



Working with Honey Bees



The 4-H Beekeeping project helps you learn about raising honey bees. Beekeeping offers many exciting educational experiences, from learning about bees and honey plants, to raising healthy bees and ultimately, producing honey and other bee products.

This is the second of three 4-H beekeeping manuals. In the first, *Learning About Beekeeping*, you learn about bees and beekeeping: types of bees, the honey and wax they produce, plants that attract bees, beekeeping equipment and how to keep records.

This manual, *Working with Honey Bees*, guides you through acquiring a colony of bees and learning how to care for your beehive throughout the year. This includes basic beekeeping operations that result in the production of extracted, chunk or cut comb honey.

When you are experienced and knowledgeable enough in the basic care of a beehive, move on to *Advanced Beekeeping Methods*. These advanced topics include increasing the number of your honey bee colonies, increasing honey production, producing special kinds of honey and more about bee societies.

The directed experiences in this manual encourage hands-on learning. A knowledgeable mentor is a big help to anyone getting started with beekeeping because there is much to learn. Having a good understanding of the process before you start is important for your bees' health. You can enhance your learning by consulting online resources and attending a beekeeping association meeting to learn from others who raise bees.

This manual is intended to help you learn the following, and more:

- How to start and care for your first beehive
- More about beekeeping equipment
- The importance of keeping beekeeping records
- How to help others learn about beekeeping
- How to learn from other sources

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Words in **bold** are defined in the glossary at the end of this manual.

Some of the information in this manual has been adapted from *Starting Right with Bees*, a publication by the editors and staff of *Gleanings in the Bee Culture* and the standard for many years. Although the book is now out of print, a wealth of information is available at the Bee Culture website (www.bee-culture.com/us/). Their magazine, which has been published since 1873, and podcasts are recommended, especially for new beekeepers. You can find a wealth of information on their website and by signing up for the magazine.



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The Value of Honey Bees

People value honey for its wonderful taste and as a healthier substitute for sugar and an important baking ingredient. It has been used for its antiseptic qualities in burn ointments and the preparation of medicines. Honey has been used throughout history in the production of wines, especially honey wine or mead, which is still popular in many parts of the world.

Honey bees are important in our food system because they pollinate many crops when collecting nectar to make honey. Pollination is critical to the food and agriculture industries because many plants must be pollinated to produce fruit. The United States Department of Agriculture (USDA) pollinators website (www.usda.gov/pollinators) notes: "Pollination services from honey bees and other insects provide the backbone to ensuring our diets are diverse and plentiful with fruits, nuts and vegetables. There are over 100 crops grown in the United States that depend on pollination." Honey bees pollinate 75 percent of all crops and are responsible for at least 30% of the food you eat!

Many **species**, including bats, birds, butterflies, flies and wasps pollinate plants, but none of them do it as well as honey bees. Honey bees are used in agriculture because they are hard workers, visit only one type of flower on a particular trip and their beehives can be moved to areas where flowers need to be pollinated. Because of these special qualities, American crop producers rent millions of colonies of honey bees each year to pollinate their crops.



Honey bees also produce beeswax, another product with important uses. The cosmetic industry uses beeswax in the preparation of products such as cold cream, lotion and lipstick. Beeswax is a basic ingredient in many candles. Pharmaceutical manufacturers include beeswax in many salves and ointments. Dentists use it for impression wax. Foundries need it for molds in precision casting. Beeswax is an ingredient in many types of polishes for floors, furniture and shoes. Other uses include adhesives, crayons, chewing gum, inks, basketball moldings, ski wax, thread wax, ironing wax and bowstring wax for archery.

Bee Stings

Honey bees sting if they think they're in danger. An important part of beekeeping is understanding and accepting that you are going to be stung from time to time. No matter how good a beekeeper you become, occasionally you will accidentally crush or disturb a bee. Or you may visit the hives when the bees are disturbed by a change in the weather, hunger or something else beyond your control. You may be stung as a result because the bees are trying to protect themselves.

The sting of a bee is a momentary discomfort for most people. It reminds us to slow down, be more careful and show greater respect for bees. But a bee sting can be life-threatening for some people. A serious reaction to stings is unusual, but a person may have difficulty breathing or another dangerous reaction after being stung. See a doctor immediately if you or anyone you are with has a reaction to a bee sting. Do not open a hive alone until you know how you react to being stung. If you are highly allergic to stings, you must be particularly careful when working with bees. See an allergist before you consider continuing with this project.

Experienced beekeepers know what to expect when they get stung and what to do to reduce its effects.

A sting always hurts, but you don't need to be afraid of the honey bee sting unless you are allergic to it. It will hurt a little whether it's a first sting or the thousandth. Only the worker bee stings, and her stinger is barbed, like a fish hook. When she pushes her stinger into your skin, it catches and pulls out of her body as she flies quickly away. The bee dies soon after it stings.

She leaves behind the barbed stinger attached to a poison sac in your skin, with part of her intestine often still attached. Scrape the stinger off your skin using a fingernail or hive tool. Then puff smoke from a smoker or rub dirt on the area of the sting. This covers the smell of the sting so other bees won't be disturbed. Swelling around the spot may last a day or so, and ice may reduce it. Odd as it seems, many beekeepers report that the more they are stung, the less swelling results. So, the good in being stung may be that it won't be as bad when you are stung again! (Taking an antihistamine after the sting can help reduce symptoms like itching and swelling.)

If your bees sting a lot even though you're careful not to be rough with them, it is best to replace the queen. This often causes them to become gentler, but it may take some time.

Beekeepers' Associations

You can learn a lot from an experienced beekeeper in your area. Ask questions about obtaining bees, setting up your hive and apiary management. Visiting a beekeepers' association meeting gives you the chance to meet other beekeepers in your area, ask questions, and hear others' ideas about and experiences with honey bees. As you have probably found out, a beekeeper likes nothing better than to "talk bees!" You can find information on beekeeping associations at the American Beekeeping Federation website (www.abfnet.org/page/states), or ask your advisor if a beekeeping organization meets near your home.



Record Keeping

Keep a record of all your beekeeping activities. This will help you learn more about your bees, make good decisions in the future and help organize your beekeeping work. Keep notes on these topics:

- Hive notes
- Beekeeping equipment inventory
- Receipt list
- Financial summary (assets, inventory, labor record)

You can use the tables included with this manual or make your own. The tables include information about these topics, but you may want to add items of interest to you, such as where your bees collected their nectar, your advisor and your 4-H exhibits.

Building Your Hive

This manual guides you through setting up and maintaining your own hive. You will learn what must be done to care for your bees throughout the year. Start with two hives of bees, if possible, so you have the backup resources of a second hive — brood, queen cells and honey — in case something goes wrong with the first one. One hive is usually enough for a new beekeeper, however, if keeping two isn't possible.

Beekeeping is easier to learn by working with a mentor or advisor who has kept bees for many years. Your mentor can help you decide what bees to start with, set up your hive, obtain your bees, install them and care for them. Subscribe to *Bee Culture Magazine* or *American Bee Journal* to learn more about beekeeping and current beekeeping topics of interest.

There is, of course, a big difference between reading about bees and actually working with them. You must show initiative and responsibility if your hive is to succeed. You'll make many decisions that affect your hive, starting with what kind of bees you want to work with, where to get them and where to place your hive. You have to inspect your bees regularly to make certain they are healthy and remain so. You need to decide when to feed your bees in the spring and fall, when there is danger of their swarming and when it's necessary to **super** the hive. You'll also need to know how much honey you can take from the hive and how to extract the honey.



You'll make many other decisions about your bees during the coming year. But don't worry, you aren't expected to answer all the questions on your own. Beekeepers with many years of experience still turn to other beekeepers for advice. Every beekeeper can vividly recall their first hive of honey bees: the problems, questions and mistakes they made with it. Turning to your beekeeping advisor often for suggestions and answers to your questions about your first hive will help you avoid the many mistakes others have made.

Once you have your own hive of bees, keeping records and looking to your beekeeping advisor for help and advice are especially important.

Equipment

Work with your advisor when you start thinking about purchasing your beekeeping equipment. Many variables affect your apiary, and making informed decisions will help you get off to a good start. Some things you'll want to discuss are based on where you live, such as the recommended bee race, when and where to get your bees, and how much **honey flow** is available near your hive(s).

Other decisions are related to your preferences, such as how much of the work you'll do by yourself, size and type of hive frames, and the type of honey you want to extract (comb, chunk or liquid). Your advisor can help you make good decisions. Review the information in the first manual, and make a list of equipment you need for yourself and your beehive before you meet with your advisor so you can have a productive meeting. Then check in a beekeeping magazine or online for beekeeping supply sources and place your order. Order your hive parts and frames and have them put together and ready before you get your bees.

Hive Location

Decide where to place your hive before your hive and frames arrive. Two primary considerations make a successful beehive location: access and protection. Try to choose a location as close to your home as possible. The closer the hive is to your house, the less time you'll spend traveling to and from your hive and the easier it will be to inspect it. Locating the hive near your home also makes it more convenient to access your beekeeping equipment. Beehives near your home are more protected and less likely to be vandalized by thoughtless people who find a beehive in an isolated area an irresistible target for rock throwing or shotgun blasts. Having the beehive close to your home or the home of some other responsible person provides greater security for the colony.

If you live close to neighbors, locate your hive where the bee's flight path to flowers does not bother others. Check for local ordinances or restrictions on keeping bees if you live in an urban area. Bees can do well on the scattered flowers in gardens, vacant lots and roadsides in a city or town, but it takes acres of honey plants to produce large quantities of surplus honey. State and local regulations may require you to locate your hives a certain distance from roads or property lines. Building a 6-to 8-foot fence will direct your bees on a higher flight path, above people's heads.



Do not locate your beehive where it is vulnerable to crop spray. Consider the location from a bee's perspective by walking the area, looking at maps or aerial views, and thinking about the surrounding area. Be particularly careful not to locate hives near agricultural fields that may be treated with pesticides toxic to bees.

Once you decide where to locate your hive, notify your state bee inspector of its exact location. You can find the inspector at <https://www.beeculture.com/united-states-apiary-inspectors/>. If your apiary isn't located near your house, post your name, address and telephone number prominently.

Nectar

Carefully study available honey plants around your potential hive location. Honey bees get most of their nectar and pollen within a half-mile radius of their hive. They can travel from one to two miles on their collection trips depending on the terrain and prevailing winds, if needed. Bees need acres of honey plants to produce large quantities of honey. An orchard or crop fields with nectar-producing plants can be good choices as long as no bee-damaging pesticides are used on them. Some beekeepers move their hives during the season to take advantage of flowering plants that bloom at different times.

Tips from the out-of-print book *Starting Right with Bees* still hold true today. Honey flows may be major or minor, depending on the weather and which plants are blooming. Honey flows are minor, then major and then minor again in spring, summer and fall in the middle latitudes of the United States. They can occur continuously until winter in other parts



of the country. The spring season is marked by short and intense, though minor, nectar flows. Fruit trees in bloom and dandelions contribute enough nectar to stimulate colony build-up. The colony's peak strength usually coincides with the start of the mid-season or main honey flow — June, July and sometimes August — in clover regions. Most of the surplus honey must be gathered during the major honey flow. Fall flows from goldenrod, asters and other fall plants often provide bees with substantial winter stores.

Talk to your advisor if your bees aren't filling the frames with honey during the major honey flow. Moving your beehive a mile or two can make the difference between a good or bad crop. Drought, cold or very hot weather, however, affect honey flow and are out of your control.

Water

Bees, like all animals, need a constant supply of water. A stream or pond in the vicinity of your apiary is best. A good water source is especially necessary for beehive(s) located close to neighbors' homes, or the bees may choose your neighbor's water faucet, children's wading pool or bird bath. You can avoid your bees becoming a nuisance to others by keeping a tub or pan of water near the hive if your bees don't have access to a nearby stream or pond.

Make certain that the water source has something in it like cork floats, bark or layers of crushed rock so your bees can land without danger of drowning. Always keep water in the tub, and your bees will learn to go only to that dependable source of water.

Drainage

Choose a hive location with good drainage and no possibility of the hive sitting in water. Keep the hive off the ground using a hive stand or bricks, and tilt it slightly forward. This allows any moisture that may accumulate to run out the front entrance and also makes it easier for the bees to remove dead bees and waste materials.

Sunlight and Wind

Bees seem to do best in a location that gets morning sunlight and afternoon shade. Provide light shade in hot climates. Sheds or sheltering trees should be used in hot, arid regions. Your bees likely need some shade during hot summer afternoons and protection from the cold north winds of winter if you live in a more northern region. Hives should have as much sunlight as possible, especially during the winter months. Face your hive toward the south, where the entrance has the greatest exposure to sunlight. If your location makes it inconvenient to place the hives facing south, face the hive to the east to catch the morning sun.

Vegetation

Finally, think about the vegetation immediately around your hive location. Trees to the west or north provide valuable protection from winter winds. Keep the grass and weeds cut around your hive. This reduces fire danger and helps with ventilation, which the bees need to maintain the proper hive temperature.

Quiz Yourself

- What special considerations must the backyard beekeeper with close neighbors make?

- What should you consider when looking for your beehive location?

- Bees need a constant supply of _____.

Getting Your Bees

Now that you've assembled your equipment and chosen your location, it's time to obtain your bees. Talk to your beekeeping mentor and others who live nearby to ask what bees they find best for your area. Review the information in your first manual or read about the different races of bees at the library or online to decide what is best for you. You might also want to consider a **hybrid** colony. Be sure your new bees and all beekeeping equipment are disease- and mite-free. You can also check with your state bee inspector to see if they certify disease-free bees.

Four methods are recommended for getting bees to fill your hive. You can purchase a **nuc** (nucleus) colony, which consists of several frames of bees, brood and honey with a queen; buy an established colony; buy a package of bees; or catch a swarm. Each method has advantages and disadvantages.

Buying a nuc or an established colony is a good option if you can find a local beekeeper that sells them. This gives your colony a faster start than if you install a package, because you already have drawn comb and brood. A locally bred queen also may be better adapted to your weather conditions than one shipped from another geographic location.

Ordering a three-pound package of bees is another good method for obtaining bees, and it avoids some possible brood diseases. The beginning beekeeper learns a lot by observing a package of bees developing into a full strength and producing colony. Package bees are usually collected in the afternoon when the older foraging bees and many of the drones are away from the hive, so the packages are composed of mostly young worker bees. Do not order packaged bees too early in the spring if you live in the northern states, because cool weather and lack of nectar kills small packages or sets them back too far to make a strong colony. It takes seven

to eight weeks for packages to build up to full-strength colonies, ready for the main honey flow. Try to order your packages so the bees arrive in time for the dandelion/fruit bloom.

Experienced beekeepers sometimes collect a swarm, but this method is not recommended for the beginning beekeeper.



Seasonal Management Practices

You have progressed to the heart of the 4-H Beekeeping Project: maintaining your own hive of bees throughout the year. Weather and plant conditions largely determine your honey bees' activities, so the seasonal pattern of the colony's life is easy to understand. The bees' work changes as the seasons change, and beekeepers must respond to the seasonal needs of their hive.

Seasonal management practices vary by region. You need to keep one step ahead of your bees, helping prepare them for the next stage of their annual work cycle. Keeping records helps you anticipate the work you need to do and potential problems you need to watch for.

Spring and Summer

The first warm days and blossoms of spring cause your bee colony to shake off its winter drowsiness and begin the hectic work that determines the hive's ability to survive for another year. The interior of the hive must be cleaned of winter debris and new comb built; the queen begins laying eggs at an intense rate; and nectar and pollen are collected to feed the fast-growing bee population. You must decide whether to feed and medicate your hive. You also must make certain that your quickly expanding colony does not become overpopulated and swarm, although bees sometimes swarm no matter what you do. You can reduce the bees' swarming urge by providing enough room for your bees and removing queen cells. But don't remove all the queen cells if the queen is missing or is not laying many eggs!



Nectar gathering increases in intensity, reaching its peak during the main honey flow from mid-June to mid-July in the northern states east of the Mississippi. (The main honey flow in Florida and California is from March to May.) Talk to local beekeepers and watch your bees to learn when to expect the major honey flow. Your hive should be full of bees and brood with reserves of honey and pollen. If it isn't, you may have an inferior queen and should consider not harvesting honey until your hive is stronger.

Bees get viruses, just like people do. Look for any crawling bees with deformed wings, which indicate lots of mites. Check for mites, which can compromise the colony's health. A mite check should be done in late July. Consult an expert beekeeper for what to do if you find mites.

Colony build-up is partly the result of good colony management, so consider adding a **super** if you have a strong colony. Add the super when the combs in the brood nest are white along the top edges and little spurs of wax are being built and the honey flow is still strong. Don't add supers too soon, or there will be unfinished supers and the bees may not be able to keep the hive strong.

Bees make extra honey when they collect more nectar than they consume. Through the rest of the summer months, the field and house workers continue their chores of collection, storage and feeding. Gradually the queen slows her job of egg production. Help your bees through the hot, dry summer days by providing plenty of supers for storage and to reduce crowding. You must harvest your honey early enough so that you have time to treat your bees for **Varroa destructor** mites.

Beekeeping in Cold Weather

Bees in regions with cold winters use the clear, cool days of autumn to prepare for the harsh winter months ahead. The drones' laziness and big appetites are no longer tolerated, and they are evicted from the hive and eventually die from starvation. The honey supply is centralized in the hive for winter use. The bee colony limits the queen's egg production even further. These

preparations help make the colony stronger; weaker colonies are less likely to survive a cold winter.

Moving your hive into a building for the winter is not recommended in the Midwest. A few beekeepers do that in some areas of Canada, but the building temperature must be carefully monitored — kept



cool enough so the bees are not too active, yet warm enough that they can get out of the hive to defecate.

Your bee colony (minus the drones) must live all winter long. Prepare for winter by making sure your bees have sufficient honey and are raising a healthy brood. Check that your hive entrance is properly sized to keep mice out. Your colony clusters tightly together in the center of the hive during cold weather because bees maintain their heat by mutual body warmth and a low level of activity, moving only when necessary to get more honey from the nearby storage cells. Protect your hive from the cold by staying out of it, opening it only briefly in an emergency and when temperatures are at least 45°F.

Prepare your equipment for the beginning of a new season during the winter months. Your focus during the winter is to help your colony survive the difficult winter months in a healthy, well-fed condition so it is ready to begin its important spring work.

Note: Much of the following information has been adapted from *Starting Right with Bees*.

Each colony must meet at least three requirements during the fall: healthy productive queens, plenty of pollen and ample honey. By fall it is important to have all colonies as nearly even in strength as possible. The three major ways to do this are listed below with suggestions or considerations for each.

- Unite weak colonies into one colony.
 - Research the newspaper method of combining hives, or ask your advisor for help. The bees unite so slowly that no fighting occurs between the two colonies.
- Take sealed brood from a disease-free, strong colony and give them to a weaker colony.
 - Brood should be taken only from a colony that has reached peak population.
 - Select one or more of your strongest colonies and take brood if more than 10 frames contain capped brood.
 - Make sure the weaker colony has enough worker bees to keep the brood warm.
 - A new method is to switch hive locations. Try switching the location of the strong hive with the weaker hive. This may strengthen the weaker colony.
- Buy packaged bees to boost weak colonies.
 - Packages of young bees present the fewest difficulties.
 - Get three pounds of bees without a queen if your weak colony has only a handful of bees and a young queen.
 - If your queen is old, you can kill her and requeen or just unite the colony. Your mentor should help you with this. New queens should be kept in a cage for a minimum of two weeks. Then you need to check to make sure she won't be killed when the cage is opened. You must also remove any queen cups that are formed during that time. Refer to the requeening section on page 14.

- Gorge your package if you get a queenless package, then dump the bees at the hive entrance.
- Feed the weak colony sugar syrup a few days before, during and after uniting because bees filled with syrup are not inclined to fight.

Other jobs to consider in the fall:

- Requeening – Replace your queen with a new one if your queen is inferior. A young vigorous queen fills the hive with brood. Do this in early fall.
- Fall feeding – Well-ripened sealed honey is preferred to sugar or artificial feed for overwintered colonies. Frames of honey also contain some stored pollen (**bee bread**), which is vital for brood rearing. Feeding your bees in late fall while the weather is still relatively warm helps preserve honey for spring brood rearing when it is most needed. A thick syrup of 2.5 parts granulated white sugar to 1 part hot water is best. Medication for foulbrood and Nosema diseases can also be added to the syrup, which bees quickly consume.



- Check sugar syrup often. If the bees don't eat it, the syrup can ferment and must be removed from the hive.
- Check for mites, which can cause bee-spread viruses (deformed wing virus, DWV) and compromise the colony's health. Consult an expert beekeeper for what to do if you find mites.

Wintering

- **Do not disturb:** Do not open your hives in winter unless you think your bees are starving, or you may kill them. You can tell if your hive is in trouble if you have it on a scale. A hive showing rapid or steady weight loss may require immediate attention.
- **Southern states:** Starvation is the biggest threat for bees in the winter in the South. Bees that collect pollen and a little nectar stimulate brood rearing, resulting in large stores of honey being consumed. A super of honey and pollen may guard against starvation. The need for extra syrup depends on many factors, including weather and location, so beekeepers must pay close attention to the needs of their bees.
- **Northern states:** Extreme cold is the biggest cause for concern because the bees may consume all their honey stores trying to keep the hive warm. They will starve without enough honey to make it to the first honey flow. When air temperatures drop below 57°F, the bees form a ball inside the hive to generate heat. This is called a winter cluster. When the queen resumes laying in mid-winter, the cluster temperature increases to 90°F so the eggs hatch. It is common to winter bees in a two-story hive. Provide at least 80-100 pounds of honey to each hive in areas where temperatures fall below 20°F in winter.
- Winter patties can be purchased from bee supply stores and are usually placed under the inner cover two or three times over the winter. Work quickly so heat doesn't escape the hive.
- Emergency feeding is sometimes necessary. Use dry sugar or fondant candy. (Ask your mentor for help.)
- **Windbreaks:** Windbreaks are needed in all northern states and southern states where winter temperatures range between 45°F and 68°F. Windbreaks consist of a heavy growth of bushes, young trees or a specially constructed fence.

- **Packing:** Hives subjected to extended periods of sub-freezing temperatures need packing to provide insulation and wind protection. Snow helps insulate the hives. Something as simple as a cardboard box around the hive can add insulation. Most heat loss occurs at the top of the hive (rather than the sides) so you may want to pack the box with burlap bags around the sugar syrup. Be careful of condensation when insulating. You can kill the colony if any water drips on the bees or into the hive. Also make sure the bees have ventilation. Don't let snow build up at the entrance of a hive. Make sure the vent is open on the inner cover, even if the inner cover is exposed. Your bees still need to breathe!
- Watch for dark yellow or brown spots that cover the fronts and sides of the hive and smell bad. This indicates the colony may not have wintered well and the bees are suffering from **dysentery** or **Nosema disease**. Close the entrance if the colony dies to prevent the honey from being robbed. See the section on Bee Diseases and Pests for more information.

Additional information from *Starting Right with Bees* still holds true today: The queen begins laying eggs and brood rearing in January or February in much of the U.S. The eggs and larvae are incubated at 93°F, regardless of the outdoor temperature. This takes a lot of energy, which is why having good honey stores is important to the hive. By the time spring arrives, each colony should have four or five frames of capped brood. It usually takes a colony eight weeks to build up to full strength and be ready for honey flow. Treat weak colonies the same in the spring as in the fall – unite, add brood or add queenless packages.

Bees rarely starve in winter. They are most vulnerable to starvation in spring when most of the stored honey has been consumed, brood rearing is in full swing and there is little or no nectar. Monitor your colonies carefully in the spring and be ready to feed them if necessary. Keep a supply of dry sugar, honey frames, pollen substitutes and sugar syrup on hand for this purpose.

Big swings in temperatures can kill bees. This is likely to happen from January through April in states such as Wyoming and Colorado, where a warm spell (in the 60s) causes the bees to leave the hive to look for nectar. In turn they consume large amounts of honey, so it's more important to feed winter patties and sugar syrup during these times than at any other.

Bees don't start to increase numbers until pollen arrives. As soon as you see bees entering the hive with pollen, the queen will start laying more eggs.

Quiz Yourself

- What are the four recommended methods for getting bees to fill your hive?

- You should stay out of your hive, opening it only briefly in an emergency and when temperatures are at least _____°F to protect your colony from the cold.
- Honey bee eggs and larvae are incubated at _____°F, regardless of the outdoor temperature.
- Windbreaks are needed in all northern states and southern states where winter temperatures range between _____°F.

Queens, Swarms and Robbers

Requeening Your Colony

Note: Much of the following information has been adapted from *Starting Right with Bees*.

You need to get a new queen if a queen dies or is lost and there are no larvae for the bees to raise a new one. If larvae are present and you don't want to introduce new genetics, you can let the bees raise a new queen. Joining a queenless colony with one that has a queen is possible but must happen within a few hours of losing the queen, or the queenless bees will likely attack the new queen. If you are requeening your colony because your queen is not laying well, it is best to dequeen and requeen in one operation. Work with your mentor on requeening. This is an advanced skill.

Introduce a new queen carefully. Poke a hole through the candy she was shipped with and place the cage above the opening between two frames, screen side down, in the center of the super so the bees can reach it. They will eat the candy and release the queen in 24 to 48 hours. Leave the hive alone for a week so you don't disturb the bees.



Sometimes the bees form a mass and cling to the new queen (or the queen cage) to smother her. This is called **balling**. Balling is caused by her new smell and the distress she is in when put in the new environment. If this happens, the hive may already have a queen or you may have introduced the cage too soon.

The best way to check if the queen has been accepted is to gently run your finger along the cage. If the attendant bees move out of the way, the queen can be released. If even one attendant clings to the queen cage, she is at risk of being killed when released, so wait another two or three days before making sure she is released. Remove any queen cups at the time so your new queen is fully accepted.



Worker bees that refuse to accept a new queen bite and ball the cage.

If balling occurs, the bees probably have a queen and won't accept the new queen that you introduced. Rescue the new queen quickly if your bees try to ball her by using a puff of smoke or by dropping the ball of bees into water. Bees that won't accept a new queen should be given a frame of eggs or young larvae. Bees occasionally ball a familiar queen due to a disturbance by the beekeeper, vandals, skunks or other threatening intruders. The colony is then queenless but will likely start making queen cells and raise a new one.

If requeening when there is no nectar or pollen, you must feed syrup or pollen substitute to simulate a honey flow before, during and after you introduce the new queen. Take a frame of capped brood and larvae from a stronger colony to supply the young bees needed to feed the new queen and her larvae. Leave the colony undisturbed for at least five days

after the queen has been accepted. If the queen has not been released after five days and the bees seem to accept her, spray her with syrup, pull off the screen and drop her down between the frames. Mark the queen with a dab of fast-drying paint if she is not already marked.

Swarming

Some bees swarm when the hive is strong and the brood nest is crowded with bees in the spring. An estimated two-thirds of the bees leave with a swarm, which causes the remaining worker bees to care for the hive and little time to collect nectar. This reduces honey production unless you can capture the swarm.



Swarming occurs after the bees are rearing a lot of brood, usually in May and June in the northern United States and March or April in the Gulf states. Swarms are a natural method of colony reproduction. Work with your advisor or read about the causes and control of swarms if this is a problem in your apiary.

Robber Bees

Bees sometimes learn that it is easier to steal honey or pollen from other hives than to collect nectar and pollen themselves. Italian honey bees are known for robbing.



This is especially likely to happen when little or no nectar is nearby. Robbing can also start if sugar syrup is spilled on the ground, honey frames or supers are left uncovered, or the bees are given wet extracted supers. Stopping this behavior can be difficult once it starts because when bees get a taste of honey they haven't made, they become excited. They return to their hive with fully ripened honey and excite other bees in the hive that also become robbers. This continues until they destroy the weaker colony they have been robbing. Help protect weaker colonies by reducing entrances to 1-2 inches and moving it to another yard or joining it with a larger colony.

Be particularly careful if you are harvesting honey when little nectar is available. Use an escape board with bee escapes rather than brushing or blowing bees off the frames. The cover must fit bee-tight and should not be warped or cracked, as a worker bee can squeeze through a 0.163 inch hole. Any supers above an escape board are unprotected so are tempting targets for robber bees.

Young bees just testing their wings are sometimes mistaken for robber bees. Watch to see if they are just flying around and not fighting and if activity soon decreases. Robber bees, on the other hand, dart around, going in and out of the hive, and the excitement increases.

Quiz Yourself

- _____
to simulate a honey flow before, during and after you introduce a new queen.

- About what percentage of the hive is estimated to leave when it swarms?

- Young bees just testing their wings are sometimes mistaken for

_____.

FYI - Scientific names

Honey bees belong to the genus *Apis*. Honey bees represent only a small fraction of the roughly 20,000 known species of bees.

Note from the *American Bee Journal* style guide: Italicize the Latin names of species. Capitalize the genus, but not the species or sub-species: *Apis mellifera mellifera*. In subsequent mentions, use an initial for the genus and species name, *A.m. mellifera*.

African bee – *Apis mellifera scutellata* (and hybrids)

Carniolan bee – *Apis mellifera carnica*

Caucasian bee – *Apis mellifera caucasica*

Eastern honey bee – *Apis cerana*

German black bee – *Apis mellifera mellifera*

Italian bee – *Apis mellifera ligustica*

Western honey bee – *Apis mellifera*

Bee Diseases and Pests

Pests and diseases can harm honey bees. Mice can be destructive during the winter as they are attracted to both the warmth and the honey and pollen in hives. Protect your entrances to decrease damage by mice. Many beekeepers fix a 1/4 inch square wire mesh over any openings during the fall and winter to prevent entry. Other bee pests include mites, ants and **wax moths** (small hive beetles) The Varroa mite is currently the worst problem for beekeepers worldwide and *must be controlled*.

Your bees will probably stay healthy, but be aware that disease can infect them. Some bee diseases are destructive to a hive, especially Nosema and American foulbrood. Viral diseases are also important but have no known effective treatment.

- Nosema disease is more common in Midwestern beehives than most beekeepers realize but seldom is so serious that it noticeably weakens the hive. It can, however, become a serious problem during the winter. The antibiotic Fumagillin can be used to treat Nosema, but it must be purchased from a veterinarian.
- American foulbrood can pose a serious threat to bee hives. Other brood diseases (European foulbrood, chalkbrood and sacbrood) are stress-induced diseases that usually can be cleared up by re-queening or feeding sugar syrup.

Learning about bee diseases and pests takes expertise and experience. Ask your advisor for help in determining causes and solutions. Do not attempt to evaluate and solve a problem by yourself until you have worked with bees for many years.

Some of the most common honey bee diseases, pests and medications are listed in Table 1. It is included to help you understand what to watch for and how to identify possible causes of problems. The information and suggestions in this publication are intended as a guideline for bee management. You can learn more from your advisor, journals, beekeeper meetings and the internet.



Controlling and treating some bee diseases and pests may require the use of pesticides. Many of these require training and certification. Laws and regulations change, so Purdue University Extension assumes no liability for these recommendations, which are included in this guide for educational purposes. They are incomplete and are not a substitute for reading and following pesticide labels.

Complete instructions for the use of a specific pesticide are on its label. The user is responsible for applying pesticides according to label directions as well as for problems that may arise through misapplication or misuse. Label changes, product cancellations and changes to recommendations may have occurred since publication of this guide. Ask your advisor for help with any pesticide you plan to use. This guide uses trade names for clarity, but they do not constitute an endorsement by Purdue University, nor do they imply discrimination against other products.

Table 1. Bee diseases, symptoms and treatment

DISEASE	SIGNS	TREATMENT (Rx)	CAUSE	METHOD
American foulbrood	An uneven pattern of brood with lots of empty cells. Some cell cappings may look darkened and sunken. Cells may be partially opened by bees. Larvae die after cell is capped. Bad smell.	Terramycin Destroy the colony and everything that came into contact with an infected colony: hives, suits, frames etc. Hive tool and smoker can be sterilized.	Bacteria, <i>Paenobacillus larvae</i> (= <i>Bacillus larvae</i>)	Not necessary to treat if there is no problem. Watch for symptoms and treat if needed. Sprinkle powdered sugar mixed with Terramycin according to the label instructions (3 treatments, 5 days apart).
Chalkbrood	Dead larvae become white or grey cottony "mummies" inside of cells. The bees may have discarded mummies in front of hive (cool weather problem).	Usually no treatment (Rx) required. Feed sugar syrup, add more brood or requeen.	A fungus, <i>Ascosphaera apis</i>	No drug needed. Chalkbrood often clears up when weather improves or after a new queen is introduced to the hive.
Diarrhea (Nosema)	Brown spots and streaks on hive box where bees come out. Foul smell. Nosema can be a problem in winter.	Fumadil-B Providing good ventilation helps!	A protozoan living in the bee's gut, <i>Nosema apis</i>	Treat package bees in spring with Fumadil in 1:1 sugar syrup. Treat hives with 2:1 sugar syrup in fall.
Tracheal mites	No obvious symptoms. Mites that are too small to see are inside the breathing tubes of the bees. In winter, infested bees may crawl out of the hive and die.	Usually no treatment (Rx) required. Some people use menthol crystals.	A mite, <i>Acarapis woodi</i>	No treatment needed. Most bees are resistant to tracheal mites. If your bees die in the winter, purchase queens from a different supplier.
Varroa mites	Look for Varroa mites in capped cells (especially drone cells) or on adult bees. In bad infestations, an uneven pattern of brood with some dead brood. Some bees may have deformed wings. Eventually results in death of the colony, especially early winter kills.	Apistan strips (fluvalinate), Checkmite+strips (coumaphos), or Apilife VAR tablets (contains thymol oil) Using a drone comb may also be helpful. The queen lays only drone on special frames with larger cells. The brood is then collected and frozen so mites can't hatch.	A mite, <i>Varroa destructor</i> (=V. jacobsoni)	<i>This bee problem must be controlled!</i> Check for Varroa spring and summer with sticky boards. Checkmite is effective but toxic and could harm developing queens. Apilife VAR is less toxic but more labor- intensive.
Wax moths	A problem of weak or dead hives and stored comb. Webbing in comb. Wax moth larvae bore right through bee brood and comb, leaving lines of dead brood and webbing. Can destroy good comb!	PDB moth crystals (paradichlorobenzene) are used in stored equipment only. Not moth balls! Bees usually control moths in colonies. Remove dead colonies.	Greater wax moth, <i>Galleria mellonella</i> . Especially attracted to combs containing brood and pollen.	Stack hive bodies or supers and put a piece of newspaper on top. Place 1/3 cup PDB moth crystals on paper above every fourth box. Renew as crystals evaporate. Or kill moths by putting boxes in freezer.

Follow all label instructions when you are treating your bees. Some bee diseases are highly contagious, spreading easily and quickly. Even if you are an excellent and conscientious beekeeper with healthy bees, your hives could become infected by bees from diseased hives of another beekeeper who lives several miles from you.

Questions & Answers

- What are the signs of Nosema disease?

- How would you protect your bees from Nosema?

- What are the signs of American foulbrood disease?

- Describe how American foulbrood can be successfully treated.

- What is chalkbrood disease?

- How is chalkbrood disease treated?

- How would you know if your bees have Varroa mites?

- What would you do to treat them for Varroa mites?

The Beekeeper's Calendar

The beekeeper's calendar helps you think through your bee colony maintenance during the year. It is based on a Midwestern time scheme and needs to be adjusted for other parts of the country. Your advisor can help you with necessary changes.

January

- Perform emergency feeding with sugar candy or dry sugar on top of the inner cover, if necessary.
- Inventory, repair and build new equipment you'll need before spring.

February

- Perform emergency feeding with sugar candy or dry sugar, if necessary.
- Order package bees or nucleus hives.
- Stage equipment for the active season.
- Clean up dead colonies.
- Begin spring feeding toward the end of the month or early in March.

March

- Order package bees and queens needed to replace those that are failing, or to make splits.
- Clean out entrances and bottom boards.
- Continue feeding sugar or syrup if colonies are empty.

April

- Introduce package bees. Feed package bees syrup.
- Requeen colonies with failing queens.
- Split strong hives and requeen one half to prevent swarming.
- Reverse hive bodies on two-story colonies where the queen is only laying above.
- Check colonies for American foulbrood and Varroa mites.

May

- Add a super to each strong colony.
- Remove queen cells to prevent swarming (but make sure they haven't swarmed first!).
- Provide a ventilation hole.
- Place queen excluder below shallow super on colonies for comb honey.
- Start to rear queens if you want to raise your own.
- Add another super if appropriate.

June

- Remove queen cells to prevent swarming.
- Replace defective combs with full sheets of foundation.
- Provide plenty of super space.
- Split hives to increase the number of colonies, if desired.
- Requeen toward end of month.
- Check colonies for American foulbrood and Varroa mites.
- Remove comb honey supers when properly sealed.

July

- Add sufficient super space.
- Monitor for Varroa mites with a screen bottom board using plastic sheets sprayed with vegetable oil. Assess treatment efficacy.

August

- Harvest honey supers when they stop filling up.
- Treat for Varroa mites with honey supers off.
- Extract clover honey.
- Remove section supers.
- Do not work bees too much, to avoid robbing.
- Perform fall requeening.

September

- Provide supers for fall flow, or let bees store it in brood nest.
- Check colonies for American foulbrood and Varroa mites.
- Either put empty supers above the inner cover to let bees clean them, or let bees rob from the supers in the bee yard. Then store with PDB moth crystals.

October

- Extract honey from fall flow.
- Put on entrance reducers or mouse guards.

November

- Complete late fall feeding if hives are light.
- Provide top entrance.
- Provide windbreaks.

December

- Check your state's apiary rules and regulations to be sure you are in compliance.
- Read about bees. Recommendations:
 - *The Education Store* (www.edustore.purdue.edu) — enter "bees" in the search box on the right.
 - Articles on your state's Extension website
 - Bee Culture information (www.beeculture.com/) and Bee Culture magazine (www.beeculture.com/magazine/)

Extracting Honey

You can extract (take) some of your bees' honey if they produce more honey than they need for the winter. Be careful to leave plenty of honey for the bees to eat during the months when nectar is not available. Work with your advisor or mentor to learn how to do this before trying it on your own. We give an overview here but as with other aspects of beekeeping, learning from someone else is easiest.

When the first super is two-thirds capped over, you can remove it. Lift off all the supers and put the one that is next fullest on top of the brood nest. Place full supers on top of an escape board so the bees can leave the super. It takes about 24 hours for bees to leave the super through the escape board. The full super can be stored on top of your hive.

Tips from the out-of-print book, *Starting Right with Bees*, still hold true today. Examine each comb quickly to be sure it doesn't contain brood, is more than half uncapped honey or isn't broken. This is a good time to clean frames of burr comb and propolis and to remove frames that are broken or contain dark, old or crooked combs. Honey supers removed from the hive during hot weather can be



extracted without supplementary heat. Store the supers in a warm room, or extract the honey on a warm day. Extracting the honey when it's 80-90°F is important because it allows you to spin the honey out of the combs quickly.

Now you need to cut off the cappings. New beekeepers often use a serrated knife or a **capping scratcher**. A heated or electric knife speeds up the process but may not be needed unless you have many supers. Pick up a frame and place it on end so that the center of the bottom end bar rests on the nail above an **uncapping tank**. Heat your knives in a can of hot water if you don't have an electric knife. Slice off the cappings with an upward sawing movement, dropping them into the uncapping tank. Move the knife upward, with combs leaning so the cappings fall clear of the comb and into the tank. The other side of the comb is uncapped the same way. Wipe the knife and put it back into the hot water. Use a new knife if you have another comb to uncap.

Extracting honey with an extractor

An extractor is recommended equipment because it makes removing honey from the comb much easier. Your mentor may let you use theirs while you are learning, or check with your local club or beekeeping supply store to see if you can rent an extractor.

You can also buy the first three items on the list below — extractor, settling tank and uncapping knife — from any manufacturer of beekeeping equipment. Purchase jars and tins from this company, too, if you choose to use a uniform bottling system. A stainless-steel strainer is easy to use. Try to find one that fits over your honey bucket.

- Gather the following equipment.
 - Work apron or coveralls (this is a messy job)
 - Honey extractor
 - Settling tank
 - Uncapping knife/knives (one if electric, two if not electric)
 - Cappings scratcher
 - Jars, storage tins
 - Cheesecloth or stainless-steel strainer
 - Five-gallon bucket
- Place the frames around the extractor equally to keep the reel in balance. Start spinning slowly and follow the manufacturer's instructions.

- Place the frames into empty supers soon as they are extracted. Place empty supers near the extractor on heavy paper, newspaper or plastic sheeting to catch drippings.
- Drain the honey from the extractor into your five-gallon bucket after every spin.
- Pour your honey into a storage tank fitted with a strainer. Leave it in the storage tank for at least 24 hours to allow air bubbles, fine particles of wax and other material to rise to the surface.
- Skim the wax off the top and draw the honey from the bottom of the tank.

Note: Some states require training to learn the rules and regulations for selling honey at farmers markets, stores or roadsides.

Extracting honey without an extractor

It's possible to remove honey from the comb without an extractor if you don't want to invest in one until you're sure that beekeeping is something you really want to do. However, extracting honey without an extractor is time-consuming and difficult. This method is only practical for a limited amount of honey and results in loss of otherwise reusable comb.

- Work in a warm room (about 80°F).
- Remove the cappings from the surface of the comb.
- Cut the comb from the frame and mash up the comb.
- Separate the honey and wax by using one of the following methods.
 - Strain the mashed comb through a stainless-steel screen. This avoids heating the honey too much, which can affect its flavor and color.
 - or*
 - Squeeze out the honey with cheesecloth (or a clean nylon hose).
- Once the honey and wax are separated, turn off the heat, allow the honey to cool and lift off the wax.
- Strain the honey through cheesecloth and allow it to settle overnight. The honey will be ready for bottling by morning.

Honey varies considerably in its tendency to granulate, depending largely on the flowers the nectar was taken from. Honey for home use or sold directly to a consumer may be bottled straight from the settling tank without heating. If, however, the honey is to remain on a grocery shelf or stored in bottles, process it with heat to avoid crystallization in the jar. Honey to be sold as natural or raw calls for a minimum of straining and little or no heat. If the honey is not bottled immediately after extracting, it should be drawn out of the storage tank into 5-gallon pails or 55-gallon drums.

After extraction, return the supers to the hive for the bees to clean up. Make sure none of the wet supers are from diseased colonies or you will spread the disease. Distribute wet supers on several hives and place them out in late afternoon to reduce the possibility of robbing.

Leave the uncapping tank overnight so the remaining honey can drip out. Drain the tank the next day and strain out the honey. If you used an electric uncapping knife, the honey may be scorched. Scorched honey isn't good to eat but can be fed to a weak hive. Some extractors spin out cappings. Some beekeepers let the bees clean out cappings or melt them in boiling water, honey and all, to collect the cappings wax.

When you're done, wash your extractor with cool water.

Comb honey

Cut comb honey is produced by simply cutting the whole honeycomb free from the frame and dividing the comb into smaller square or rectangular pieces.

Sharing Your Knowledge

Now that you've learned to care for a colony of bees, you might want to share your knowledge in a poster or demonstration at a 4-H club meeting, school, fair or beekeepers' meeting. Check with your local Extension office for guidelines for fair exhibits. Some possible topics are listed here, but you are encouraged to present anything that you found interesting as you began keeping bees.

- Selection of a hive location
- Your hive's health
- Disease control
- The seasonal management of a beehive
- Extracting honey

Learn More

Find fact sheets and much more at the United States Department of Agriculture (USDA) website (www.usda.gov/pollinators) and/or the USDA Natural Resource Conservation Service website (www.nrcs.usda.gov/pollinators).

The Complex Life of the Honeybee, The Education Store, www.edustore.purdue.edu

Auburn University Bee Laboratory, <https://agriculture.auburn.edu/research/enpp/bee-lab/>

The University of Florida Bee Lab, <https://entnemdept.ufl.edu/honey-bee/>

Glossary

Adult: Last stage of bee development after the bee emerges from the cell.

Afterswarms: Swarms that leave a colony with a virgin queen after a swarm of the same season has already left the hive.

American foulbrood: An extremely contagious disease of bees that affects them in the larval (worm) stage of development caused by the bacteria *Bacillus larvae*.

Apiary: A collection of colonies of honey bees; also, the yard or place where bees are kept.

Apiculture: Beekeeping.

Balling: Worker bees surround an unacceptable queen (or queen cage) to try and kill her.

Bee bread: A mixture of pollen and nectar or honey and the main source of food for honey bee workers and larvae.

Bee escape: A device to remove bees from supers or buildings; constructed to allow bees to pass through in one direction but to prevent their return.

Beehive: A box or other structure for housing a colony of honey bees.

Bee space: An open space (1/4 to 3/8 inch) that permits free passage of a bee but is too small to encourage comb building.

Beeswax: The wax that bees secrete from eight glands in the underside of the abdomen, used in building their combs.

Bee veil: A wire screen or cloth enclosure worn over the head and neck for protection from bee stings.

Bottom board: The floor of a beehive.

Brace comb: Small pieces of comb built between combs and the hive.

Brood: Young developing bees found in their cells in the egg, larval and pupal stages of development.

Burr comb: Small pieces of wax built on a comb or upon a wooden part of a hive but not connected to another comb or part.

Capping scratcher: A fork-like device used to remove the wax cappings covering honey so it can be extracted.

Castes: The different kinds of adult bees in a colony: worker, drone and queen.

Cell: A single compartment in a honeycomb in which brood is reared or food is stored.

Chunk honey: A piece or pieces of comb honey packed in a jar with liquid extracted honey.

Clarification: The removal of foreign particles from liquid honey or wax by straining, filtering or settling.

Cluster: A large group of honey bees hanging together, one on another.

Colony: A community of honey bees having a queen, thousands of workers and (during part of the year) a number of drones.

Cut comb honey: Squares of honey in the sealed comb in which it was produced; cut from a shallow, super-size frame of sealed honeycomb and then packaged in clear plastic.

Drifting: The return of field bees to colonies other than their own.

Drone: A male honey bee.

Dysentery: A disease of honey bees causing an accumulation of excess waste products that are released in and near the hive.

Egg: The first stage of metamorphosis of the honey bee.

European foulbrood: An infectious disease affecting honey bees in the larval (worm) stage of development; caused by the bacteria *Streptococcus pluton*.

Extracted honey: Liquid honey.

Extractor: A machine that uses centrifugal force to remove honey from the comb without destroying the combs.

Field bees: Worker bees, usually at least 16 days old, that leave the hive to collect nectar, pollen, water and propolis.

Foundation: A base made of either wax or plastic on which bees can construct complete comb.

Frame: Four strips of wood joined at the end to form a rectangular device for holding honeycomb.

Granulated honey: Honey that has crystallized, changing from a liquid to a solid.

Hive: Worker bees available for purchase. As a verb, to put a swarm in a hive.

Hive body: A single wooden rim or shell that holds a set of frames. When used for the brood nest, it is called a **brood chamber**. When used above the brood nest for honey storage, it is called a **super**.

Hive cover: The roof or lid of a hive.

Hive tool: A metal tool with a scraping surface at one end and a blade at the other, used to open hives, pry frames apart, clean hives, etc.

Honeycomb: The mass of six-sided cells of wax that honey bees build and in which they rear their young and store their food.

Honey flow: A time when nectar is plentiful and bees produce and store surplus honey.

House bee: A young worker bee, one day to two weeks old, that works only inside the hive.

Hybrid: A cross between any two distinctly different populations.

Inner cover: A thin wooden board placed just beneath the hive cover for added protection and insulation from the elements.

Job shadowing: Learning from others by following, watching and studying what they do in their jobs.

Larva: The grublike or wormlike immature form of the honey bee in its second stage of metamorphosis

Metamorphosis: The series of stages an insect passes through: egg to larva to pupa to adult.

Movable frame: A frame of comb that can be easily removed from the hive. It is constructed to maintain a proper bee space, which prevents the bees from attaching comb or fastening it too securely with propolis.

Nectar: A sweet liquid that plants secrete, usually in their flowers, and that bees convert into honey.

Nosema: An infectious disease of the adult honey bee that infects the mid-gut, or stomach, caused by a protozoan parasite. Symptoms closely resemble those of dysentery.

Nuc: A nucleus hive consisting of three-five frames of bees, brood and a laying queen.

Observation hive: A hive made mostly of glass or clear plastic to permit observation of the bees at work.

Pesticide: A general name for materials used to kill undesirable insects, plants, rodents or other pests.

Pollen: Dust-like grains formed in the flowers of plants in which the male elements are produced. Honey bees use pollen as a protein food for their young.

Proboscis: The tongue of a honey bee.

Propolis: A kind of glue or resin that bees collect and use to close up cracks, anchor hive parts, etc. It is also called **bee glue**.

Pupa: The third stage of a developing bee when it is inactive and sealed in its cell. The adult form is recognizable during this stage.

Outer cover: Protects the hive from rain.

Queen and drone excluder: A device, usually constructed of wood and wire or sheet zinc, with openings large enough for worker bees to pass through but too small for the passage of larger drone and queen bees.

Robber bee: A field bee from one colony that takes, or tries to take, honey from another colony.

Sacbrood: A slightly contagious disease of brood caused by a virus.

Sealed brood: Brood, mostly in the pupa stage, that bees have capped or sealed in cells with a somewhat porous capping of wax.

Section comb honey: Honey in the sealed comb produced in thin wooden frames called sections.

Smoker: A device that burns slow-burning fuels to generate smoke that keeps bees calm while working in their hive.

Solar wax extractor: A glass-covered box for melting down beeswax with the heat of the sun.

Species, sub-species: The biological division below genus comprising organisms capable of interbreeding. Sub-species (in bees, usually synonymous with **race**) have defining characteristics.

Super: A receptacle in which bees store surplus honey placed over (above) the brood chamber. As a verb, to add supers in expectation of a honey flow.

Supersedure: Rearing a new queen to replace the mother queen in the same hive.

Swarm: A large group of worker bees, drones and a queen that leaves the mother colony to establish a new colony.

Travel stain: The darkened appearance on the surface of comb honey when it is left in the hive for some time, caused by bees tracking propolis over the surface as they walk over the comb.

Uncapping knife: A knife used to shave off the cappings of sealed honey before extraction. It can be heated by hot water, steam or electricity.

Uncapping tank: A container that frames of honey are uncapped over. It usually strains out the honey, which is then capped.

Uniting: Combining two or more colonies to form one large colony.

Varroa destructor: Commonly called the Varroa mite, considered the most serious cause of colony winter losses.

Virgin queen: An unmated queen.

Wax moth: A moth whose larvae feed on and destroy honeycomb.

Appendices/Attachments: Record Keeping

Hive Notes

Label each hive if you have more than one.

Hive (number and location):
Queen color and temperament:
Brood pattern (compact or loose):
Cleanliness (appearance of bottom board):
Bee handling ease:
Whiteness of wax cappings:
Productivity - honey removed (# of supers) and dates:
Conservation of stores:
Disease problems and medication record:
Swarms (include dates):
Propolizing tendencies:

Beekeeping Equipment Inventory

Date Obtained	Item	Number	Cost
Total			

Receipt List

Date Obtained	Item	Value (used at home)	Value (sold)
Total			

Financial Summary

Assets

	Value of bees, equipment on January 1
	Value of supplies, equipment purchased during the past year
	Miscellaneous expenses during year - describe
	Total

Inventory

	Value of bees and equipment on January 1
	Value of bee products (number of bottles of honey and amount of extracted, chunk or cut comb honey) on December 31
	Total

Labor Record

Record all the time you spent working.

Date	Location	Kind of work	Time (hrs)
Total			

