

Section 2: Project Record



Cloverbud Beekeeper



Name

Club

Cornell Cooperative Extension | **Dutchess County**

CCEDC is an employer and educator recognized for valuing AA/EEO, Protected Veterans, and Individuals with Disabilities and provides equal program and employment opportunities. The programs provided by this agency are partially funded by monies received from the County of Dutchess. Please contact the CCEDC office if you have any special needs.

Adapted from:



Introduction to Beekeeping

Beekeeping is rapidly growing in popularity as a hobby and a vocation (i.e., job or career). It is a fun way to spend your time and it is also a very beneficial (i.e., helpful or valuable) to **agriculture**. Bees produce products like **honey** and **beeswax**, and are responsible for pollinating up to 70% of our agricultural crops according to the United State Department of Agriculture (USDA). **Apiculture** is the human practice of actively managing honey bee **colonies** (known as **hives**). The art of beekeeping cannot be taught purely from a book. It has to be experienced.

Safety

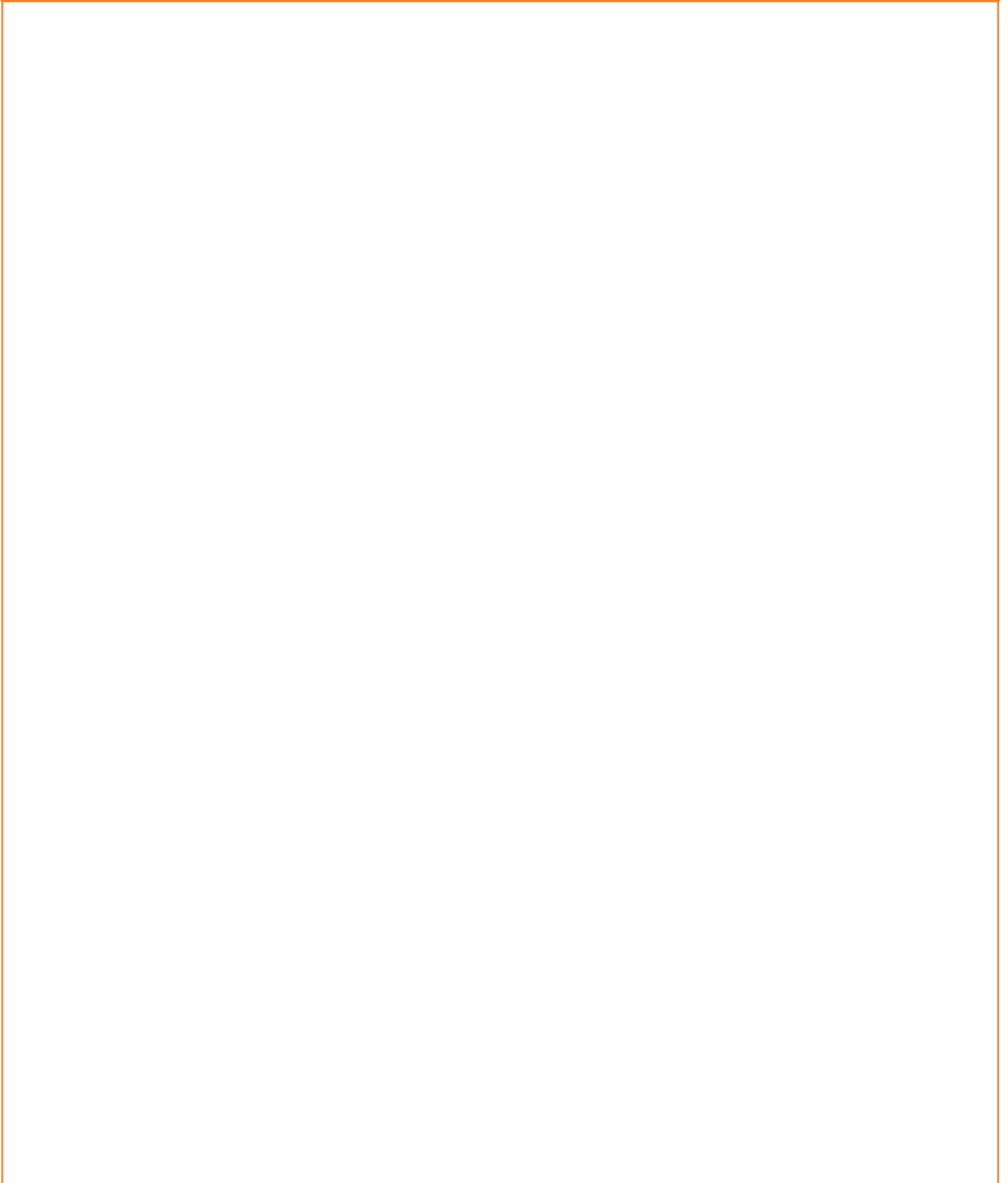
Protective gear is standard precaution against bee stings. Protective gear includes veils, gloves, close-toed shoes, and loose-fitting, long-sleeve and long-pant clothing. However, bee stings can and do occur when working with active colonies, even through protective gear. It is important to know whether or not you are allergic to bee stings and to be prepared for an emergency in any situation. Talk to your family doctor or pediatrician about your risk and options for epinephrine injections.

Bees are generally easy going, but certain actions of the beekeeper, weather conditions, or various other factors can affect the way a colony behaves. Even if bees are not aggressive, you can still get stung when you accidentally crush one. It's almost impossible not to when working with that large number of bees. Although it does not happen often, getting stung becomes a "when", not an "if", for many beekeepers.

Therefore, when a bee stings you, it is important to know what to do. Do not pull out the stinger with your fingers! Pinching the stinger with your fingers will cause more venom to be injected into the skin. Instead, use an object, such as fingernail, hive tool, or credit card, to scrape the stinger out of the skin. It will probably hurt for about 20 seconds and then the pain should subside. It is not uncommon for the site of the sting to be red or swollen for a day or two also. Signs of a severe allergic reaction are important to recognize! If you or someone with you gets stung and has the following symptoms, seek medical attention immediately: difficulty breathing or swallowing, swollen lips, face, or throat, nausea or vomiting, or dizziness or fainting.

NOTE: If you are allergic to bee stings and still want to participate in this project, work with your 4-H Project Leader to complete this record book without putting yourself in harm's way.

Picture of Safety! Draw a self-portrait or attach a photo of yourself demonstrating good protection from bee stings.



Goal Setting

For this project, you will manage one hive. Name at least two goals you would like to achieve by participating in this project, as well as an action you will take to achieve each goal. In addition, think of pitfalls (i.e., problems) or potential limitations that may prevent you from achieving your goals. **Use the table below to write your goals, actions, and pitfalls.**

	Goal	Action	Pitfall
Example	Learn to identify varroa mites in my hive	Study pictures, work with a knowledgeable beekeeper, and look for signs of mites in my hive	If I do not use a specific test for varroa mites, I may not be able to identify them on moving bees.
1			
2			
3			

Importance of Pollinators

Pollination is the movement of pollen (containing the plant's genetic material) from one flower to another. It is often accomplished by insects, but many plants are pollinated by other animals, such as birds and bats, or by the wind. Animals forage (i.e., feed off of in a traveling pattern) the **nectar** and **pollen** of flowering plants. As animals move from flower-to-flower and plant-to-plant, they transport the genetic material of plants with them, aiding in plant **reproduction**. If a plant is successfully fertilized with pollen, it can bear fruit and seeds.



Pollinators, the animals responsible for pollinating plants, are an integral (i.e., important or vital) part of agriculture. Honey bees are good pollinators because they spend a very high percentage of their lifetime foraging for nectar and pollen. Pollination events increase both the quality (i.e., shape, size, uniformity) and quantity (i.e., number) of fruits



and vegetables (Figure 1). Additionally, native plants benefit from pollination by receiving pollen from plants of the same species, which helps to maintain genetic diversity within a wild population. Honey bees have survived and even thrived for thousands of years as wild and cultivated (i.e., nurtured or managed) colonies. However, according to the USDA's National Agricultural Statistics Service (NASS), the number of honey-producing bee colonies has been decreasing in the U.S. for several decades. Colony Collapse Disorder (CCD), identified in 2006, has also been a cause of big concern, as well as the introduction of parasites and **pests** to honey bee colonies in the U.S. A first for bees of any kind, 7 species of native Hawaiian bees were added to the U.S. Endangered Species list in October 2016. In addition, the rusty patched bumble bee was added to the list in January 2017 (www.fws.gov). Therefore, it is more important than ever for **beekeepers** to be knowledgeable, responsible advocates (i.e., promoters or supporters) for pollinators and the environment.

Figure 1. A partially pollinated cucumber (left) compared to a completely pollinated cucumber (right). The seeds did not form and consequently the fruit did not grow throughout the poorly pollinated cucumber. *Image credit: Penn State Extension*

When we think of food and bees, honey is usually the first thing we think about. However, the most important role of bees is the pollination they provide for agricultural crops! Crops that benefit from bee pollination are most of our fruits, vegetables, nuts, some raw fibers, and even flowering forage for livestock like clover, field beans, and other cover crops. Therefore, bees not only provide us honey as sweet treat, but also help fill our plate and clothe us on a daily basis!



Did you know?!

One of every **three** bites of food (1/3) depends on bees. Your plate might look a lot different if there were not bees to pollinate our crops.



In the space below, name and draw one agricultural crop you enjoy that is dependent on honey bee pollination.

A large, empty rectangular box with a thin purple border, intended for the student to write and draw their answer.

Basics of Entomology

Entomology is the study of insects. **Insects** are a class of invertebrates within the arthropod phylum that have an exoskeleton, antennae, a 3-part body (head, thorax and abdomen), 3 pairs of legs, and generally 1-2 pairs of wings.

Are honey bees insects? (Check a box.) Yes No

Label the illustration below with the following terms: antennae, wing, pollen basket, compound eye, thorax, abdomen, stinger. The term “head” has been labeled for you as an example.



Have you ever wondered why *honey bee* is spelled with two words and other animals, like *dragonfly*, are spelled with one?

Honey bee is spelled with two words because *honey* is an adjective used to describe the type of *bee*. Honey bees are true bees. Dragonflies are **not** true flies; they are insects belonging to the order 'Odonata'.

Honey bees have a social, **caste** structure that they follow. There are three kinds of adult bees within a colony with various numbers and roles within the hive. **For each category below, draw a line to match the description to the appropriate caste below: worker, drone, and queen bees.** (You should have 9 lines drawn when you are finished.)

Number in a colony

One

Hundreds

Thousands

Worker

Appearance

Big body with large eyes

Long, tapered abdomen

Smallest

Drone

Role in a hive

Gathers pollen

Mates with queen

Lays eggs

Queen



Identify the different kinds of adult bees in a colony.

Find the queen!

Can you find the queen? **Circle the queen.**



**Did
you
know?!**

It takes
12 bees their
entire life to make
1 teaspoon of
honey.

There are between
30,000 – 60,000
bees in a colony.

The lifespan
of a **queen** can be
2 – 8 years!

circle all the drones!

How many drones can you
find in the picture? **Write the
number of drones you circled
on the line below.**



Pest and Predator Control

Part of being a beekeeper is managing (i.e. dealing with) pests and **predators** that might try to take advantage of the hard work your bees are doing! Honey-bee pests are insects or other animals that feed off of the bees' products or the bees themselves. Pests can also spread diseases, weakening individual bees or the entire colony! **Use different colored markers or crayons to follow the path connecting each animal's name to its picture. Each animal is a pest or predator of honey bees.**

Bear

Small Hive Beetle

Hornet

Skunk

Varroa Mites

The image contains five labels on the left and five corresponding images on the right. The labels are: Bear, Small Hive Beetle, Hornet, Skunk, and Varroa Mites. The images are: a small brown beetle on a yellow surface, a black and white striped skunk, a black bear in a field, a hornet on a green leaf, and a close-up of a Varroa mite on a bee's back with an orange arrow pointing to it. A tangled grey line connects the labels to the images: Bear to the skunk, Small Hive Beetle to the bear, Hornet to the Varroa mite, Skunk to the hornet, and Varroa Mites to the small brown beetle.

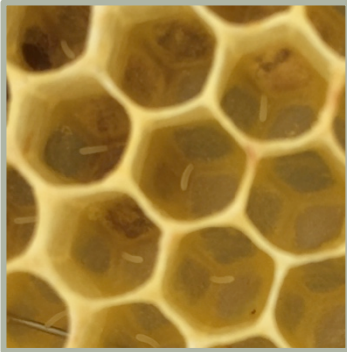
Share one thing you can do to protect your bees from pests.

Blank area for writing the answer.

The **honeycomb** in a hive will contain one of three things: honey, pollen, or **brood**. Honey-bee brood develops in stages, consistent with the lifecycle of an insect, and takes approximately three weeks.



Timeline for a worker bee:
(day 0 – 3)



(day 4 – 10)



(day 11-20)



(day 21)

Using the series of 3 pictures above, circle an example of each of the developmental, life stages shown: **egg**, **larva**, **pupa** or **capped brood**, and new adult.

Starting your Project Hive

Don't forget, your project hive must be installed in your apiary by May 1st!

Draw a picture of your hive.



Are there other hives in your **apiary**? Yes No If so, how many? _____

Describe where your apiary is located. *(Check **all** that apply.)*

- At your house On land owned by your family On land owned by a friend
- At a community or business location Other: _____

Describe features present at the hive and within a 3-mile radius. *(Check **all** that apply.)*

- In a wooded/shaded area In a sunny area Area with a mix of sun and shade
 - Near forestland Near wetlands Near natural areas/unmanaged land
 - Near grass, pastureland Near agricultural crops; what crop(s)? _____
 - Near subdivisions Near a golf course Near gardens (vegetable or flower)
 - Near rivers or streams Near ponds or lakes Near swimming pools
 - Other: _____
-

Maintaining your Project Hive

Your colony will grow and change over a season. Keeping track of what is going on with your bees is a very important way to recognize when it is time to feed your bees, to give your bees more space, to treat for pests, to replace a queen, to harvest honey, and to complete other management tasks. You do not have to open your hive and go through it every time you want to look at your bees. Record your observations of bees coming and going from the hive in the notes section, as well as to describe what flowers the bees are foraging on. **Use the maintenance chart below to keep track of your project honey bees.**

Date & Time	Weather	Queen Status	Plants in bloom
<i>Example</i> 7-13 at 4pm	86°F, dry (no rain in forecast)	Did not see her, but there were eggs & capped brood present	Clover was very abundant; day lilies, garden vegetables, and crepe myrtles
Notes: Number of bees looks strong. Capped honey present in center frames of upper super, so added an additional super on top.			
Notes:			
Notes:			
Notes:			
Notes:			

Date & Time	Weather	Queen Status	Plants in bloom
Notes:			
Notes:			
Notes:			
Notes:			
Notes:			
Notes:			
Notes:			

Date & Time	Weather	Queen Status	Plants in bloom
Notes:			
Notes:			
Notes:			
Notes:			
Notes:			
Notes:			
Notes:			

Flowering plants have adapted over time to attract pollinators to them. Bees like certain flowers better than others. ***Pick one flowering plant you observe honey bees visiting and describe it below.***

Name of the plant: _____

What type of plant was it? (Check **one** box.)

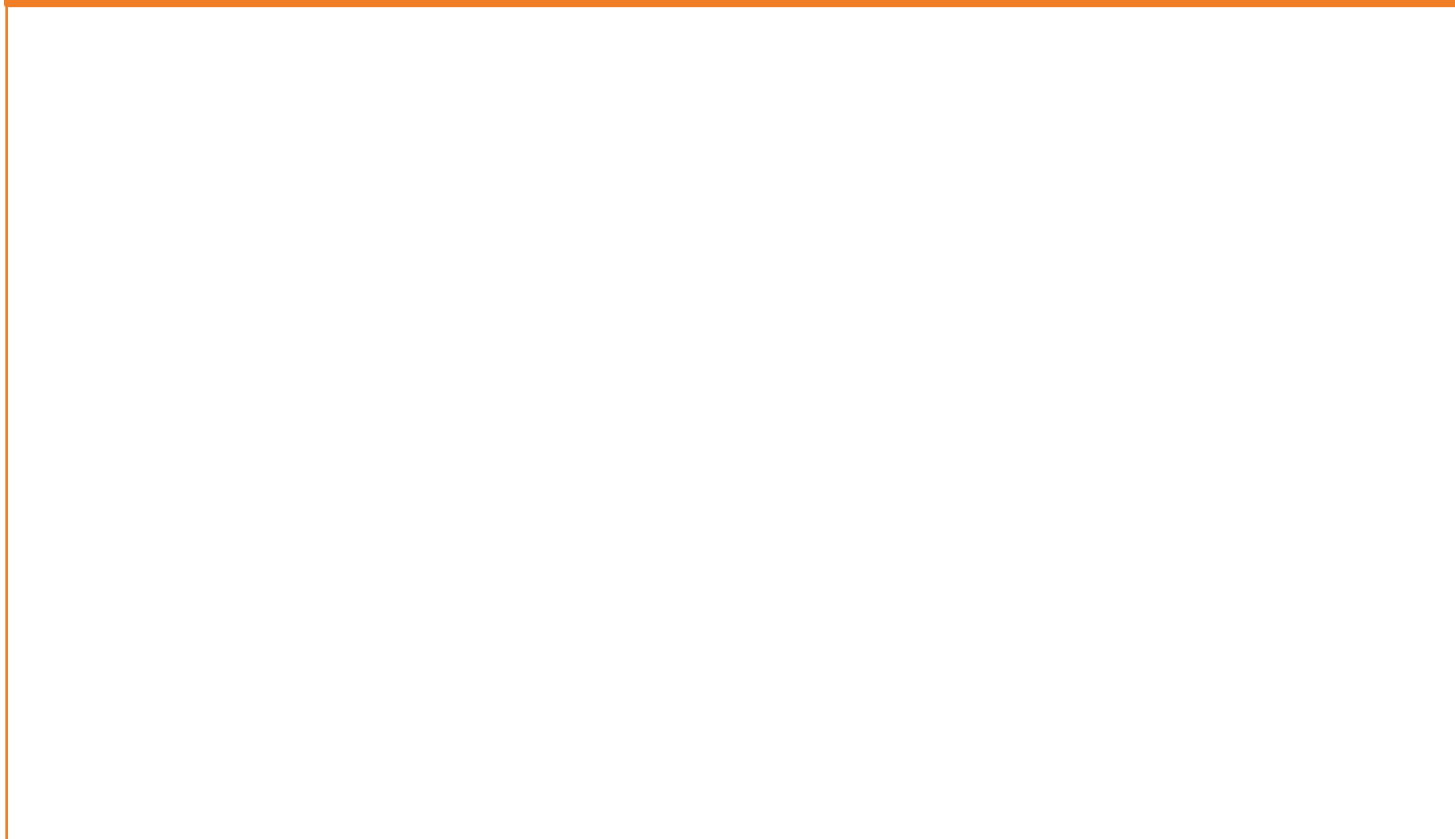
Tree Shrub Woody Vine Vegetative plant Other: _____

When was it blooming? (date range) From: _____ To: _____

What color were the flowers? _____ Did the flowers smell? Yes No

If you were a pollinator and a plant had to adapt to fit your preferences, what would it look like, smell like, and taste like? Draw an example of this imaginary plant below.

Think of your favorite colors, shapes, smells, and foods!



Harvesting Honey

The end goal of a lot of beekeepers is harvesting honey! **Fill in the following information to tell us about your honey.**

Were you able to harvest honey from your bees? (Check **one**.) Yes No

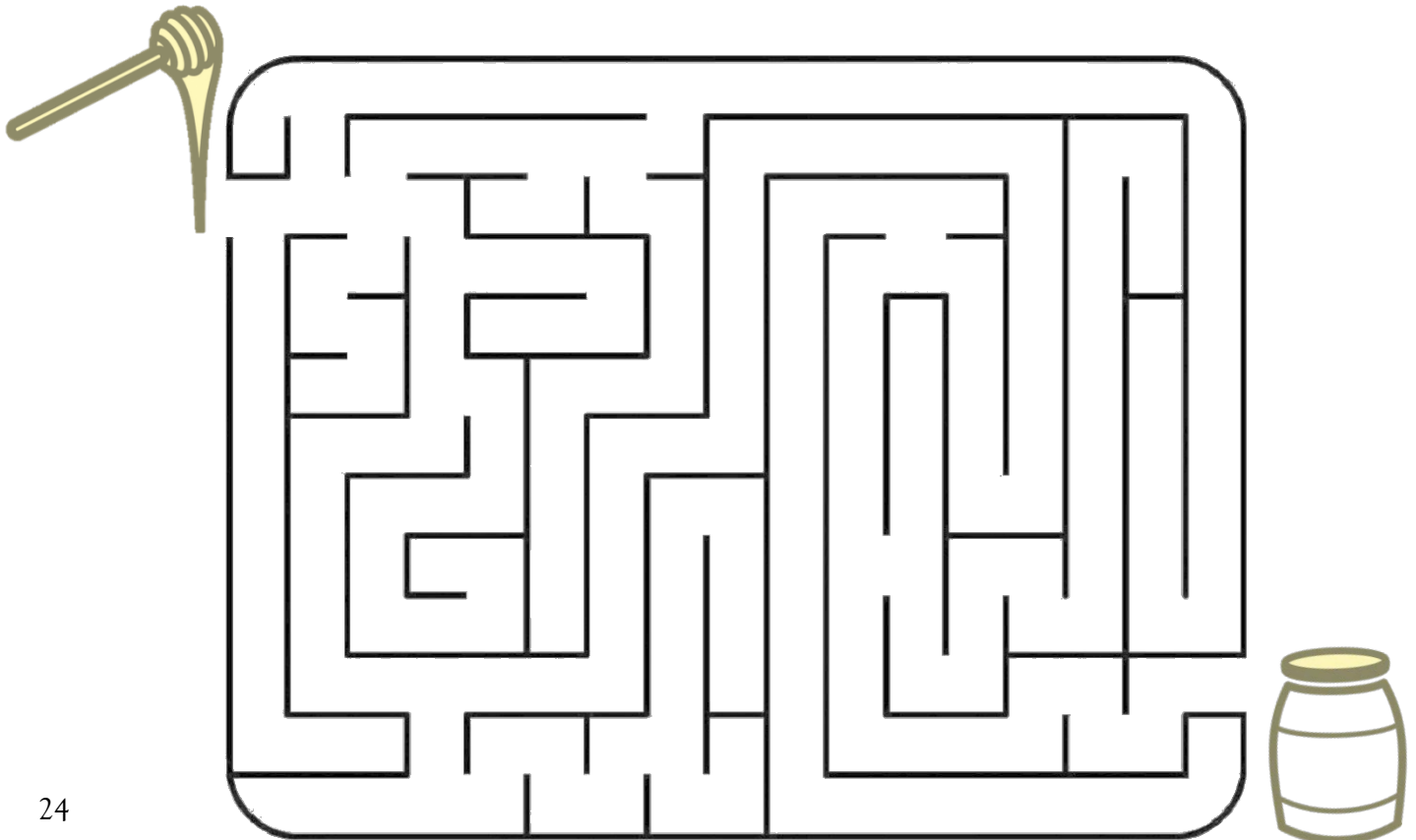
If yes, Describe your extraction process. If no, explain why not: _____

How much honey did you extract? _____ lbs or _____ gal.
(Provide approximate amount in gallons **and** pounds! Note: 1 gallon of honey weighs about 12 pounds.)

What are you going to do with your honey? (Check **all** that apply.)

Keep/Use it Sell it Give it away Other: _____

Help the honey find its way through the maze and into the jar below.



Beekeeping Equipment and Supplies:

Beekeeping requires a variety of supplies and equipment. Some larger, more expensive equipment may be shared between fellow beekeepers. Some personal equipment/supplies may be used year after year, may last a few years, or may need to be replenished/replaced yearly or throughout the year.

Below you will find a list of some essential beekeeping supplies and equipment. Work with your parent/guardian to find the typical cost for each of these basic supplies. Although these items do not represent all of the equipment/supplies beekeepers need, they are a good place to start! To find prices, you may visit a local apiarist supply store, look through a catalog, or find an online retailer. Be sure to write down the source you used to determine your prices!

<u>Personal Supplies/Equipment:</u>		<u>Cost</u>
1.	Beekeeper Suit with Hood/Hat (price the size you wear)	
2.	Beekeeper Gloves (price the size you wear)	
3.	One Unpainted 10 Frame Langstroth Hive with 2 Deep Boxes	
4.	Hive Tool	
5.	Uncapping Scratcher	
6.	Smoker	
7.	Smoke Pellets	
8.	Entrance Feeder with Jar	
9.	20 Wooden Frames	
10.	20 Plastic, Wax Covered Foundations	
11.	Package of Bees With a Marked Queen	
12.	25LBS of Sugar (for feeding bees in the Spring and Fall)	
13.	Formic Pro Pack (mite treatment)	
14.	12, 1 pound honey Jars	
<u>Shared Equipment</u>		<u>Cost</u>
15.	Electric Uncapping Knife	
16.	Two Frame Manual Honey Extractor	
17.	Five Gallon Plastic Pail with Lid and Filter	
<u>TOTAL COST OF EQUIPMENT:</u>		

Source of Supply/Equipment Costs:

Questions:

1. Why do you think some beekeepers want to share a piece of equipment like a honey extractor?

2. Name ONE item from the Personal Supplies and Equipment list that may only last a few years. Why?

3. Name ONE bee supply or equipment item discovered during your research that *wasn't* on the list. What is it called?

4. What is it for?

5. How much does it cost?

Honey!

At your local farmer's market or grocery, find 3 different brands of New York State Honey. How much does a jar of local honey cost and how many pounds are in the jar?

	<u>Brand of Honey</u> or <u>Name of Farm</u>	<u>Location of Farm</u>	<u>Pounds</u>	<u>Cost</u>
1.				
2.				
3.				

Pictures

Use the space on the next two pages to attach pictures of you performing actions documented in this record book (at least 5 pictures). Be sure to include dates and captions to describe each picture! (Ideas for pictures include protective wear, your apiary, installing your hive, the flowers bees really liked, queen, pests or parasites in your hive, harvesting honey, making other bee products, teaching others about your project, installing a pollinator garden, learning about bees, etc.)

Glossary of Terms

Agriculture: the science, art, or practice of cultivating the soil, producing crops, and raising livestock for products.

Apiary: a place where bees are located; *especially* a collection of hives or colonies of bees kept for their honey

Apiculture: the keeping of bees; *especially* on a large scale

Beekeeper: a person who raises bees

Beekeeping: the science, art, or practice of cultivating bees

Beeswax: wax; a yellowish, moldable wax substance produced by bees and used by them for making the honeycomb

Brood: the young of an animal or a group of young; *especially* the young belonging to a bird or insect that is hatched or cared for at one time

Caste: a specialized form of insect that carries out a particular purpose in the colony; *especially* in ants and bees

Colony: a group of individuals with common characteristics or interests situated in close association; *especially* a group of bees living together as a unit

Drone: a stingless male bee that has the role of mating with the queen and does not gather nectar or pollen

Egg: a reproductive body produced by the queen that is capable of development into a new individual

Entomology: the science of studying insects

Hive: the physical container for housing honey bees; *or*, a colony of bees

Honey: a thick, sugary substance produced by bees from the nectar of flowering plants

Honeycomb: the hexagonal (6-sided) wax chambers built by honey bees for the storage of honey, pollen, and brood.

Insect: any of a class of arthropods with the body clearly divided into a head, thorax, and abdomen, with three pairs of jointed legs, and usually with one or two pairs of wings

Larvae: brood that has hatched from an egg; young wingless forms

Nectar: the sugary liquid collected from flowering plants by pollinators. Bees convert the nectar to honey, the insects' primary source of carbohydrates. Honey provides the bees with the energy for flight, colony maintenance, and general daily activities.

Pest: a plant or animal that is detrimental to humans or human concerns; *especially* those affecting agriculture or apiculture

Pollen: the microscopic, powdery material collected from the stamen(s) of a flower that contains the male genetic material of a plant. Pollen is the bees' main source of protein. Pollen also provides the bees with fatty acids, minerals, and vitamins. The protein in pollen is necessary for hive growth and young bee development.

Pollination: the movement of pollen (containing the plant's genetic material) from one flower to another. It is often accomplished by insects, but many plants are pollinated by other animals, such as birds and bats, or by the wind.

Predator: an organism that obtains its food by primarily killing and consuming animals

Pupae: developing organisms that are in a quiescent (i.e. sleep-like) stage of development before hatching into adult forms

Queen: the fully developed, fertile female of social insects whose function is to lay eggs

Reproduction: the process by which plants and animals produce offspring

Worker: any of the members of a social-insect colony that perform most of the labor and protective duties

Acknowledgements

Writers & Contributors (2016):

Youth Pollinator Collaboration

Dr. Ashley Burns, Assistant Director 4-H Youth Development
Mallory Dailly, Oconee County 4-H Agent
Kerry Owen, Bee Well Honey Farm and Supply, Inc. Owner and Operator
Zachary Snipes, Beaufort/Charleston County Commercial Horticulture Agent
Cory Tanner, Urban Horticulture Program Team Leader
Morris Warner, Oconee County Coordinator and Extension Agent
Allie Winter, Lexington County 4-H Agent

Reviewed by (2016):

4-H Natural Resources Program Committee & Environmental Education Experts

Julia Cox, Aiken/Edgefield County 4-H Agent
Cathy Reas Foster, Montreat College Graduate Student
Steve Hucks, Lancaster County 4-H Agent
Jaime Pohlman, McCormick County Forestry and Natural Resources Agent
Jennifer Scales, Charleston/Dorchester County 4-H Agent
Carly Smith, Williamsburg County 4-H Agent
Kariisa Ulmer, Savannah Valley Regional Lead Agent
Alana West, Horry County 4-H Agent
Patricia Whitener, Greenville County 4-H Agent
Rick Willey, 4-H Natural Resources Specialist

Information was gathered from the Clemson University Cooperative Extension, South Carolina 4-H, National 4-H Council, and National 4-H Headquarters websites, or as otherwise referenced.

Club Meeting Summary Cloverbud

What you did in your Club this 4-H Year

Club Name:

How many meetings did your club hold this year

How many meetings did you attend this year

Tell us one thing you really enjoyed about 4-H this year

Tell us three things you learned this year through 4-H

Summary and Declaration

Those youth completing all 4-H expectations will be deemed as being in “GOOD STANDING” for the current 4-H year. This is an accomplishment to be proud of and will be rewarded with a Certificate and 4-H Achievement Pin.

Complete the table below to be eligible for this award by checking the box to certify you fulfilled each expectation.

4-H Expectations to complete the 4-H Year in GOOD STANDING	State YES if you completed this
Enrolled in 4-H by May 31 of the current 4-H year	
Always abided by the 4-H Code of Conduct	
Attended at least the minimum number of meetings required by my club(s)	
Met all 4-H and Club deadlines on time	
Completed a County-level Public Presentation	
Submitted MY 4-H Story in the correct format on time	
Submitted my completed Project Record Book on time	

I hereby declare that this 4-H Record Book, which contains:

Section 1: My Personal Development Record; and

Section 2: My Project(s) Record(s)

is a true record of my activities/accomplishments from the current 4-H year.

I confirm that, so far as is reasonably possible given my age and abilities, it is my own work.

Signed by 4-H'er:

Signed by Club Leader: