheeto. Students **WILL NOT** be allowed to wipe or lick their fingers until the activity is done.
3. As students move from bag to bag, they will be collecting "pollen" from each "flower."
4. Once students have eaten out of everyone's bag, they will go find a bag and wipe their fingers all over the flower.
5. Complete the worksheet describing the pollination process.

Through this lesson, students learn the pollination process. Bees move from flower to flower collecting more pollen as they move along. They then spread it to other areas to grow those plants.

For additional resources, activities, videos and ideas related to pollination, visit the Wisconsin Ag in the Classroom Pinterest page at www.pinterest.com/wiagclassroom



Pollen Here, Pollen There...



Draw a picture...

Write a sentence...

My bag of Cheetos represents...



My hand represents...



When I touched a flower...



THE FOOD WE EAT NEEDS POLLINATORS

ALL THE FOODS LISTED BELOW DEPEND ON BEE POLLINATORS. ARE THESE FOODS PART OF YOUR FAVORITE MEAL OR SNACK? THINK BACK ON WHAT YOU ATE FOR BREAKFAST, LUNCH OR DINNER TODAY. COULD YOU HAVE EATEN ALL OF THOSE FOODS IF BEES WERE NO LONGER AROUND TO POLLINATE OUR CROPS?

FRUIT CROPS:

- * APPLE
- * APRICOT
- * AVOCADO
- * BERRIES (BLACKBERRY, BLUEBERRY, CRANBERRY, RASPBERRY, STRAWBERRY)
- * CHERRY
- * CITRUS
- * KIWI
- * MELONS (WATERMELON, CANTALOUPE)
- * PEACH
- * PEARS
- * PLUM

VEGETABLE CROPS:

- * ASPARAGUS
- * PUMPKIN
- * BROCCOLI
- * RADISH
- * BRUSSEL SPROUTS
- * GARLIC
- * CABBAGE
- * KALE
- * CARROTS
- * KOHLRABI
- * SQUASH
- * CAULIFLOWER
- * CELERY
- * ONION
- * PEPPER
- * LIMA BEANS
- * CUCUMBER

NUT CROPS:

- * ALMOND
- * CASHEW
- * MACADAMIA

OILSEED CROPS

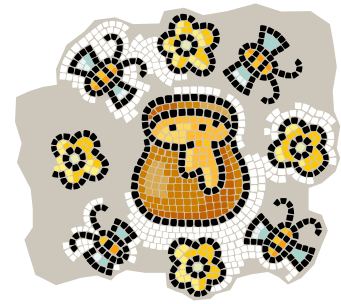
- * COTTON
- * SOYBEANS
- * SUNFLOWER

CAN YOU THINK OF ANY OTHER FOODS YOU EAT THAT WOULD REQUIRE POLLINATION BY BEES?

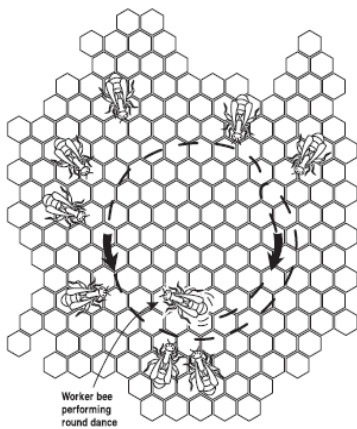


Honey Bee Dance

Honey bees communicate with each other by dancing. After a honey bee has found food she tells the other bees when she returns to the hive. The bee will dance on the honeycomb, while the other bees feel the dancing bee and learn where the food is. By smelling the dancing bee and getting a taste of her load of nectar, the other bees can tell what type of flower she has visited. Different dances are used when the food is close to or far away from the hive. Bees have receptors on their feelers and legs which they use to feel the dance.



There are several bee dances, but the most common are the round dance and the waggle dance.

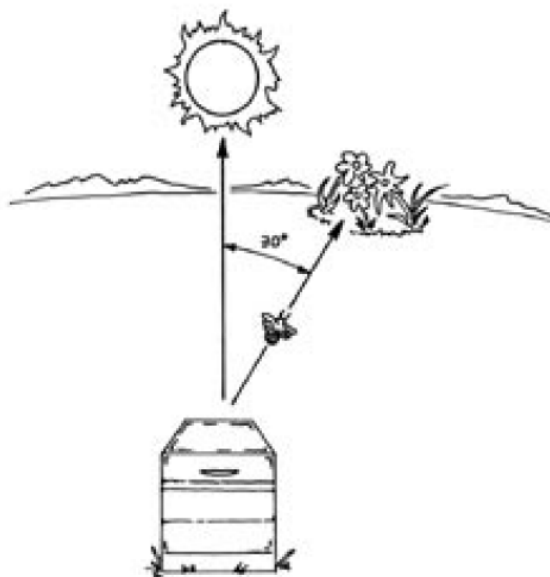
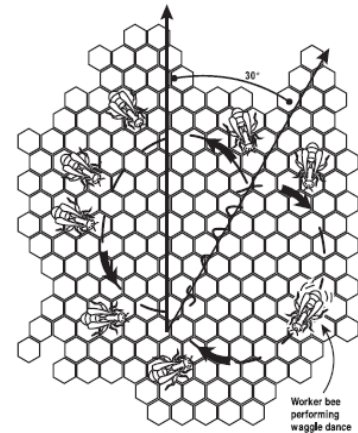


Round Dance

When food is close to the hive (less than 100 yards), a worker bee performs the round dance. She goes round and round, first one way and then the other. The round dance does not show the exact location of the flowers so fellow worker bees must fly out in many directions looking for them.

Waggle Dance

If the flowers are more than 100 yards away from the hive, the returning bee performs the waggle dance. The bee dances a half circle in one direction, turns, and runs straight while wagging her abdomen. Then she dances a half circle in the other direction. These two half circles form a figure eight.



If the food is in the same direction as the sun, the central run of the dance is straight up the comb. If the food is to the left or right of the sun, the bee alters the direction of the dance by the correct amount to the left or right of the upright line.

The distance between the hive and the food is communicated by the speed of the dance and the buzzing sound made by the dancing bee. The faster the worker dances, the closer the food. The waggle dance shows both location and distance of the flowers, so the bees know where to fly.

Additional Resources

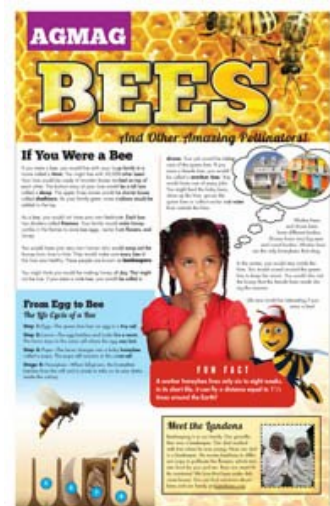
Books About Bees:

- Cole, Joanna; "The Magic Schoolbus Inside a Beehive"
- Gibbons, Gail; "The Honey Makers"
- Heinrichs, Ann; "Bees"
- High, Linda Oatman; "Beekeepers"
- Kalman, Bobbie; "Hooray for Bee Keeping"
- Polacco, Patricia; "The Bee Tree"
- Sexton, Colleen; "The Life Cycle of a Bee"
- Slade, Suzanne; "What if There Were No Bees?"



Bee Ag Mag:

The *Bee Ag Mag* is a great way to incorporate agriculture into a science or literature classroom. This 100% standards aligned nonfiction text covers topics such as: How is honey made? Who is a beekeeper? How do farmers use bees? What is the life cycle of a bee and more! It is also available in Spanish! This publication comes in a pack of thirty and is available from wisagclassroom.org.



Websites:

National Honey Board - www.nhb.org

Wisconsin Honey Producers Association - www.wihoney.org

Scholastic – Get the Buzz on Honey Bees - www.scholastic.com/browse/unitplan.jsp?id=283

Florida Ag in the Classroom – What’s the Buzz on Bees? – www.faitc.org/whats-the-buzz-on-bees/

Farm Bureau’s Ag in the Classroom program provides teachers and students K-12 with an understanding of how their food is produced. The program seeks to work within existing curricula to provide basic information on our nation’s largest industry: Agriculture. Wisconsin’s Ag in the Classroom program is carried out by a network of local educators, volunteers and representatives from agricultural organizations and businesses. The goal of the program is to help students gain a greater awareness of the role of agriculture in the economy and society, so that they may become citizens who support wise agricultural policies.

