

Why Do Apples Need Bees?

TIME ESTIMATE: 15-30 minutes **SUGGESTED FOR:** Grades K-3

SUBJECTS: Science; 2-L S2-2. Students will practice sequencing and learn about fruit pollination.

MATERIALS: A copy of the pollinator cards for each student and scissors. For best results, print worksheets on cardstock or thick paper.

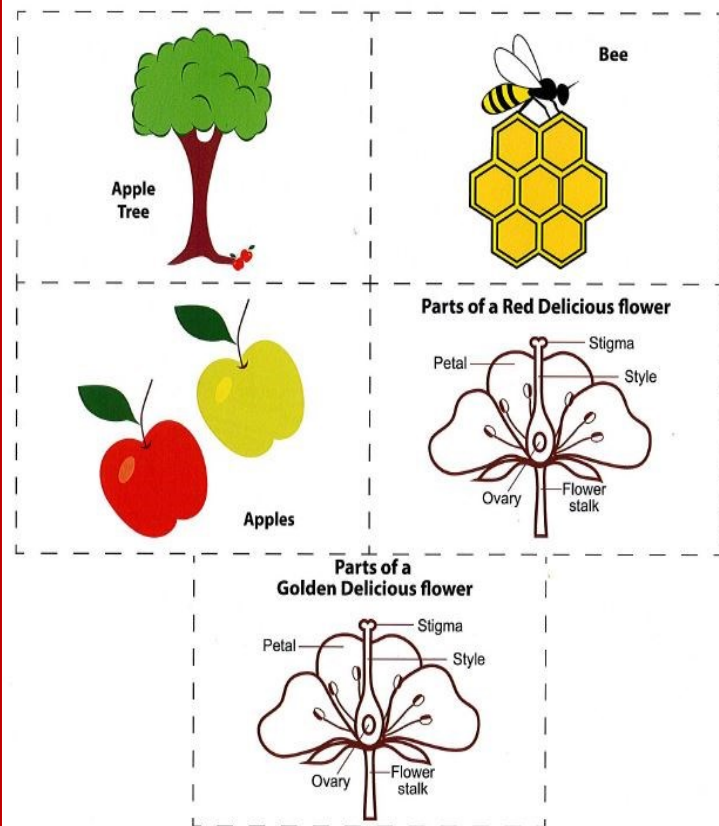
OUTLINE: First, review the pollination process

1. Pollination is vital for fruit production.
2. Many apple varieties require cross pollination, or pollen from different kinds of apple trees.
3. Bees and other insects carry pollen from flower to flower, thereby ensuring fruit production.
4. Pollen from the stamen on one bloom is transformed to the pistil on another tree bloom, thus forming the seed which will become a fruit.
5. Apples are grown in orchards because of the need for cross pollination. Bees (pollinators) carry the pollen to different varieties of apple trees.
6. Orchards also help ensure that apples are ready and available for harvesting at different times.

After reviewing, make a set of the game cards for each student. The cards can be used for sequencing or to play matching/concentration. Older students may play a game where they have to get one of each card for the sequence.

The cards include: Honey bee • Parts of a Red Delicious Flower • Parts of a Golden Delicious Flower • Apple Tree • Apples

Pollination Cards



Courtesy of The American Farm Bureau Foundation for Agriculture Educator's Guide for "The Apple Orchard Riddle" (www.agfoundation.org)

Apple Chain

SUGGESTED FOR: Grades K-3

OBJECTIVE: Use this activity to learn more about the life cycle of an apple.

MATERIALS: 2 red paper plates per student (or plain white plates to be colored)
 • crayons • glue • yarn • stapler • tape • hole punch • Construction paper (yellow, pink, brown and green)



(apple chain templates can be found at <http://www.agintheclassroom.org/TeacherResources/InterestApproaches/Apple%20Chain.pdf>)

DIRECTIONS:

1. Cut out each item from construction paper: seed, tree blossom, bee and little green apple. Punch a hole on the top and bottom of the items you made with construction paper. The brown seed only gets one hole punch.
2. Glue two red paper plates together around 2/3 of the edge. Leave the other 1/3 open. Allow time for it to dry. Can also skip glue by stapling plates together depending on age of student.
3. Tape or staple a piece of yarn to the inside of the paper plates and extend the yarn out of the opening.
4. Add a stem and leaf to the red paper plates to make them look like an apple.
5. Tie the little green apple to the yarn coming out of the apple. Tie the bee to the little green apple, Tie the bee to the tree. Tie the tree to the seed. These should all form a chain.
6. Tuck the green apple, bee, blossom, tree and seed into the apple. Starting with the seed, slowly pull shapes out of the apple and tell the story of how apples grow.

Courtesy of Illinois Agriculture in the Classroom



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www.agclassroomn.org/nh email: nhaitc@nhfarmbureau.org
 295 Sheep Davis Road Concord, NH 03301 ph: (603) 224-1934



Spring Agricultural Literacy Program 2016 Educator Resource Guide

Dear Friends and Educators,

The mission of New Hampshire Agriculture in the Classroom is to help students increase their understanding and appreciation of the role that agriculture plays in their daily lives. We are actively doing this through classroom programs, teacher workshops, school-to-farm field trips and more.

Each year we offer an Annual Literacy Program where we select an agriculturally accurate book, then send volunteers into schools throughout the state to read the book and to share related information with the students. Following the presentation, the book is donated to the school for continued enjoyment and learning. We also provide lesson materials to help supplement the school visit. Teachers are encouraged to utilize these resources to round out the lessons with activities based in science, language arts, social studies, etc. These, plus additional information pages, worksheets and activities are also available on our website, www.agclassroom.org/nh. Upon completion of the program, we ask that both teachers and volunteers complete a brief survey to evaluate our effectiveness. A hard copy is enclosed or you may find it at <https://www.surveymonkey.com/r/WJM38RX>.

The book selected for this year's program is *How Do Apples Grow?* by Betsy Maestro. Students will discover if they have ever eaten a part of a flower and explore how an apple grows from bud to flower to fruit. This year, we are thrilled to have support from Brookdale Fruit Farm and Hubbard Farms. Please visit their websites for additional information about their work.

We hope that you find this material useful and that your students enjoy learning about apples. If you are interested in integrating other agricultural topics or programs into your curriculum, please don't hesitate to contact us at (603) 224-1934, email nhaitc@nhfarmbureau.org or visit our website at www.agclassroom.org/nh.

Sincerely,

Debbi Cox
 State Coordinator
 NH Agriculture in the Classroom



Comparing Apples and Earth

Explore how much of the Earth's surface is needed for growing food for a world of people. Consider that the United Nations predicts a population increase of 2.5 billion people worldwide between 2015 and 2050.

Materials (enough for each student if they are old enough to handle a knife)

- Apple (or a paper cutout of an apple)
- Knife
- Chopping board or plates
- Paper towels or wet wipes

Activity

1. Hold up an apple to the class and tell the students that it represents Earth.
2. Slice the apple into fourths. Set aside three of the fourths as they represent water on the Earth's surface.
3. Cut the remaining slice in half. Set aside one of the halves as uninhabited deserts, swamps & Arctic areas.
4. Divide the remaining piece into fourths. Set aside three of the pieces for land that is too rocky, wet, hot or poor for crop production.
5. The remaining piece is 1/32 of the original apple. Carefully peel this section. Hold up the peel and explain that it represents the thin layer of soil that is available for producing all of the world's food crops.
6. Be sure to follow-up with discussion questions such as how farmers are stewards of the land and progressive agricultural techniques that will help provide more food.



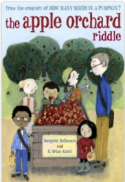
Courtesy of California Agriculture in the Classroom

Popular Varieties of Apples Grown in New Hampshire

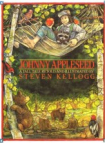
Cortland		Large, all-purpose apple, tart and tangy, good for baking, cross between Ben Davis and McIntosh
Empire		Sweet, firm, doesn't bruise easily, good to eat and cook with, cross between McIntosh and Red Delicious
Fuji		Sweet, medium to large size apple, good to eat fresh and dried, keeps well, cross between Red Delicious and Ralls Janet
Gala		Crunchy and juicy, good for snacks, salads and baking, came from the Cox's Orange Pippin and Delicious
Honeycrisp		Really crunchy and juicy, good for eating fresh, stores well, came from the University of Minnesota breeding program
Jonagold		Crispy and juicy with a honey flavor, a cross between Golden Delicious and Jonathan
Macoun		A medium-sized apple considered by many people to be the tastiest apple, developed in New York
McIntosh		Juicy and tart, smells good, tasty to eat fresh, great for baking and making apple sauce, accounts for 2/3 of the 6 million bushel New England apple harvest
Mutsu		Sweet, great for desserts, salads and cider, came from Japan in 1962
Red Delicious		Sweet, crispy and juicy, a round apple, best eaten fresh

Supplemental Resources

“The Apple Orchard Riddle” by Margaret McNamara and G. Brian Karas Join Mr. Tiffin and his students as they explore an apple orchard while trying to solve a riddle. The book is available for loan from NHAITC.



“Johnny Appleseed” by Steven Kellogg Learn all about John Chapman, better known as Johnny Appleseed. The story of his life highlights the history of the apple. This book is available for loan from NHAITC.



My American Farm by the American Farm Bureau Foundation for Agriculture. Online games designed for educators, learners and their families with free downloadable resources and fun family activities to explore.

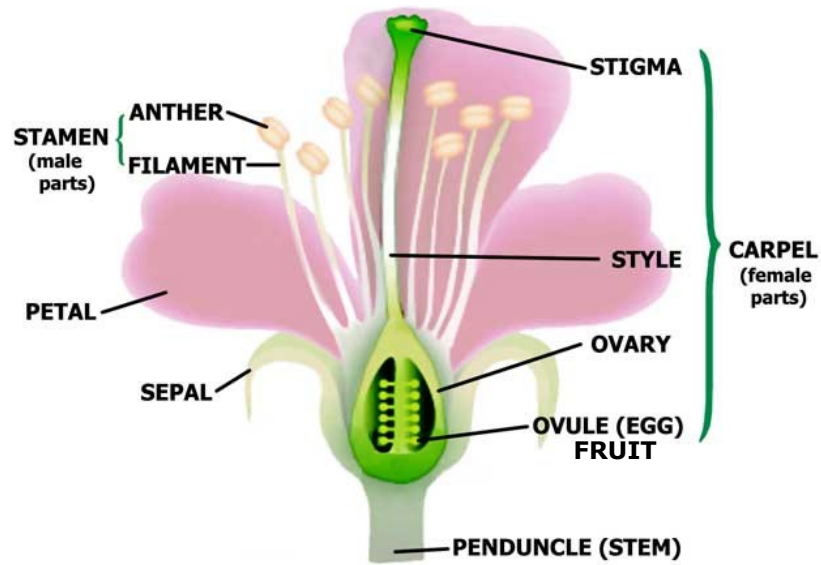
www.myamericanfarm.org



SMART Board lessons: http://www.agintheclassroom.org/TeacherResources/smart_lessons.shtml

VOCABULARY

Anther:	the part of the stamen that produces pollen
Blossom:	the flower of a fruit tree which will become the fruit
Calyx:	the stubby brown nub at the opposite end of the apple's stem which is the remaining part of the blossom
Cider:	the juice pressed from an apple
Filament:	stalk of the stamen
Fruit:	the edible part of a plant developed from a flower
Harvest:	picking the apples once they are ripe
Nectar:	the juice of a fruit that attracts the insects or birds that pollinate the flower
Orchard:	a group of fruit bearing trees
Ovary:	the rounded base of the pistil
Petal:	brightly colored parts of a flower
Pistil:	the female part of the flower made up of stigma, style and ovary
Pollination:	transfer of pollen by bees or other insects
Pulp:	the soft apple after being pressed
Stamen:	the male productive part of an anther and filament
Star:	made by the seeds in a crossways cut of an apple
Stem:	the stalk that supports a leaf, flower or fruit
Stigma:	the top of a flower's pistil
Style:	the part of the pistil that connects the stigma to the ovary



Courtesy of: <http://kidsgrowingstrong.org/Flowers>

YouTube Videos

How Does It Grow: Apples Apples may seem simple to grow, but this video may show you otherwise. <https://www.youtube.com/watch?v=UWLmEh1HIBw>

Pollination of apples in New England <https://youtu.be/Kr3S9cODwzU>

Making cider <https://youtu.be/eml2DYW1Q1l>

Grafting <https://youtu.be/vJzt7wKUj4>



NH Fruit Producers, Bill Lord

Apple Investigation

Students can hone their observation skills with an apple comparison. Older students can take one step further and learn about the presence of starch and the process of oxidation.

Materials: several apples of one variety at different levels of ripeness • apples of several other varieties • knife and cutting board • pastry brush • iodine • lemon juice

Part I: Have students compare the different varieties of apples. Label the apples (A, B, C, etc.) and have the students make observations about the color, texture, firmness, scent, taste and size of each sample. This may be easiest in a chart format. Discuss why some of these traits vary (variety, soil, climate, weather, etc.). Also, locate parts of the apple such as skin, pulp, stem, core and seeds.

Part II: Apples contain starch which naturally converts to sugar as the apple ripens. This process starts near the core of the apple and moves toward the skin. An apple is considered ripe when most of the starch has turned into sugar. Iodine will appear dark purple in the presence of starch. If you apply iodine to an apple that has ripened, it will not appear to be very purple as most of the starch is now sugar. However, an unripe apple will stain heavily purple, meaning there is more starch present.

1. Label the apples of the same variety.
2. Cut the apples in half (transversely) and separate the top half from the bottom half.
3. Observe all the apples halves while taking care to remember which halves go together.
4. Using the pastry brush, wipe iodine across the cut surface of the bottom half of each apple. Let the apples sit for 1-2 minutes.
5. The cut surface of the apples will begin to change color depending on the levels of starch. Make final observations and conclusions in an explanatory paragraph.

Option: Apple cells contain an enzyme (polyphenol oxidase or tyrosinase). When this enzyme comes in contact with oxygen, it turns plant phenolic compounds into brown pigments known as melanins. Parts of the apple turn brown when the fruit is cut or bruised which damages the cells allowing air to react with the enzyme and other chemicals. The action can be slowed by reducing the pH on the surface of the fruit (brush with lemon juice) or reduce the reaction rate by storing the fruit in the refrigerator. Try one or both of these and have students record their observations.

A portion adapted from Illinois Agriculture in the Classroom. Visit <http://bit.ly/101oEIU> for a copy of the observation sheet.

SAMPLE	APPLE #1	APPLE #2	APPLE #3
Color			
Size			
Shape (are they all the same)			
How it feels (hard, smooth, waxy)			
Texture of flesh (juicy, mealy)			
Taste (sweet, sour, tart, bland)			
Howed when eaten (juicy, dry, crumbly)			
Other			
Notes			
Observation			



Apples In New Hampshire

According to the USDA's 2012 Census of Agriculture, 205 New Hampshire farms had 1,537 acres planted in apples. Apples were harvested from 1,431 acres which were sold for a total value of \$7 million.

Online Lessons and Activities

(Visit our website or email us to access this page with clickable links)

Freshest Fruits: Students will learn about fruit and their nutritional value by completing an activity where they observe the size, shape, texture, and seeds of various fruits. http://www.agclassroom.org/teacher/matrix/lessonplan.cfm?lpid=322&search_term_lp=apples

Apples: A Class Act!: A teacher's guide of activities for children kindergarten through 3rd grade to learn about apples. <http://ncapples.com/DataImages/Directory/0000000135.pdf>

Apples: A Class Act!: Published by the U.S. Apple Association, this teacher's guide offers suggestions for activities for a series of lessons about apples (6 pages, Grades: 4-6) <http://ncapples.com/DataImages/Directory/0000000134.pdf>

Ageless Apples: Place apple slices into solutions with different levels of acidity to change the rate at which the apples turn brown. <file:///C:/Users/nhaitec/Downloads/Ageless%20Apples.pdf>

An Apple for the Teacher: Activities for Johnny Appleseed's Birthday: Make these apple activities part of your "core" curriculum. Includes science, nutrition, language arts, social studies and art. http://www.educationworld.com/a_lesson/lesson077.shtml

All About Apples: Third grade students will learn about the nutritional benefits of eating apples while practicing ELA skills. Projecteat.acoe.org/sites/default/files/harvests/lessonplans/All%20About%20Apples%20Third%20Grade.pdf