

Section 2: Project Record



4-H Beekeeper



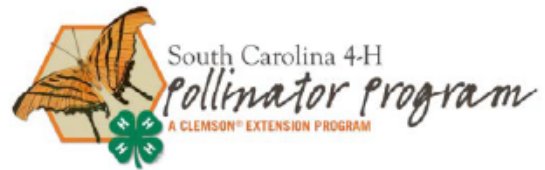
Name

Club

Cornell Cooperative Extension | **Dutchess County**

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Adapted from the:



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

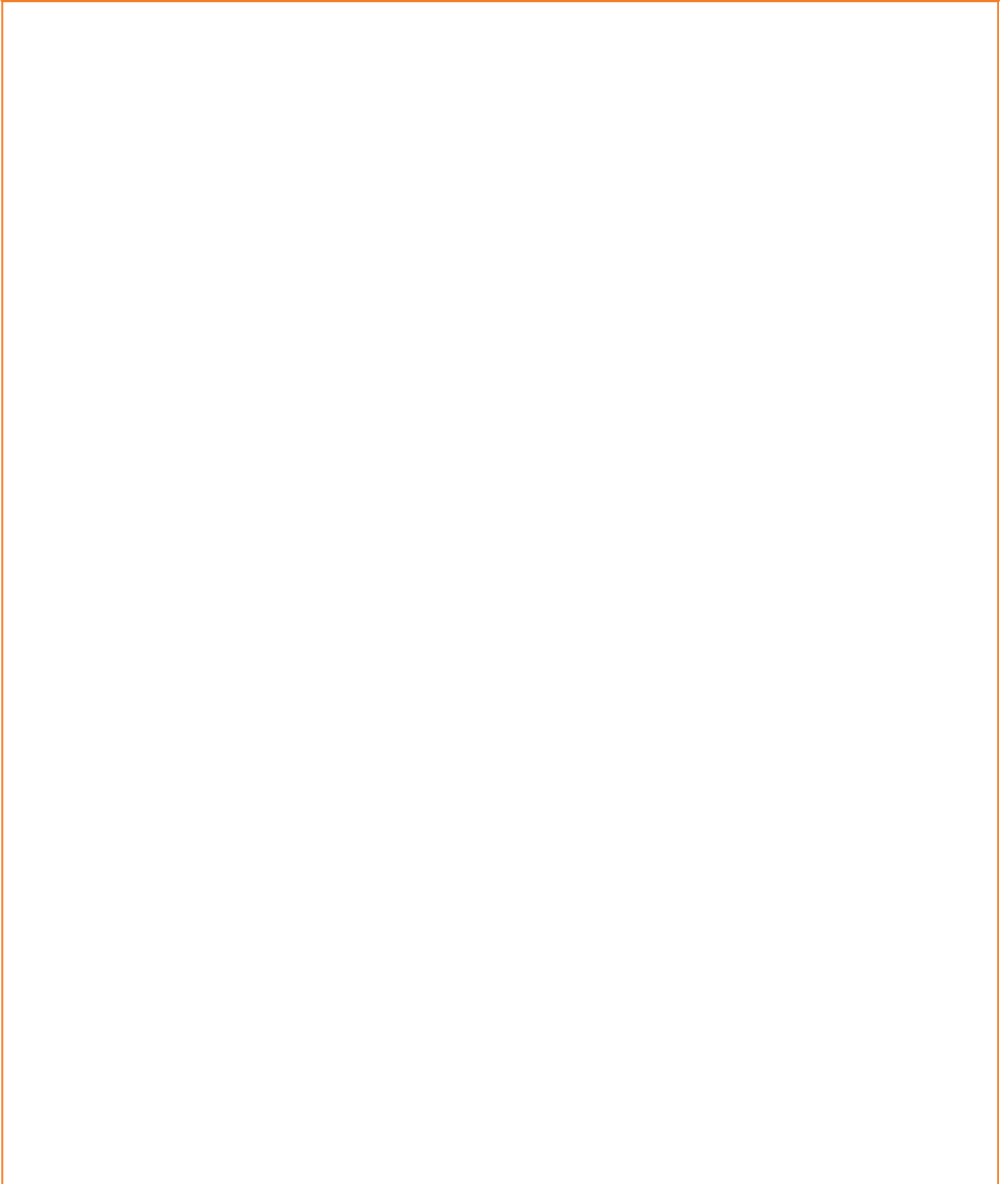
Protective gear is standard precaution against bee stings. Protective gear includes veils, gloves, close-toed shoes, and loose-fitting, long-sleeve and long-pant clothing. However, bee stings can and do occur when working with active colonies, even through protective gear. It is important to know whether 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*



Figure 2. Bees are responsible for pollinating 70% of crops. Almonds, peaches, blueberries, cotton, oranges, and apples (clockwise from top left) are agricultural crops that are particularly dependent on pollination according to the USDA. Percents represent each crop's dependence on pollination by honey bees.

Although we usually think of honey as the primary product of managing honey bees, the most important role of bees is the pollination they provide for agricultural crops! In the U.S., the value of bee pollination to crops is estimated to be \$12 billion (Johnson and Corn, 2015) and the value of honey produced in 2015 was only \$327 million (USDA NASS, 2016). Agricultural 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 (Figure 2). Therefore, bees not only provide us honey as sweet treat, but also help fill our plate and clothe us on a daily basis!

In the space below, draw and describe one agricultural crop you enjoy that honey bees are responsible for pollinating.

Basics of Entomology

Entomology is the study of insects. **Insects** are a class of invertebrates within the arthropod phylum that have a chitinous exoskeleton, 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, forewing, hindwing, pollen basket, compound eye, thorax, abdomen, stinger, mandible. 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. ***In the spaces provided below, describe the roles of worker, drone, and queen bees and how you can visually tell them apart.***

Thousands of female workers

role:

Description:



Hundreds of male drones

role:

Description:



One queen bee

role:

Description:



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! **List at least four parasites or pests that commonly affect honey bee colonies in our area:**

1. _____

3. _____

2. _____

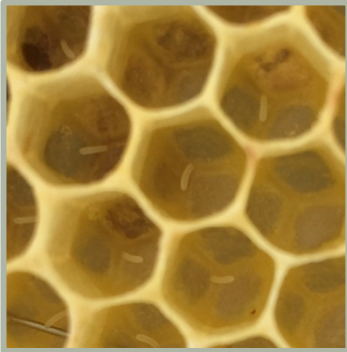
4. _____

Pick one parasite or pest you listed above and describe how you can control it your hive?

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, draw a line and label the developmental, life stages shown: **egg**, **larva**, **pupa** or **capped brood**, and new adult.

At any one time in a hive, there are usually honey bees in every life stage. For instance, there are eggs, larvae, pupae, and adults. How does this affect the way we treat for pests and parasites in a hive?

Did you know?!

Queens can determine the gender of their offspring by selecting to fertilize or not fertilize each egg. Fertilized eggs become *females*, while unfertilized eggs become *males*, drones.

All bees are vegetarians. Honey bees may fly three miles or more from the hive in search of food. They eat pollen for protein and nectar for a carbohydrate source. Pollen and nectar also supply bees with vitamins, minerals, lipids, and antioxidants!

Starting your Project Hive

What type of hive are you using? *(Check all that apply.)*

Langstroth Top-Bar Flow Warre Other: _____

Why did you choose this style? _____

Describe your initial hive set-up (number and size of boxes, frames, etc.): _____

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

Where is your apiary located? _____ (City, State)

Describe the location of your apiary and features that are present within a 3-mile radius.
*(Check **all** that apply.)*

At your residence On land owned by your family On land owned by a friend

At a community or business location Other: _____

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

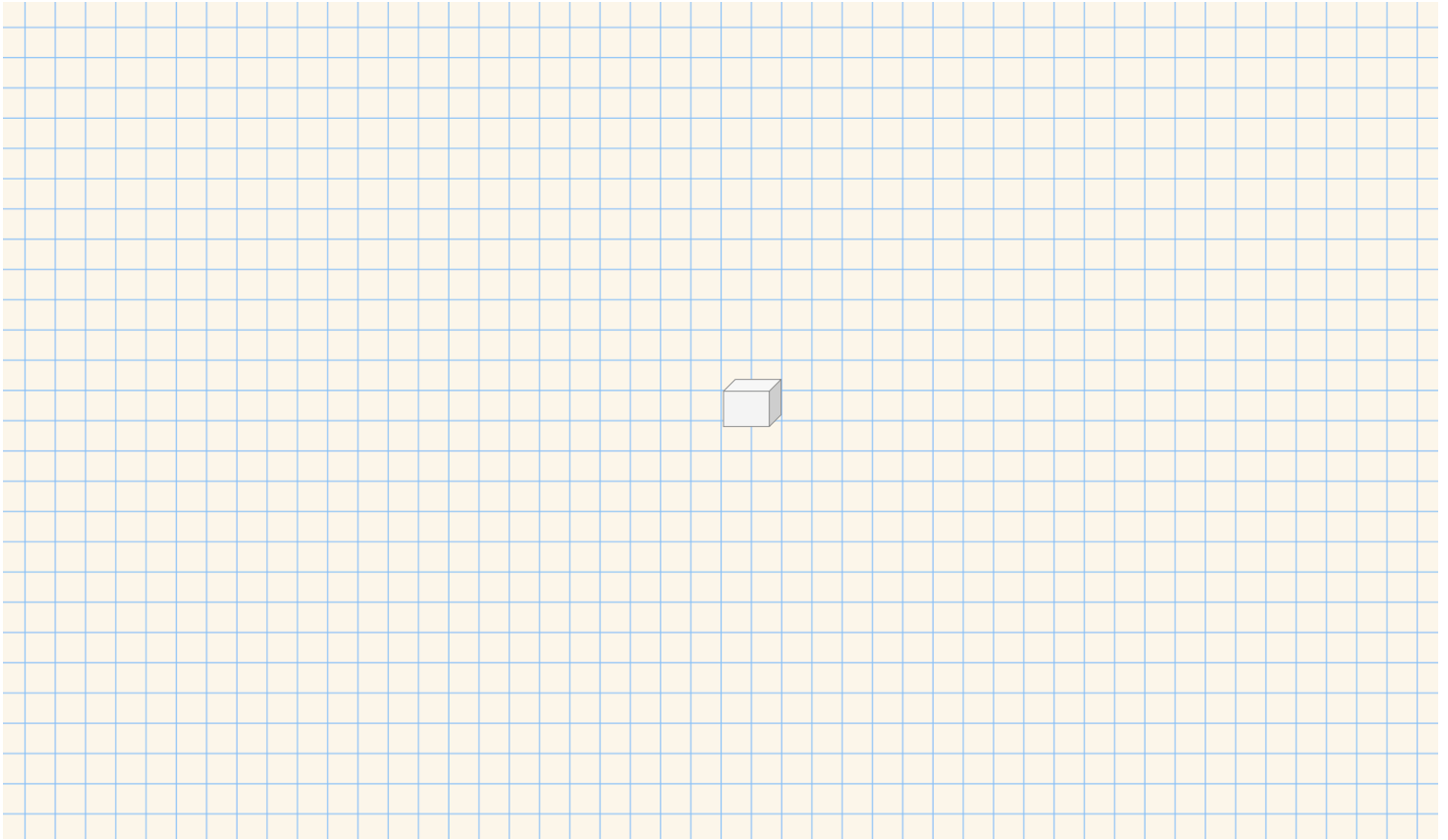
Near grass, pastureland Near agricultural crops; what crop(s)? _____

Near subdivisions Near a golf course Near gardens (vegetable or flower)

Near rivers or streams Near ponds or lakes Near swimming pools

Other: _____

In the grid below, draw or paste an aerial map of where your apiary is located. The map needs to depict features like those mentioned on the previous page and show a surrounding radius of 3 miles (6 miles in diameter). Make sure to include a key, compass, and scale. The center of the map is marked to represent your apiary.



Where did your bee colony come from? (Check **one** box.)

Existing Split Package Nuclear Hive Swarm Other: _____

Why did you choose this source? _____

What is the race or genetic background of your honey bee colony? (Check **all** that apply.)

Italian, *Apis mellifera ligustica* Russian, *Apis mellifera caucasica*
 Carniolan, *Apis mellifera carnica* German Black Bees, *Apis mellifera mellifera*
 Africanized, *Apis mellifera scutellata* Unknown Other: _____

What date did you install or start working with your bees? _____

Flowering Plants and the Nectar Flow


As temperatures warm up in the spring, bees will begin to emerge from the hive and start looking for food sources. **Identify and describe at least 4 flowering plants bees foraged on at different times (early, middle, and late) throughout the project season.**

Early	<p>Name of plant:</p> <p>Type of plant: (tree, shrub, flower, etc.)</p> <p>Dates blooming:</p> <p>Description:</p>	
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Middle	<p>Name of plant:</p> <p>Type of plant: (tree, shrub, flower, etc.)</p> <p>Dates blooming:</p> <p>Description:</p>	
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Late	<p>Name of plant:</p> <p>Type of plant: (tree, shrub, flower, etc.)</p> <p>Dates blooming:</p> <p>Description:</p>	
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Your choice	<p>Name of plant:</p> <p>Type of plant: (tree, shrub, flower, etc.)</p> <p>Dates blooming:</p> <p>Description:</p>	
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Use this box to draw a picture of the flower, add a photograph, or attach a dried, pressed flower. 

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	Hive Configuration	Queen Status	Frames of Bees*	Brood Pattern**
<i>Example</i> 7.7.2017, 4:00pm	86°F, dry (no rain in forecast)	1 deep box, 1 super 10 frames each	Not seen, but eggs & capped brood present	8 of 10	4
Notes: Hive looks good. A few adult hive beetles under the top cover. Center frames of top super contained capped honey. Added a queen excluder above the super and added a 2 nd super. Bees were very active on the white clover all over our yard!					
Notes:					
Notes:					
Notes:					
Notes:					
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Notes:					
Notes:					
Notes:					

*After gently smoking your bees, open the top box from the bottom and look up at the underside of your frames. Estimate the number of frames that are completely covered by bees.

**Rate your brood pattern on a scale of 1 (worst, very spotty with lots of open cells) to 5 (best, solid covering of capped brood with few open cells).

Date & Time	Weather	Hive Configuration	Queen Status	Frames of Bees	Brood Pattern
Notes:					
Notes:					
Notes:					
Notes:					
Notes:					
Notes:					
Notes:					
Notes:					
Notes:					
Notes:					

Date & Time	Weather	Hive Configuration	Queen Status	Frames of Bees	Brood Pattern
Notes:					
Notes:					
Notes:					
Notes:					
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Notes:					
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Notes:					
Notes:					
Notes:					

Add additional pages if needed and attach them to the inside of the back cover.

Mastering the Art of Beekeeping – Learning

Learning is a life-long process and you have the opportunity to learn something new every time you look in a hive. Besides working directly with your project bees, what activities have you done to improve your knowledge and skills related to natural resources, pollinators, or beekeeping? This could include, but is not limited to, reading books, journals, and magazine articles; shadowing an experienced beekeeper; watching videos, tutorials, and demonstrations; taking classes, touring pollinator gardens and apiaries, joining a beekeeping club or association, and participating in workshops or clinics. **List your learning activities during this project.**

	Date	Activity
Example	7.10.2017	Attended the local beekeeper's association meeting. Learned about hygienic races of bees.
1		
2		
3		
4		
5		
6		
7		
8		

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 no, explain why not: _____

Describe your extraction process (where, when, extraction method, who helped, filtration or straining, bottling):

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

Did you measure the water content or density of your honey? (Check **one**.) Yes No

Explain: _____

Describe your plans for the honey (sell, keep, use, give away, etc.): _____

Discuss any other products of your honey bees that you have plans for (beeswax, comb, rearing and selling queens, making splits, etc.): _____

Financial Records

List any expenses (i.e. money spent) you had during the project this year. This could include the project registration fee, equipment (hive boxes, construction materials, protective wear, hive tools, etc.), sugar, water, books, beekeeper association fees, etc. Provide copies of your receipts.

Date	Description of Expense	Dollar amount

overall project expenses

What was your net project profit? _____

Net profit can be calculated as overall project expenses minus income (on the next page).

List any income (i.e. money gained, revenue) you earned during the project this year. This could include sales from honey, bees, and bee-related products (soaps, lip balms, raising queens, splits, etc.) or services.

Date	Description of Income	Dollar amount

overall project income

In addition to your overall project income and expenses, you also are likely to have assets (i.e. property or equipment of value) and unsold inventory. **List them below.**

Assets	Dollar value

Inventory	Dollar value

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 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: 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.)

Acknowledgements

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Reviewed by (2016):

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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.

YEAR IN REVIEW

Specific to your project, answer the following questions. Please add drawings, pictures, diagrams, or newspaper clippings.

What were your goal(s) for this year?

Did you achieve them? Explain why or why not.

What was your greatest accomplishment this year?

What do you want to work on or learn about next year?

YEAR IN REVIEW continued

Use this space to add additional feedback on your project this year.

Summary of Club Meetings attended in the current 4-H Year

This record is of business meetings and educational activities done as a club. It does not include special events such as countywide events, field trips, shows, the fair, etc.

Club Name:

Club Leader(s)

Club meetings attended this year	# Meetings held by Club	# Meetings you attended	% Meetings you attended	# Hours you attended
A minimum of 6 meetings per year is required by all clubs. What percentage attendance is required by your club? <input style="width: 160px; height: 60px;" type="text"/>				

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: