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Installing Packages and Hiving Nucs

One of the greatest joys of beekeeping is acquiring one's first hive. I dedicated an entire article to discussing how to acquire bees and queens (see Ellis, J.D. 2015. Acquiring bees and queens. *American Bee Journal*, 155(1): 29-33). In the current article, I discuss the next step in becoming a beekeeper: initiating your new colonies. Given that most beekeepers acquire their hives as packages or nucs, I feel that it is appropriate to share how to install both colonies of bees into a full size hive.

A package of bees, quite literally, is a cage of bees that one can purchase to install into existing hive equipment. They can be purchased from a number of sources. Usually, packages can be picked up directly from the producer or the producer may ship the package via the U.S. Postal Service or other carrier service. The physical package typically is constructed of a wooden top, bottom, and sides while the faces of the package are screen mesh. There are new, fully plastic packages available on the market. I suspect these will become more common in the future.

Packages are sized and sold by the weight of the bees they carry. This usually ranges from 2 – 5 lbs of bees. Furthermore, packages can be purchased with/without queens, though it is most common to purchase packages with queens.

Nucs, short for “nucleus colony,” are small versions of full size colonies. They are composed of full depth and length hive bodies and supers. However, the nuc hive bodies and supers are narrower and accommodate fewer frames. Nucs are functioning colonies, complete with a queen, brood, worker bees, honey, pollen, and wax. In essence, a nuc is

a small colony, ready to grow into a big one.

Nucs are sized and sold by the number of frames they contain. Nucs usually contain three to five frames, with the most common size being the five-frame nuc. Typically speaking, nuc producers sell only the frames/bees and charge more money to beekeepers wanting to purchase the accompanying nuc lids, bottoms, and hive bodies. Many nuc producers will require a deposit for the nuc lid, bottom, and hive body. That way, they make money on this equipment if the beekeeper purchasing the nuc fails to return the equipment. The beekeeper is given his/her deposit back if he/she returns the nuc hive parts to the nuc producer.

Every beekeeper has his/her preference regarding nucs and packages. To be sure, there are advantages and disadvantages to starting with nucs and packages. To help you decide between nucs and packages, I developed a table (Table 1) in which I compare various aspects associated with nucs and packages directly. Furthermore, I provide below step-by-step instructions for installing packages and nucs, with many photographs that illustrate what I discuss. Finally, I provide additional pointers regarding nuc and package bee installation that I hope are of some use to you. At the end of the day, every beekeeper should install a package and a nuc, just to experience the work associated with doing both.

Step-by-step instructions for installing packages

Step 1 – Acquire your packages (Figure 1).
Step 2 – Know the parts of your package (Figure 2). Packages typically have wooden tops, bottoms, and end walls. The faces of

the packages are made of screen wire. There is a wooden lid on top of the package. The lid covers a large hole that accommodates a metal feeder can that extends about 3/5 of



Figure 1. Packages ready to be installed. These packages were received one day prior to their installation into colonies. Consequently, they were stored in a cool (75°F), dark room until they were installed. Photograph: University of Florida



Figure 2. A typical, 3 lb package. The bees have been shaken down to the bottom of the package so that the feeder can is visible. Photograph: University of Florida

Table 1. Comparing nucs and packages.

	Packages	Nucs
Price	\$81 – 100 for a 3 lb package of bees with a queen (2015 prices)	About \$125 – 190 for a five frame nuc (2015 prices)
How are they sold?	2 – 5 lb packages with 3 lb packages being most common	3, 4, and 5 frame nucs with 5 frame nucs being most common
Amount of bees included	About 3,500 – 4,500 bees per pound, this being a rough average. It is common to purchase packages with queens, though one can purchase queenless packages.	About 2,000 bees per fully occupied frame (both sides of a frame) in a nuc. Nucs should come with mated and laying queens.
Presence of brood	Does not come with brood	Comes with brood of all stages of development
Stored honey	Does not come with stored honey	Comes with stored honey
Stored pollen	Does not come with stored pollen	Comes with stored pollen
Wax comb	Does not come with comb	Comes with comb
Availability	Typically available from late March through June or July. Package producers often do not ship packages during summer months.	Typically available February through October, depending on where the producer is located in the U.S.
Likelihood of disease transmission	Only pests/pathogens that can accompany adult bees can be acquired through packages. These include the various adult bee viruses, <i>Nosema</i> , tracheal mites and <i>Varroa</i> , among others.	All pests/pathogens that a colony can have can be acquired through a nuc. Arguably, beekeepers are more likely to acquire a pest/pathogen through a nuc than through a package.
First season productivity	Typically, colonies derived from packages are in growth mode the first season. This is especially true if the bees were hived on foundation. However, packages can produce surplus honey the first season if managed correctly.	Like packages, hived nucs typically are in growth mode the first season. They do have a head start over packages given that they already have brood, an accepted/laying queen, and some food stores. They can produce surplus honey the first season if managed correctly.
What equipment accompanies the bees (what equipment comes with the purchase)?	You can keep the package (the cage in which the bees come).	Nucs come with the purchased frames. Usually, the nuc hive body, lid, and bottom board can be purchased with the frames/bees, but for an added cost. Often, nuc distributors require a deposit for the hive body, lid and bottom board, with the beekeeper getting the deposit back upon return of the equipment to the producer.

the distance into the package from the top. The feeder contains sugar water or corn syrup and has holes in its bottom surface. The caged bees feed from these holes while the package is in transit. The feeder rests on a small piece of wood that runs between the two screen faces of the package. The package also contains a small queen cage that houses the queen and sometimes attendants, the latter depending on queen breeder habit (i.e. some queen breeders add attendants, worker bees who “attend” the queen, to the cage while others do not). The queen cages usually are made of wood or plastic.

Step 3 – Get your hive components together



Figure 3. An apiary containing full size, empty hive bodies that are ready to receive packages. Photograph: University of Florida

and make them ready to receive the packages (Figure 3). In Figure 3, the hives are composed of single deep hive bodies and contain wooden frames outfitted with plastic foundation. If is, of course, OK to start colonies on pulled combs as long as the combs are pest and disease free.

Step 4 – Take the packages to the hives in which they will be installed (Figure 4).



Figure 4. Packages placed on the hives into which they will be installed. Photograph: University of Florida

Step 5 – Spray the packages with water (Figure 5). Bees lightly misted with water cannot fly, making package installation significantly easier. Many people use sugar water for this purpose. However, sugar water makes the package and bees sticky, attracts robbing bees, and is not necessary.



Figure 5. Misting the bees with water. Photograph: University of Florida

Regular tap water will do just fine. First, mist the bees with water through both screen faces of the package. Next, lightly bounce the bees down to the bottom of the package by giving package a firm tap on the ground. Spray the bees as they cluster on the bottom of the package. Next, firmly tap the package on one end. This causes the bees to fall to one end of the package and allows one to mist bees that were in the center of the cluster originally and, consequently, were not sprayed earlier. Then, firmly tap the package on the opposite wooden end, causing the cluster of bees to slide to the opposite side of the package. Repeat this procedure 2-4 times, misting the bees every time. This should be done until all of the bees in the

package are misted. Do not over mist the bees. You do not want them to drown or chill if daytime temperatures are cool.

Step 6 – Remove the wooden lid from the top of the package using a hive tool (Figure 6). Bees cannot escape the package with the lid removed since the feeder blocks the opening.



Figure 6. Removing the lid of a package using a hive tool. Photograph: University of Florida

Step 7 – Remove the feeder from the package using a hive tool (Figure 7) and place the wooden lid loosely over the package opening. The sugar water in the feeder can be added to a hive feeder to feed a colony. Thus, it is useful to have a can opener on hand.



Figure 7. Removing the feeder can using a hive tool. Photograph: University of Florida

Step 8 – Remove the queen cage from the package. Often, the queen cage will have a metal tab or something similar affixed to it so that it can hang on the frame beside which it is installed. If this metal or similar tab is not present, staple a piece string (about 6 inches or 15 cm) to the back of the cage (Figure 8). Make sure the staples are not long enough to go through the cage walls and into the space where the queen and workers are. This could damage the bees within. Also, the string should be sta-



Figure 8. Stapling a string to the back of a wooden queen cage. Photograph: University of Florida

pled to the end of the cage containing the “candy” so that this side of the cage will be facing up when hung between frames.

Step 9 – Remove four frames from the hive (Figure 9). I usually remove the frames from one side of the hive if I am going to install the bees by placing the entire package into the hive. I remove the frames from the middle if I am going to install the bees by shaking the bees from the package and into the hive. Both methods of package installation are discussed below.



Figure 9. A deep hive body with four frames removed, ready to receive the package of bees. Photograph: University of Florida

Step 10 – Suspend the queen cage between two frames before the bees are added to the colony (Figure 10). The frames in the colony in Figure 10 only have foundation. There are no frames with pulled combs. Thus, the queen cage must be secured between the two frames using the string stapled to the cage.



Figure 10. Placing the queen cage into the hive. Photograph: University of Florida

Step 11 – Staple the string affixed to the queen cage to the top bar of a frame (Figure 11). This will suspend the queen cage close to the top of the frame. This step is not necessary if the frames between which the cage is installed contain pulled combs. Cages can be secured between two frames containing pulled combs simply by squeezing the frames together and allowing the queen cage to sink into the wax of both combs. Figure 12 shows the correct placement of the queen cage adjacent to a frame. First, the candy end of the cage (the circular chamber containing the solid white candy) is pointing up. This is important, especially when worker bees are in the cage with the queen. Sometimes, the accompanying workers die in the cage and fall to the bottom. If the candy end of the cage points down, the dead worker(s) can block the queen’s exit hole. Second, the screen face of the queen cage



Figure 11. Stapling the string attached to the queen cage to the top of a frame. The cage is affixed about 1/3 of the distance from one end of the frame. That way, it is not in the center of the hive where sugar water can drip onto the cage from jar feeders placed overhead. Photograph: University of Florida

is oriented perpendicular to the face of the comb. Installed this way, the colony’s workers can interact with the queen through the screened face of the cage. The cage’s screen face should not run parallel to the combs between which it is installed. Oriented this way, the bees from the colony are not able to interact with the queen in the cage. Thus, they may not have accepted her by the time she is released. At this point, many beekeepers would remove the cork from the candy end (note the corked hole at the top of the queen cage in Figure 12). Done this way, the worker bees in the colony will eat through the candy in one to three days. However, I like to release my queens from their cages manually, when I can tell that the bees in the colony have accepted them. How do I know if the bees have accepted the queen? Bees usually have accepted the queen if they move freely on the screen face of the cage. The bees in this case can be brushed easily from the cage with one’s finger. Bees that have not accepted the queen tend to cluster tightly on the face of the cage, biting the screen wire. In this instance, it can be difficult to brush the bees from the cage since they are holding on so tightly. It almost appears that the bees are trying, aggressively, to gain access to the queen so that they can attack her.



Figure 12. The correct placement of a queen cage in the hive. The candy end of the cage (circular chamber with white solid covered by wax paper) is pointing up and the screened face of the cage runs perpendicular to the face of the comb. Photograph: University of Florida

*** At this point, the package can be installed one of two ways. I cover the first method (package placement into the hive) beginning in Step 12 and discuss the second method (shaking bees from the package and into the hive) beginning in Step 18.

Placing the package directly into the hive
Step 12 – This step follows step 11 and represents one of two methods for installing the package into the hive. The bee-filled package can be placed into the colony, in the empty space created when the frames are removed (Figure 13). Installing packages this way seems less invasive to the bees than does the second installation method. Furthermore, I find that the bees are less likely to abscond (completely abandon the nest) when installed this way than when shaken into the colony. Let me expand on this idea a bit. I have installed hundreds of packages in my life and occasionally, an entire colony will abscond after installation.



Figure 13. Placing a package into a hive. Photograph: University of Florida

This can occur for any number of reasons. However, I see it happen most often when the package contains a queen that the package producer overlooked when shaking the bees into the package. The package of bees then initiates a behavior that is similar in nature to swarming but where all of the bees, rather than a fraction of them, leave the hive in search of a new nest. This behavior often can trigger other installed colonies to leave the nest. In fact, I have seen many installed packages merge into super swarms, or one big swarm composed of bees from multiple hives. When installing many packages, I like to (1) install packages late in the evening to give the colony as little daylight as possible to abscond and (2) install the pack-



Figure 14. The package is placed to one side of the hive, with the queen cage positioned between the remaining frames, about 1/3 of the distance from one end of the frames. Photograph: University of Florida

age by placing the entire package into the colony (Figure 14). This seems to be less chaotic than shaking the bees into the nest and I find that it results in fewer absconding colonies.

Step 13 – Place the lid on the colony (Figure 15).



Figure 15. The lid returned to the colony. Photograph: University of Florida

Step 14 – Provide food to the bees (Figure 16). Most beekeepers and bee educators recommend using a 1:1 mixture of sugar:water, by volume. For example, you could add one quart of water to one quart of sugar, two liters of water to two liters of sugar, etc. Newly installed packages need to be fed as much sugar water as they will take unless a major nectar flow is ongoing. This is especially true if the packages are hived on foundation since the bees will need the incoming energy provided by the sugar to create wax.



Figure 16. The feeder jar placed on top of the colony. Photograph: University of Florida

Step 15 – Return to the colony in three days to finalize the installation process. At this point, the empty package should be removed from the hive and any bees remaining in the package should be shaken into the hive.

Step 16 – The queen cage should be checked to see if the queen has been released from the cage, if allowing the bees to release the queen. If intending to release the queen manually, the screen mesh of the cage should be pulled open with the hive tool and the queen allowed to emerge from the cage, onto a face of one of the combs. Watch the queen closely in this instance. She should be returned to the cage if there is any indication that the bees in the hive are attacking her, thus suggesting the queen has been rejected. Additionally, caged queens that are not clipped can fly (and often do)! It is common to release a queen manually onto a comb only to have her fly away in the process. There are a couple of ways around

this issue. First, you can purchase clipped queens for a slightly higher price. Second, you can remove the cork from the side of the cage that does not contain candy and put the cage back into the colony. The queen soon will crawl out of the cage and self-release, of course after you determined she was accepted by looking at bee reactions to her while on the screen face of the cage.

Step 17 – Finally, the four frames removed prior to package installation should be replaced into the hive and the lid returned to the nest.

Shaking the bees into the hive

Step 18 – This step follows step 11 and provides an alternative method of installing packages into hives. It also is the most common way packages are installed into the hive. In this method, the bees in the package (prepared as noted in steps 1-11) are shaken into a hive in the space created when removing the four frames from the hive (Figure 17). To do this, turn the package over the hive and shake it lightly. The misted bees will pour from the hole in the top of the package and into the nest in the empty space created by removing the four frames (Figure 18). After most of the bees have been poured from the package into the hive, the package can be tapped firmly to group the remaining bees into a small cluster that can be poured easily from the package.



Figure 17. Shaking bees from a package into a nuc. Photograph: University of Florida



Figure 18. A close-up view of bees being shaken from a package and into a nuc. Photograph: University of Florida

Step 19 – Bees will clump together when poured into the bottom of a hive (Figure 19). As a result, the beekeeper must take care not to return the frames too quickly to the hive because they may squish the bees on the bottom of the hive (Figure 20). The frames should be returned to the colony with care to avoid killing bees.

Step 20 – The lid should be returned to the hive and the colony fed (Figure 21) as often as it takes the food.

Step 21 – I usually lay the nearly empty package against the hive entrance (Figure 22). This allows any bees that were not shaken from the package to exit the package and enter the nest on their own over the next few days.



Figure 19. The bees shaken into the hive will form a thick layer on the bottom. *Photograph: University of Florida*



Figure 20. The frames must be returned to the colony slowly in order to reduce the chance that the bees layered on the bottom will be crushed. *Photograph: University of Florida*



Figure 21. The lid returned to the colony and the feeder jar being added. *Photograph: University of Florida*



Figure 22. The package can be laid against the hive to allow any remaining bees to exit the package and go into the hive. *Photograph: University of Florida*

Additional points to consider when installing packages

- Some beekeepers treat the package bees for pests and diseases before the bees are introduced into the colony. They do this because they believe that it is easier to get pests and pathogens under control before adding them to the nest matrix (wax, pollen, brood, honey, etc.). There is some evidence that dusting bees with powdered sugar while the bees are in the package can help remove some of the *Varroa* that adhere to the bees. I knew a beekeeper who would feed his packaged bees Fumagilin mixed according to label to control *Nosema*. Regardless, it can be a good idea to treat the packages prior to or soon after introducing them into the hive.
- I want to reiterate that packages should be installed in the evening, making it less likely for them to abscond.
- The caged queen should be positioned relatively close to the package if installing the package by placing it into the nest. That way, the bees emerging from the package can find the queen quickly and cluster around her to keep her warm if the package is being installed in cooler temperatures.
- The queen cage must be fastened securely between frames. Otherwise, the cage may fall to the bottom of the hive where the bees cannot tend the queen or keep her warm.
- Packages of bees tend to be quite docile. However, it remains important to mist the bees prior to package installation to keep the bees from flying during the installation process.
- Some package producers will pay you back a little money if you return the physical package after the bees have been installed into the colony.
- Occasionally, a queen accompanying a package can arrive dead. It is important that the package producer be notified of this immediately upon discovery. This increases your chances of getting reimbursed for a queen or being sent a replacement queen.
- A final note on bee biology: the queen is kept in a cage inside the package because she is not related to the bees in the package. Usually, queen breeders produce queens in one apiary and shake packages from colonies in another one. The two (queen and package) are put together in the field or back at the warehouse. Thus, the queen cannot be released immediately into the package because the bees contained within may kill her.

Step-by-step instructions for hiving a nuc

Step 1. Acquire your nuc(s).

Step 2. Set up a full size hive on a stand and ready it to receive the nuc by removing a number of frames from the brood box equivalent to the number of frames in the nuc (Figure 23).

Step 3. Smoke the nuc and inspect the combs to ensure that the queen is present and lay-

ing and that the nuc otherwise is disease/pest free (Figure 24).

Step 4. Shake bees from the nuc lids into the full size hive (Figure 25).

Step 5. Begin transferring frames from the nuc into the full size hive (Figure 26). Check the frames throughout this process and make sure that the queen is transferred on one of the frames into the full size hive.

Step 6. Space the frames appropriately once all of the frames have been transferred from the nuc to the hive (Figure 27).

Step 7. Shake all of the bees remaining in the nuc into the full size hive (Figure 28). It is ok to “bounce” the nuc on the full size hive body to help dislodge the bees.



Figure 23. A deep, full size hive body established on a screened bottom board. Five frames have been removed from the hive to create a space that will accommodate the five frames from the 5-frame nuc sitting behind the colony in the photograph. *Photograph: Amanda Ellis*



Figure 24. Inspecting the nuc frames for a queen, brood, and general health issues. The bees in this nuc have just begun to construct comb on the black plastic foundation. *Photograph: Amanda Ellis*



Figure 25. Shaking bees from the nuc inner cover into the full size hive. *Photograph: Amanda Ellis*



Figure 26. Transferring frames from the nuc into the full size hive. *Photograph: Amanda Ellis*



Figure 27. Adjusting the frames in the full size hive now that the transfer of frames from the nuc to the full size hive is complete. *Photograph: Amanda Ellis*



Figure 28. Shaking bees from the nuc hive body into the full size hive. *Photograph: Amanda Ellis*



Figure 29. The full size hive after the nuc transfer is complete. *Photograph: Amanda Ellis*

Step 8. Assemble the full size colony (Figure 29).

Step 9. Feed the full size colony 1:1 sugar:water unless a major nectar flow is happening.

Additional points to consider when installing nucs

- You have the right to inspect any nuc prior to purchase. Nucs can have any pest/pathogen that a colony is capable of having. It is important that nucs be inspected prior to purchase or upon placement into a full size hive. It probably is a good idea to treat the bees soon after they are installed into the full size hive. If inspecting for nothing else, I highly recommend that all nucs be inspected for American foulbrood. The scales produced by this debilitating disease are visible in the brood combs. You should NOT purchase nucs that show evidence of American foulbrood.
- Unfortunately, some nuc producers produce and sell nucs as a means of getting rid of old equipment. Consequently, the quality of frames in a nuc may be poor and/or the combs may be old. It is always advisable to inspect the nucs prior to purchase to ensure that you are getting quality equipment.
- The price of a nuc usually includes exclusively pulled combs (i.e. no foundation) and should include a hive full of bees (every face of every comb is covered with bees). You should accept nothing less.
- Given that nucs should come full of bees and with a laying queen, nucs are prone to swarming if they are not hived soon after purchase. It is common for me to hear reports of nucs swarming because the beekeeper purchased them one week but did not plan to install them into full size equipment until weeks later. You should plan accordingly.
- Nucs can be overwintered, provided that they have ample food supplies heading into winter. One advantage to five frame nucs is that many equipment suppliers sell equipment that can be used on 5-frame nucs. For example, one can purchase medium supers for five-frame nucs. This is useful because it provides the bees in the nuc a place where they can store winter food.
- Purchasing nucs allows you to get an honest appraisal of the queen you are purchasing. After all, she is mating and laying, thus allowing you to judge her brood pattern and overall productivity.

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