CALENDAR FOR BEEKEEPING IN CENTRAL NORTH CAROLINA

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This calendar was designed for general beekeeping use in most of central North Carolina. Recommendations are based on average climate/weather conditions, and may vary with significant temperature changes. Those who manage hives for commercial operations may have different needs than those listed below. Details regarding bloom types/dates and pest/disease management are not included here due to space limitations; consult *reliable and current resources* for this information. This calendar is subject to being updated as new information becomes available. **Remember: bees often follow a different calendar than humans do!**

January

Add pollen supplements, if needed; check amount *and location* of honey stores, and feed (2:1 syrup or fondant) if <3/4 super of stored honey left.

Check/repair/replace stored equipment; order wax/woodenware.

Order nucs/packages.

Keep learning---bee school, read books/journals, etc.

Combine or insulate smaller (less than 4 frames of bees) hives.

Combine hives where queen has failed, if they're still alive and haven't absconded.

Move hives if they'll need to be relocated this year.

Bees may need help removing dead bodies from entrance area.

February

Noticeable pollen flow under way, especially red maple-→ brood build-up intensifying.

Minimal if any nectar available---most hives need feeding (1:1 syrup in most cases, unless honey stores very low [i.e., <1/2 super left]).

Combine hives if needed (see January entries above).

Repair/replace equipment if needed; move hives if needed; keep learning.

During last half of February, consider adding super/hive body of wax *foundation* to allow bees to draw out more comb for spring. (Feeding or nectar is required for this.)

Replace a few (<4) frames where comb is old or has excessive drone cells.

Some hives may need treatment for *Nosema* disease, especially if too cold for cleansing flights.

Call your local cooperative extension office if you want your name on a "swarm-catcher" list.

Make plans to attend the annual NCSBA Spring Meeting in March.

March

NCSBA annual Spring Meeting (usually first weekend in March)---<u>great learning opportunity</u>!

Swarming under way-→ implement prevention measures (make splits, remove queen cells, "checker-board", temporarily or permanently remove current mother queen); set up "bait" hives.

Reverse bottom two or three boxes on hive to give queen more room to lay: most hives have moved up above the bottom hive body, leaving it virtually empty. This measure also helps reduce swarming. Caution: be careful not to split up clusters of brood when you do this. Two to three weeks after this reversal, it's likely that you'll need to reverse them again. (An alternative to reversal: simply add another hive body.)

Assess for pest and/or disease problems (especially varroa mites, American foulbrood, and European foulbrood) and treat if needed. Treatments should be completed by early April to limit risk of contaminating honey.

Check honey stores; feed (1:1 or thinner syrup) if needed.

Look closely at the brood pattern; order new queen if current one failing.

Continue to replace few frames of old/undesirable comb, if needed.

Near end of the month, add at least one honey super; remove entrance reducers; equalize hives.

April

Nectar flow is often heaviest this month: make sure that all medications are out of hive unless required for bees' survival, be prepared to add new supers every 7-10 days, and remove feeders from all except new or weak hives.

Bees should be <u>very</u> busy; closely examine hives that are not, and trim weeds that may be hindering flight.

Swarming usually heavy---continue prevention/capture measures.

Look closely at brood pattern; replace queen if needed.

Have everything ready to install nucs/packages that you've ordered; feed upon installation.

Consider adding queen excluder to prevent brood in honey supers.

May

Nectar flow continues---keep adding supers; get extraction/bottling equipment ready. Consider adding an additional hive entrance (via 5/8" hole or shim) above brood area, for foragers.

Swarming continues---keep up prevention/capture measures.

Replace failing queens.

Start planting annuals for future nectar/pollen supplementation.

Install traps for small hive beetles if needed (i.e., if more than 20 adult beetles seen in hive).

Place two or more bee "watering holes" in apiary, if not already present.

June

Main nectar flow starts to dwindle---fewer supers needed, unless sourwood nearby: if in area of sourwood, consider harvesting available honey before mid-June sourwood flow to ensure more "pure" sourwood crop.

If honey being harvested, put "wet" supers back on hives late in day to limit robbing.

Can start late-season splits during last half of June; feed splits initially, even if there is nectar available

Continue measures to control small hive beetle population.

Keep water for bees constantly available.

Make plans for attending NCSBA Summer Meeting in mid-July.

July

May harvest some (or all) of honey; may continue late-season splits; continue beetle controls; keep water available for bees (see June activities).

Attend NCSBA annual Summer Meeting, if possible (usually mid-July)---great learning opportunity!

Get supers on for cotton honey, if hives near cotton fields.

Replace failing queens; consider replacing any queen that is two years old or older.

Can begin annual varroa mite assessment, and treat if needed/practical.

August

If not in area of significant cotton bloom, harvest remaining desired honey by mid-month to keep bees from eating it.

Pest control is critical this month: hive beetle populations are peaking, varroa mites are nearing their peak populations, some factors increase risk of damage from wax moth larvae, and yellow jackets/ hornets tend to be plentiful.

Careful assessment of queen performance---this month is usually last chance to replace queens until the following spring.

Can still make late-season splits early in August if using mated queens.

Keep water available for bees constantly.

Be prepared for "badly behaving bees": because nectar flow is so scarce, bees may become more defensive and more likely to rob other hives→ install robbing screens or entrance reducers (but be aware of need for ventilation), and keep hive inspections as brief as possible.

Completing honey harvest + decrease in queen's egg-laying = extra empty supers of drawn comb; store them using method that prevents damage from wax moth larvae (freezing, keeping open to light/ventilation, using paradichlorobenzene [PDB] crystals).

September

Continue measures for pest control; if hives *exposed to but not sickened by* American foulbrood, apply treatment to prevent full-blown disease. Varroa control should be completed by end of month!!

May feed thin (1:1 or more diluted) sugar syrup for 2-3 weeks to stimulate queen laying---builds up winter population---but by last week of September, begin feeding thicker (2:1) syrup for winter stores, although thicker syrup may not be necessary if >3 supers of honey left on hive and/or heavy fall nectar flow.

Consider *Nosema* assessment/treatment.

Combine colonies later in the month if weak and/or have failing queens.

Should have brood in bottom box→ if not, may need to rearrange things.

October

Post-treatment assessment for varroa mites (i.e., did your treatment work?).

Remove all queen excluders, if present.

Combine hives that are weak/have failing queens.

Feed thick syrup, if needed, for winter food stores.

Limit frequency of inspections after mid-October: bees are sealing cracks with propolis, and waste lots of time/energy if they have to keep replacing it.

Add entrance reducers near end of month to keep mice out.

Drones being expelled in most hives.

Plant (in October and November) herbaceous perennials for future nectar/pollen sources.

November

Combine hives that are weak/have failing queens.

Ensure adequate ventilation near top of hive.

Feed thick syrup, if needed, for winter stores.

Provide weights (brick, rock, concrete block, etc.) for tops of hives to limit wind-induced toplessness.

Plant trees for future nectar/pollen sources (tulip poplar, maple, sourwood, etc.).

Consider closing off screened bottom board to improve heat insulation.

Bee caught up before Thanksgiving, so you can enjoy food, family, football, Black Friday, etc.!

December

Combine hives that are weak/have failing queens.

Feed thick syrup if needed (i.e., if not more than one super of honey stored up).

Consider insulating smaller hives (those with 4 or fewer frames of bees).

Sell honey to Christmas gift shoppers.

Year-end review/assessment of apiary success/challenges.

Leave bees alone, if possible. (Take a break---you probably need it by now!)

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Basic Beekeeping Operations

Hive Location

While bees can fly up to two miles to find nectar and pollen, they do best with less "travel time." Bees can be kept almost anywhere; they do not have to be in a "perfect" spot. Choosing the best possible location, however, increases the chances for a strong, productive colony. Consider both the bees and your neighbors when making your decision. Some points to keep in mind are:

1. Bees need water to dilute honey and cool the hive during hot weather. If water is nearby, they can spend more time gathering nectar and less time collecting water. If necessary, a dripping garden hose or water trough filled with coarse gravel may be placed near the hive. Bees will drown in deep open water containers.
2. Bee behavior is affected by temperature. They rarely work when the temperature is below 57^{o}F or above 100^{o}F. They cannot fly when the temperature is below 55^{o}F. On very hot days, bees cluster outside unshaded hives and do not work. However, too much shade in the summer makes bees irritable
3. Windbreaks provide some protection from cold winter winds. Bees eat more stores and are more susceptible to dysentery when located where cold winds hit the hive.
4. Field bees orient themselves with the sun and usually fly from mid-morning to mid-afternoon. Avoid placing hives on the west or north sides of buildings. Orient the hive entrance to the south or southeast but not into prevailing winds.
5. If you are in hilly country, locate your hive in a valley. Bees fly uphill for nectar and downhill when loaded with pollen or nectar. Locate the hive so you can carry filled supers down the slope to your storage area.
6. Locate your bees close enough to your home to observe them regularly.
7. Hives near highways, sidewalks, or watering troughs might be a nuisance. If your hive is in this situation, build a high fence so bees leaving and returning to the hive must fly over the area.
8. Avoid locating the hive near large rivers bees must cross to forage. Bees within a half mile of wide rivers often drop into the water and drown when returning home tired and loaded with nectar.
9. Bees will fly two miles in any direction over level ground for nectar, but honey production increases if nectar is closer. Try to locate the hive near fall and spring nectar sources.

Examining the Colony

"Going through the bees" is a phrase beekeepers use for opening the hive to examine the condition of the brood and food stores and look for signs of disease, swarming, or anything else that needs attention. During off-seasons, especially winter, monthly inspections are generally sufficient. During the six-week period from the beginning of rapid colony buildup to the beginning of the spring nectar flow, examine the colony weekly.

When opening a hive, take precautions to avoid harm to the bees and yourself. Most danger is avoided by working slowly and carefully and wearing the appropriate protective gear. The most important item is the bee veil because stings around the eyes or temples are more dangerous than stings elsewhere. Also, reacting suddenly to stings around the head entices more bees to sting.

Bees dislike dark, woolly, or sweaty materials, so wear clean, light-colored, cotton coveralls or a long-sleeved shirt and full-length pants. Tuck your pants cuffs into your socks and your shirt cuffs into your bee gloves, or tie your pants and shirt cuffs so bees can't get in. Bees have a harder time stinging through loose clothing, but do not wear clothing that flops about. Many beekeepers are toughened enough to tolerate a few stings on the hands so they often do not wear gloves, which are slightly cumbersome. However, it is best to wear gloves until you know how you will react to stings on the hands. Dropping a frame of bees or swatting at a stinging bee only makes things worse.

Weather and other conditions influence the temper of bees, so examine the hives under the most favorable conditions. During a nectar flow, bees work from mid-morning to mid-afternoon on calm sunny days when the temperature is above 70^{o}F. Bees are more even-tempered when they are busy. Also, when most of the field bees are out foraging, fewer are in the hive to interfere with your inspection. Bees tend to be irritable between nectar flows or on poor flying days. When bees are actively brood rearing, avoid opening the hive on cold, overcast, or windy days lest the brood be killed by chilling.

Your smoker should be lit and smoldering properly before approaching the hive. Move to the hive from the side or rear; stay out of the line of flight. Move slowly and avoid making quick or sudden motions. Reach around to the front of the hive and give the entrance two or three puffs of smoke. This disorganizes the guard bees and distracts the others from what you do next. Quietly remove the top cover and place it upside down on the ground to the rear of the hive. Puff some smoke through the hole in the inner cover, wait a few moments, then pry up the inner cover with your hive tool. Puff a little more smoke under the cover as you lift it off. Lean the cover against the hive. Use additional smoke if necessary, but do not overdo it. A little smoke stimulates the bees to fill up on honey and be peaceful; too much smoke drives them from the hive and disrupts their workday.

Bees glue contact points together with propolis, so frames must be pried loose with the hive tool. Insert the tool between the hive wall and the ends of the frames to pry them loose. Then pry between the outside frame and the one next to it to separate them from each other. Remove the outside frame, which usually contains no brood, and stand it on end against the shady side of the hive. There is now space in the hive to shift the remaining frames. They can be removed, examined individually, and replaced. Do not set any of these frames down outside the hive. Examine as few frames as possible to assess the condition of the colony. Keep the hive open only as long as necessary to judge its condition.

Avoid crushing bees when shifting or replacing frames, especially the queen. Crushed bees emit an odor which excites other bees to sting. After a nectar flow, do not keep a hive open for more than a few minutes at a time. Otherwise, bees from other colonies might begin robbing. Robbing results in heavy bee loss. If it starts, put the hive back together immediately and place some grass in the entrance to help the bees repel robbers.

When looking at the frames, hold them vertically by the ends of the top bar. Stand so that the light comes over your shoulder. To see the opposite side of the frame, raise your right hand until it is above your left hand and rotate the frame like a hinged door until the opposite side is in full view. Then bring your right hand down level with your left. The frame will be upside down in your hands. Depending on the season, things to look for are:

1. Is there sufficient honey and pollen?
2. Is the queen healthy? If eggs and brood are present, the queen is probably all right.

3. Are swarm cells present? If so, destroy them and check further for conditions that might cause swarm reparation.
4. Is there enough room for the queen to lay and for the workers to put away stores?
5. Are the combs broken or sagging or with many drone cells?
6. Is the brood diseased? Are there sufficient worker bees? Too many drones might be a sign of a failing queen or poor combs.

Record your observations in a notebook immediately after hive examination. Look back at this information to review the season's activities and plan for next year.

Bee Stings

All honeybee workers are potential stinging insects but usually sting only to defend their colony or themselves. To avoid stings, do not pass directly in front of a colony of bees. Instead, work from the side or back. If a flying honeybee comes near you, remain still or walk to a brushy area, building, or vehicle. Swatting at bees aggravates them

If you are stung, remove the stinger immediately by scraping it with your fingernail or a knife. Do not squeeze the stinger. This injects the full dose of venom into your skin. The scent of the poison often alarms and irritates additional bees, so either wash the wound site with a natural odor or apply a few puffs of smoke to mask the scent. Rubbing the wound only produces more itching and swelling.

Persons made ill by one or several stings ordinarily should not attempt to work with honeybees. Evidence of oversensitivity to bee stings includes a sharp change in the pulse rate, difficulty in respiration, loss of consciousness, and hives on various parts of the body.

Requeening

Many queens live five years and some up to nine years, but vitality decreases with age. The aging process is hastened by a high demand to lay eggs. Most beekeepers prefer to replace the queen before she begins to fail. This can be a yearly process, but in our area most requeen every other year. Requeening is relatively inexpensive, especially when you consider the production loss and generally weakened colony due to a failing queen.

A queen may begin to fail at any time so always check her condition. Several symptoms can alert you to the problem. An old queen usually has a dark dull appearance because her body hairs have been broken or rubbed off. The edges of her wings might be worn and ragged and her abdomen might droop away from her thorax. She moves more slowly and might avoid the workers. Also, very old queens lay mostly drone eggs. The brood area of a failing queen is smaller than normal or "scattered" on the comb. Honey production is down even when production conditions are favorable. The workers build supersedure cells near the center of the comb in preparation for replacing a failing or missing queen. At this point, it might be just as well to let the queen be superseded rather than purchase a new queen. However, it is best not to let the situation deteriorate to this point. If the queen is missing for an extended period of time, workers might begin to lay unfertilized eggs. These eggs only produce drones. Unlike the queen, laying workers deposit several eggs in each cell. It is often difficult to requeen a colony that has been queenless for some time.

Requeening can be done at several times. Select a period when nectar is coming into the hive. This improves the chance of the new queen being accepted. The earliest time in the year is in spring when bees are bringing in nectar about six to eight weeks before the main nectar flow. The advantages then are few supers to handle and a relatively small colony. Also, the old queen is easier to locate, and it's easier to check for acceptance of the new queen. A disadvantage is the higher cost of queens during this time.

Some beekeepers requeen after the main nectar flow begins. If the old queen has been laying fairly well, she will have laid most of the eggs needed for a good work force. The disruption of brood rearing by introducing a new queen is only slight. A disadvantage is difficulty working through the large number of bees to locate the old queen.

Requeening can be done in the fall if there is a dependable nectar flow. The colony is not overly large at this time, and a good queen will be established for the spring buildup.

The simplest requeening method is to introduce a purchased queen from the mailing cage. About midday, as soon as possible after the queen arrives, open the hive using as little smoke as possible. Remove the brood chamber combs one by one, checking each one carefully for the old queen. When you locate her, kill her and destroy any queen cells present. Uncover the candy hole in the end of the mailing cage and punch a small nail hole through the candy. Suspend the cage in a horizontal position between the top bars of two center frames of the brood chamber. Close the hive, and do not disturb it for seven days. At the end of this time check to see if the new queen has been accepted. Look first at the mailing cage to see if she is free. If she is not, enlarge the candy hole or release her directly into the hive. If the queen is free and eggs are present in brood cells, it is not necessary to locate her.

Swarming and Its Control

A beekeeper can use one of several artificial methods to increase the number of colonies, but the natural method by which bees increase colonies is swarming. Swarming reduces honey production for the season because the parent colony and the swarm each have fewer bees than the original colony. They do not build to full strength as quickly as the original colony would have if swarming had not occurred.

When preparing to swarm, bees build large numbers of queen cells along the bottom of the comb. Shortly before a new queen emerges, the bees stop their field work. The swarm bees, usually at least half the bees in the colony, engorge with honey. They leave with the queen, fly a short distance, and cluster on a bush or tree limb. They wait there while scout bees locate a satisfactory hiving place. During the wait, the bees are very gentle and can be handled with much less danger of stinging. If scout bees come back with news of several satisfactory hive sites, the swarm somehow selects one. The dense ball of bees breaks up into a boiling cloud and flies directly to the new hive.

After the first swarm leaves the old hive, new queens may lead other swarms from the hive within a few days of each other. After all the swarming is over, normally enough bees are left in the old hive to keep it going although the colony strength might be greatly weakened.

The impulse to swarm is governed partly by the innate character of a bee colony and partly by conditions in the hive. Some races of bees tend to swarm more than others. However, swarming is most often associated with overcrowding in the hive. Overcrowding can result from a variety

of unsatisfactory hive conditions (Table 1) including lack of supers, improper super sequence, poor comb spacing, poor ventilation, too many young bees or drones, and combs filled with honey.

A common time for overcrowding is when pollen becomes abundant in spring and prompts a rapid increase in brood rearing. Brood cells are filled with brood faster than they are emptied by the emergence of new bees, so the area containing brood expands. The area being filled with nectar and pollen also increases. If space is not provided to accommodate this expansion, swarming is apt to occur.

During the spring buildup, inspect the colony weekly to see that ample space is provided for brood rearing and honey storage. Brood chambers need to be added if the colony overwintered with one hive body. If the colony has more than one brood chamber, chambers should be rearranged to best accommodate the expanding brood. Normal colony behavior is to expand the brood nest upward, so put brood chambers that are empty or contain the oldest brood on top and the chamber with the youngest brood on the bottom. Brood chambers might need to be rearranged every two to three weeks until the nectar flow starts. After the nectar flow starts honey supers should be added. See the section on supering.

Check for signs of swarming during hive inspections and at other times. If a strong colony has few bees out working on calm sunny days, the colony might be preparing to swarm. If swarm cells are along the bottoms of frames, swarming will occur soon unless changes are made. Remove the swarm cells and correct the conditions stimulating swarming. If only a few queen cells are found on the face of the comb, do not remove them; these are supersedure cells and indicate a missing or failing queen. The usual time for supersedure is also just before a nectar flow so swarming and supersedure can occur together. Supersedure swarms contain one or more virgin queens. The former queen is left behind to be replaced by a queen still developing.

You can prevent supersedure swarming by maintaining a vigorous queen in the colony. This is usually assured by requeening the colony every other year. An old, frail queen is not able to uphold her egg-laying task during the demand for rapid buildup of brood just before the main nectar flow. Workers become eager to replace her with a more efficient queen and begin building a few supersedure cells on the face of the comb. If you discover supersedure cells during hive inspection, allow them to develop. It is better to allow the bees to replace the queen than to force them to stay with a queen that is not productive. Most likely they will keep building supersedure cells until they succeed in replacing the failing queen.

Supering and Removing Supers

The procedure for supering to obtain the best honey crop depends on the style of honey desired. Styles, listed by ease of production management, are chunk comb honey, extracted honey, and section comb honey. Chunk comb honey production is advisable for beginning beekeepers. Supering instructions for the other styles of honey and special techniques can be found in such books as *How to Keep Bees and Sell Honey, The Hive and the Honeybee,* or *ABC and XYZ of Bee Culture*.

Add a super when the nectar flow starts in your area and the bees begin to whiten the tops of the frames with new wax. Super frames should be complete with foundation so the bees can start drawing out the combs immediately. Add a second super to the top when the first is two-thirds full. Add new supers on top of supers already on the hive. Add the third super when the first is

nearly full and the second is half full. Reverse the order of the first and second supers and add the third on top. If the third super is being drawn rapidly, put it next to the brood. Reversing supers keeps the bees working throughout the stack. If more supers are needed, follow the rotation suggested. Do not add supers too fast or add too many at one time. Remove each super as soon as it is completely capped. Add supers sparingly toward the close of nectar flow so there are fewer partially filled supers when the bees quit working.

When a super is completely capped over, move it to the top of the stack and place it on top of an inner cover that has a bee escape in the center hole. It takes about a day to clear the super of bees with this method. The next day the super can be removed from the hive. During the day in hot weather, do not leave on a super containing no bees. Without bees, the combs might melt.

When opening hives and removing supers, be aware of the potential of bees to initiate robbing. To avoid robbing, do not keep hives open for extended periods of time. Always keep supers of honey covered, and do not expose combs, especially those not covered with bees.

Feeding Bees

Early spring and late fall are the most important times to watch for the need to feed. Bees are nearing starvation when no capped honey is in the hives. Bees should have 50 to 60 pounds of stores going into winter. If properly wintered, enough should be left to build the colony to full strength in time for the main nectar flow.

The honey crop will be small if bees are still building colony strength during the main nectar flow. This is due to the small workforce and the fact that they must spend most of their time gathering food just to maintain the brood. It takes one cell of honey and one of pollen to rear one bee, and the adults must eat too. Food should be provided if there is an imbalance between brood needs and available food.

There might be a tendency to overfeed bees too early in the spring or too late in the winter in an attempt to prepare them for nectar flow. Bees store syrup as if it were honey and may be stimulated to swarm even if there is not a natural source of nectar. To avoid this, feed bees only the amount they need when they need it. You will learn by experience to judge the condition of stores by hefting the hive. Assume a full deep frame weighs six pounds and full shallow frame weighs three pounds. Never allow stores to drop below 12 to 18 pounds.

The best bee food is ripe honey. Beekeepers often set aside dark, strong flavored, or other low-value honey to feed bees during emergencies. The honey is left in the frames and used to replace empty frames as needed. If you do not have honey reserves, make a syrup from equal volumes of pure cane sugar and water. Bring the water to a boil and remove from the heat. Stir in the sugar until it dissolves.

You can spread dry sugar on the inner cover during warm weather when the bees are flying freely. Make sure water is available when feeding dry sugar. Sugar candy can be used for emergency winter feeding and is made as follows. Add 12 pounds of sugar to a quart of boiling water. Stir well and let simmer for 15 minutes. Add a little salt and a teaspoon of cream of tartar. Let it partially cool, then stir vigorously and pour into dishes. After the candy is set, a dish may be put upside down over the frames holding the cluster.

Honey gathered in late fall might not be ripe and can cause problems for the bees. Wintering bees become loaded with indigestible material from this honey when they cannot get out of the hive to void themselves in flight. They become restless and die in the hive. Feeding 10 pounds of syrup to the colony before brood rearing stops in the fall can help.

No special equipment is needed to feed dry sugar, but put syrup in containers large enough to hold a good amount but not enough for the bees to drown. There are many types of syrup feeders. Some are designed to be placed in the hive; others are for use outside. Outside feeders might be inaccessible to bees during bad weather and can encourage robbing by attracting bees from other hives.

One of the best feeders is a five- or 10-pound friction top pail with about a dozen small nail holes punched near the center of the lid. A large screw top jar may be used as well. Place the feeder lid-down over the hole in the inner cover on the hive body. Place a super around the feeder and cover with the top lid.

Some beekeepers prefer to use a division board feeder. The size and shape of a deep frame, it is supported in the hive by top projections like a regular frame. The feeder sides are made of metal, plywood, or a similar material. It can be made watertight by coating the inside with melted paraffin. The top floats on the surface of the syrup allowing the bees to enter and feed without drowning. The feeder is hung at one side in the hive and may be left there permanently. If no feeder is available, fill an empty comb with syrup and hang it in the hive.

An adequate supply of pollen is essential for early spring brood rearing. At this time, natural pollen is scarce and poor weather can prevent pollen collection. This is the critical period for colony buildup so you might need to feed a pollen substitute. Make this by mixing one part brewer's yeast, two parts expeller-processed soybean flour, and three parts sugar syrup. Mix these to a paste-like consistency and shape into cakes to be placed over the brood area of the colony. Start with a small cake in late winter, and use larger portions as the brood area increases. Continue to feed freshly prepared pollen substitute until natural pollen becomes available. A pollen substitute may be purchased from supply dealers and is usually better than a homemade mixture.

Types of Honey Production and Packaging

Honey is classified according to its nectar source or the style in which it is sold. You might not have much control over the nectar source, which determines the honey's color and flavor. The three main styles, however, are determined by bee management practices and simply require some advanced planning. These styles are cut comb honey, extracted honey, and section honeycomb.

Cut comb honey is the easiest to produce and the cheapest to package and market. Simply cut chunks of honey-filled comb from the frames. Wrap individual pieces in plastic wrap and they are ready for gifts or sale. The price is not as good as for other styles, but there is usually a ready market. This style is recommended for the beginning beekeeper.

Extracted honey is the liquid after it has been removed from the comb. Professional extracting equipment is available but expensive. Small-scale beekeepers can do the job cheaply by crushing the combs and letting the honey run slowly through strainers. One method is to lay the comb on top of two or four thicknesses of cheesecloth on hardware cloth or hail screen. This is

placed over a dish pan or collecting dish. The hail screen supports the mass, and the cheesecloth does the straining. Do this when temperatures are near 90°F so the honey will flow. Specialty products such as honey butter and whipped honey are made from extracted honey.

Section comb honey is the most difficult. It is produced in special square basswood containers. There are four comb sections in a shallow frame. The bees draw out the comb and fill in the cells in these sections. In effect, they package the honey for you. The management technique for this style of honey encourages the bees to swarm and they usually do. A round section adapted for use in standard frames of foundation is now available and has some advantages over the conventional section comb equipment.

Moving Bees

Moving colonies is primarily the concern of migratory beekeepers, but you might need to move yours at some time. Relocating the hive can really upset the colony. Field bees from colonies moved distances less than a mile tend to return to the original location. Move hives far enough to put them into unfamiliar territory. While there is no exact minimum distance, two miles is usually sufficient.

The best time to move bees is about dusk, when most of the bees have returned to the hive. Any time on a cool rainy day is also a good time to move bees provided they are not flying.

Fasten together hive parts using hive staples, lath, steel, or plastic strapping a day or more in advance. In hot weather, use moving screens in place of regular hive covers. Moving screens are similar to inner covers that have had the thin-plywood center replaced with eight-mesh hardware cloth. Screen the entrance closed with a folded piece of window screen or eight-mesh hardware cloth.

When you are ready to load the hives, put on a veil and light a smoker. Smoke the hive entrance well and wait a minute or two before slipping in the entrance screen. Place the hives on the truck or trailer. Arrange them as close together as possible and/or tie them in place to reduce shifting en route. At the new location, put all the hives in place, smoke the entrances well, and remove the entrance screens immediately.

Uniting Colonies

Weak colonies produce little honey and are poor risks for winter. It is better to take your losses in fall rather than spring. Combine weak colonies with moderately strong colonies with good queens. Uniting two weak colonies does not produce one strong colony. Always examine the colonies for signs of disease before combining them. Kill any queen present in the weak colony. Then place the hive, with the bottom board removed, above a single sheet of newspaper over the top of the stronger colony. Punch a few small slits in the paper to make it easier for the bees to remove the paper. The bees should remove the paper with little fighting as the colonies are united.

Beekeeping Insect Note 15

Reducing the Likelihood of Stings During Outdoor Activities

Prepared by:
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The advent of warm weather is the time for outdoor fun and yard work. Picnicking, swimming, golfing, tennis, gardening and lawn mowing are just a few of the activities people engage in when the weather is pleasant.

But no one likes to be stung by an insect and for the 3-5 percent of the population who are allergic to an insect sting, such an event could be life-threatening. There are only a few types of insects which cause most of the problems. With the proper knowledge and precautions, the likelihood of being stung can be greatly reduced.

Social wasps such as yellow jackets, hornets, and paper wasps can be very sensitive to vibrations and very defensive of their nests. These nests, made of "paper" can be located underground, hanging from trees, or under protected areas. Though the nests are started anew each spring, the populations of insects build to substantial numbers by mid-summer. These nests should be avoided or eradicated with an aerosol hornet and wasp pesticide if located in a troublesome area. These insects are generally not aggressive unless they or their nests are threatened.

Most types of bees are not highly defensive and mean no more harm than does a fly. Notably, however, are the social bees such as honey bees and bumble bees which can be quite defensive around a nest, but under other circumstances have no desire to sting.

During picnicking, hiking, or other activities, you may be at greater risk to be stung as you place yourself in greater proximity with insects. Avoiding nests, being aware, and remaining calm are your best strategies. To help avoid being stung, the following suggestions should be useful:

- When hiking, wear boots or proper footwear.

- Avoid perfume, cologne, hair spray, suntan lotion or other fragrances that might attract curious insects.
- Wear dull tan or white clothing which is not baggy and which could trap an insect inside.
- Standard repellants are not effective against stinging insects.
- When picnicking, keep all food covered except during mealtime (this applies to sweets and meats). Pay special attention to open soft drink containers and glasses to be sure there are no "visitors" on or in the vessel before you take a drink.
- Do not eat or rest too near trash bins. Food debris will be a major attraction to some of these insects, especially in autumn.
- If an insect lands on you or your food, do not become alarmed. They are only investigating or foraging. Blow or gently brush the insect away. DO NOT swat or wave at the insect. Slow movement is best.
- Scout out the area for nests or potential problems before you choose that "perfect" spot to picnic or rest.

NOTE: These insects are beneficial either as pollinators (bees) or in consuming other insects. Do not destroy them unnecessarily. They will not sting without cause. If you are stung, the best treatment is to remove the stinger (if present) and apply an ice pack. If you are allergic to a particular stinging insect, carry an epinephrine kit with you or have immediate access to one. See your doctor!

NCSBA Master Beekeeper Program, Certified Beekeeper Study Guide

The first thing an interested person should do when considering becoming a beekeeper is to buy a recommended book and READ IT.

The second thing and the third things are nearly simultaneous:

2. Take a beekeeping class from a local club or cooperative extension

3. Buy *{or you arrange to borrow}* your own protective clothing (suit, jacket, veil, gloves) so that you can go into an apiary with mentors, teachers, and experienced beekeepers to learn. You cannot expect these things to be provided for you; Nor should you expect the mentor to be liable for your discomfort or injury if you are not prepared. Often these things are provided on a one-time introduction basis; but following that it would be the responsibility of the perspective beekeeper to arrange to have.

Whether you choose to use this protective gear going forward on your own is up to you. In the meantime, the distraction of your not being properly protected from stings is an extreme disadvantage to the learning process.

The fourth thing a perspective beekeeper should do is to join and participate, as much as they can, in their local and state beekeeping associations. The ability to converse and observe more experienced beekeepers in a multitude of venues is invaluable experience. (club & members bee yards; public presentations; club meetings, mentors, etc.)

The Master Beekeeper Program offered by the NCSBA is also a valuable tool towards achieving both knowledge and pleasure from beekeeping.

The progression through the MBP levels provides a structure which encourages continuing education. Beekeeping is both an art and a science. To understand the science behind any endeavor will provide the tools necessary to be more successful. The more we understand why things 'work', the better we are able to help 'make them work'.

There are four levels of the NCSBA Master Beekeeper Program. Those are CERTIFIED BEEKEEPER, JOURNEYMAN BEEKEEPER, MASTER BEEKEEPER, and MASTER CRAFTSMAN. Each has their own requirements necessary for completion. (These can be found on the NCSBA website)

The first level is CERTIFIED BEEKEEPER.

There are TWO parts to achieving the CERTIFIED BEEKEEPER certificate from the North Carolina State Beekeepers' Association. The state association is certifying that you ARE a BEEKEEPER. To do this, the Certified Beekeeper Candidate must demonstrate both academic (book) knowledge AND apiary ability.

To complete this level, one must pass a WRITTEN EXAM of true/false and multiple choice

questions with a passing grade of 70%; AND must pass a PRACTICAL EXAM that is administered by a previously documented MBP participant (Certified, Journeyman, Master or Craftsman), and who is a current NCSBA member. There is a FOUR MONTH minimum beekeeping experience before the Practical Exam can be administered

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To facilitate studying for the Written Exam, please review the following Certified Level Study Guide:

To facilitate preparing for the bee yard Practical Exam, please review the form (see link) that is used to administer/proctor this portion.

When you feel you are ready to take the exam, contact someone at your local club, OR contact a member of the MBP Committee.

CERTIFIED LEVEL WRITTEN EXAM STUDY GUIDE

NCSBA: (North Carolina State Beekeepers Association:

Since you are here in North Carolina, you should know about the state beekeeper's association. You should know:

- How long it has been in existence
- That it is the largest state beekeepers association in the USA
- That it is a resource for information and comradery that will benefit both your beekeeping experience and expertise - by offering many programs that encourage your involvement, enjoyment, and continued education.
- What the various programs and opportunities are within the organization and within N.C. (zoo, state fair, Master Beekeeper Program, Golden Achievement Program, Certified Honey Producer Program, annual judged contests for hive products and more)

HISTORY of BEEKEEPING and HIVE PRODUCTS:

- How long has man been harvesting honey (and other products) from honeybees?
- What are some of the various ways that they kept bees?
- What list of products is obtained from a bee hive?
- What are those products used for?
- What are some of the ways that man used bees and bee products in the past?
- What is the primary importance of the honey bee?
- What is Bee Space?
- Who is Rev. L.L. Langstroth, and what is he most known for?
- Who are Charles Dadant and A. I. Root?
- What inventions have modernized beekeeping?
- When did honeybees arrive in the Americas?
- What major events occurred in the US that regulated or changed methods of beekeeping?
- What major events occurred in N.C. that regulated or changed methods of beekeeping?

RACES Of BEES

- What are the various types of bees throughout the world?
- What are the races of bees that are kept and what are their characteristics?
- What makes an Africanized Bee different from the European (or "western") honey bee?
- What threats or difficulties do Africanized bees pose to the USA and NC?
- What can be done about Africanized honey bees? (NC response)

FORAGING and POLLINATION

- What is pollination?
- Be generally familiar with parts of a flower.
- How do bees differ from other insects in relation to pollination capabilities?
- What are the benefits of apiculture to agriculture?
- What crops are dependent on honey bees for pollination?
- What crops benefit from bee pollination, but do not require bees to set fruit?
- What crops do not require bees at all to pollinate?
- What are the differences between a hobbyist beekeeper; a sideliner; and a commercial operation?
- What do the commercial operations do throughout the year?

ANATOMY:

- What are the two sexes of honey bees in a colony?
- What are the two castes of honey bees in a colony?
- What is haploid?
- What is diploid? *(taught, but not tested)*
- What are the 4 stages of honey bee development?
    - How are they different from one another?
    - What is the purpose of each stage?
    - What is the length of development time for each individual type – by stage?
    - What are the different segments of the bee?
    - What primary structures (organs and glands) are located in each segment?
    - What are their functions?
- What are the different sensory structures of an adult bee?
- Know the primary functionality of the body parts and organs, and general location of: Circulatory system
- Respiratory system
- Digestive and excretory systems
- Reproductive system
- Sensory (how do bees see/hear/smell/taste/feel?)

DRONES:

- What is the sex of a drone bee?
- Are they haploid or diploid?
- What is the primary function of drone bees?
- How do they differ in appearance and function from the queen and the workers?
- What is a drone's development time?
- How long does a drone live?
- What happens to drones in the winter?
- Do drones feed themselves?
- Do drones make wax, bee bread, or honey?

WORKERS:

- What is the sex of the "worker bees" in a colony?
- Are workers haploid or diploid?
- How is the worker different from a queen?
- Do workers have ovaries?
- Can they lay eggs?
- What are the various tasks of the worker bee; and at what age do they generally perform these tasks?
- How long does a worker bee live? (in the summer?/ in the winter?)
- What do bees forage for outside of the hive?
- How do they transport what they forage upon?
- Where are foraged items stored within the hive?
- What changes, if any, do the bees make to the items they forage for?

QUEEN:

- What is the sex of the queen?
- Is a queen haploid or diploid?
- How does she differ in appearance from a drone or a worker bee?
- How is a queen produced?
- When does a colony produce a new queen, and why?
- What is a swarm cell?
- What is a Supercedure cell?
- Where, when, and why are they in the hive?
- How, where and when do bees mate?
- What is the approximate life length of a queen?
- Approximately how many eggs does a queen lay a day (during brood build-up)?

BROOD:

- What is meant by "brood"?
- Where is brood generally found in the hive?
- What does healthy larvae look like?
- What are the three stages of development prior to emerging as a young adult bee?
- How does a brood cell become capped?
- How does the covering of brood cells differ from the covering on honey or pollen appear?
    - Why?
    - Composition?
- What does brood eat?
- How?

GLANDS:

- Hypo pharyngeal, Nasanov, Wax and Sting Glands

The remainder of the glands likely should be taught, but the Certified Candidate is not tested on those

PHEROMONES

COMMUNICATION:

- Dancing / Piping /Pheromones *(taught but not tested)*

Bee Activity / colony as an organism

- What is meant by "superorganism"?
- How far do bees fly when foraging?
- Mating?
- How much forage area is necessary to support a colony of bees?
- Bee Nutrition: what does pollen provide?
- What does nectar provide?
- Does it take more effort of the workers to make honey or wax?
- What are the following bee activities?
- How do they impact hive management?
- What can a beekeeper do to minimize negative impacts?
- What is swarming?

- What is Supercedure?
- What is absconding?
- What is a laying worker?
- What is a drone-laying queen?
- What is robbing?
- What is drifting?
- Temperatures/Weather:
    - At what temperature do honey bees decline to leave the hive?
    - Fly?
    - What are the effects of sunny vs. cloudy days?
    - Wind or no wind?
    - Humidity?
    - Rain?
    - What are safe weather conditions to do a hive inspection?

HONEY BEE MANAGEMENT:

- Where do honey bees live in nature?
- What materials do they use to construct their hives?
- Why is honey comb built the way it is?
- Bee space / shape / location / composition
- Does one strong colony make more or less honey than two colonies each half the size? Why?
- You should have a general knowledge of making "splits", combining colonies, discouraging swarming, robbing, drifting, and absconding.

HIVE EQUIPMENT:

- What components are there in a modern hive?
- What is the purpose of each piece being considered for use?
- What standard protective clothing and tools might a beekeeper use?

SITE SELECTION: (including Good Neighbor practices, rules & regulations)

- What are some considerations when deciding where to place a bee yard?
- Which direction should the hive opening(s) face? Why?
- What are some unfavorable conditions to consider when placing a bee yard?
- How might a beekeeper overcome unfavorable conditions?
- What laws exist regarding keeping bees where you intend to place your apiary?

OBTAINING BEES:

- Where might you obtain bees from?
- Know NCDA&CS apiary inspection service agency – department of Plant Industry.
- Know NC "licensed to sell bees".
- Know the procedures to install a package of bees, with a new queen. Know how to introduce a new queen to an established colony.

HIVE MANIPULATION:

- Know how to light a smoker, and keep it lit for the duration of a normal hive inspection.
- What is the proper technique for opening a hive?

- What are some beekeeper procedures that minimize colony damage, defensiveness, and encourage colony well-being?
- What beekeeper behaviors should be avoided?
- How should frames be manipulated?
- Where should they be placed if removed from the hive?
- How should a hive be put back together?
- What can be done to minimize burr comb?

STINGING:

- Why do bees sting?
- What happens to the bee once it has stung?
- What should one do if stung in the bee yard?
    - If a bee gets inside a veil?
- Know how to remove a stinger.
- What reactions to bee sting are normal?
- What reactions to bee sting are life threatening?
- What should be done in response to a normal reaction?
    - a serious life-threatening reaction?

SEASONAL MANAGEMENT:

- What colony activities can be expected of the bees at the various times of year in your area?

SPRING:

- Inspection / Feeding / Equipment Manipulation, and why?
- Safe Weather Conditions for hive manipulation.
- Describe honey flow / 70 % "rule" / ratio of sugar to water in feeding/ pollen patties

SUMMER:

- Honey Harvesting, storage, and distribution
- How does one go about harvesting honey?
- How much honey, and when should it be extracted from the colony?
- Moisture content of honey. What happens if it is higher or lower than the recommended or legal requirements?
- What types of honey are there?
- How does the choice of type of honey effect the decision on what type of
- equipment to use on a hive?
- What cleanliness and food safety procedures should be incorporated in the extraction and 'bottling' of honey?
- Are there rules and regulations that govern this activity?
- What equipment might be used for extracting and 'bottling' honey?
- How does a mechanical extractor work?
- What is a honey gate?
- Concerning Labels:
    - Are there laws and regulations governing what is required on a label?
    - What are recommendations for labels?
        - Why do some honey labels state that it is unsafe to feed honey to infants?

- What should be done with any equipment or frames from which honey was extracted?

FALL:

- What is winter-prep?
- When should winter-prep activity be initiated?
- Treating bees for pests in the fall – how and why?
- Fall re-queening vs spring re-queening
- Fall brood build-up
- Equipment considerations
- Feeding bees (ratio of sugar to water)

WINTER:

- Clustering characteristics
- Ventilation requirement
- Protection from inclement weather
- Inspecting hives during winter

IPM: Integrated Pest Management

- Define it. How and why is it useful to beekeepers?
- Pesticide legalities of labels, and usage.

PESTS of the HONEY BEE

- (Varroa Mites, Tracheal Mites, Greater Wax Moth, Small Hive Beetle…and… Ants, Yellow Jackets, Mice, Bear, possibly others?)
- Know the various pests
- Know how to check for tolerable thresholds of pest infestation. Know the cause of the introduction to the colony of these pests Know the life cycle of the pests
- Know the symptoms of infestation by pests & the effect on the colony of bees. Know what can be done to eliminate, or reduce the presence and effect of pests.

DISEASES of the HONEY BEE

- (AFB, EFB, Nosema, Sacbrood, Chalkbrood, Deformed Wing Virus, Paralysis Virus) Know the various diseases.
- Be aware of what causes the various diseases
- Know the symptoms of the various diseases; when and where to look for them
- Know the effect the diseases have on the colony
- Know the treatment or beekeeping activity to eliminate, relieve, or prevent the diseases.

At the Certified Level of the MBP, it is expected that you will know of the possible treatments; but are not expected to know the chemical names and specific requirement or limitations of each treatment. Those aspects are applied to the expectations for Journeyman, and even more so for the Master Beekeeper levels. It is anticipated that you would seek advice from a mentor or other resource, in addition to knowing that it is a legal requirement to follow all label directions.

NON-DISEASE colony disorders

- Chilled Brood / Starvation / Pesticide Exposure

- Know how to recognize them, and what can be done to prevent, relieve, or remedy them.
- CCD – know the symptoms, what to do – who to contact, what the difference is from other bee activity (such as absconding)

RECOMMENDED REFERENCES:

Internet:

- The NCSBA website: www.ncbeekeepers.org
- The NCDA&CS website: (for apiary inspection, food handling information, pollinator programs; and pesticides)
- http://www.ncagr.gov/plantindustry/Plant/apiary/apiarymp.html
  http://www.ncagr.gov/fooddrug/ http://www.ncagr.gov/pollinators/index.htm
  http://www.ncagr.gov/SPCAP/pesticides/
- Scientific Beekeeping: www.scientificbeekeeping.org
- Or other Agriculture Departments of major Eastern U.S. Universities (ie: Cornell, Florida, Maryland)

BOOKS:

- Beekeeping for Dummies : Howland Blackiston: ISBN: 978-1-118-94546-9 (also as an –E – Book) First Lessons in Beekeeping: Keith Delaplane: ISBN: 978-0-915698-12-7
- Honey Bee Biology and Beekeeping: Dewey M. Caron (and Lawrence Connor) ISBN:978-1-878075-29-1
- The Hive and The Honey Bee: Dadant Publication (2010 printing) : ISBN: 0-91-915698-09-9
- The Hive and The Honey Bee: Dadant Publication (2015 revision): ISBN: 978-0-91-915698-16-5

PERIODICALS:

- American Bee Journal : Dadant Publishing
- Bee Culture: A. I. Root Publishing

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