

# THE SEASONS OF BEEKEEPING

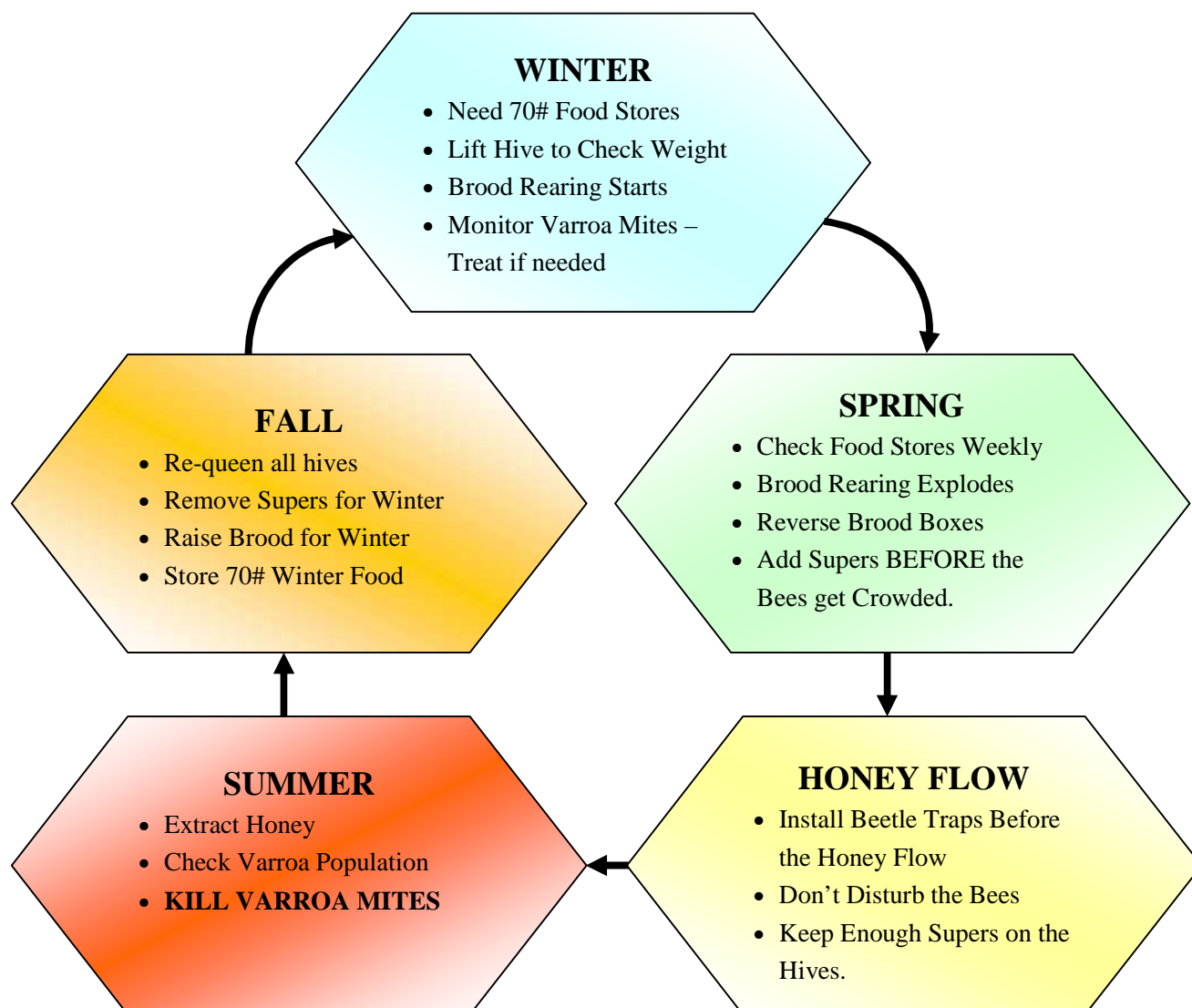
## In South Arkansas

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A lot of beekeeping calendars are available, but with Varroa mites and hive beetles to consider, I thought it might be helpful to re-visit the subject. Calendar references are based upon seasonal changes at the Arkansas/Louisiana state line. People north or south of that line will need to adjust the calendar to suit their location.

For me, success is keeping my bees alive and healthy enough to produce a surplus crop of honey. To be consistently successful, new beekeepers need to have more than a to-do list type of calendar. They have to understand the relationships between Food Stores – Brood Rearing - Swarming and Re-Queening. They also have to understand the life cycles of honey bees, Varroa mites and small hive beetles. I will try to present these concepts as simply as possible. By all means, let me know if you have suggestions or better ideas. Let's start with the basics.

**KEEP STRONG HIVES**

This is the first rule of beekeeping. Weak hives are just that – weak. They will not make a surplus of honey and may die out. Strong hives require 2 deep brood boxes or 3 medium boxes. Figure 1 shows the varying population of a strong hive. In May, there will be over 60,000 bees. In January, the population may fall below 20,000 bees. I cannot count that many bees! Instead, I count how many spaces between frames are filled with bees. The Population Diagram illustrates 4 spaces full of bees – over 20,000 bees. Since bees tend to cluster in an oval shape, 2 more outside spaces are about half full and I don't count them. TABLE 1 defines how many frames of bees I consider to be a strong colony at different times of the year. In the fall and spring, any hives that have less than half the expected population of a strong hive should be combined with other hives.

Population Diagram

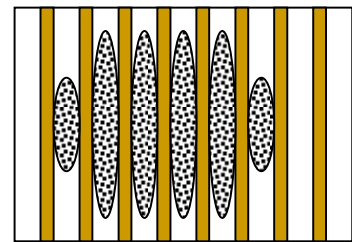
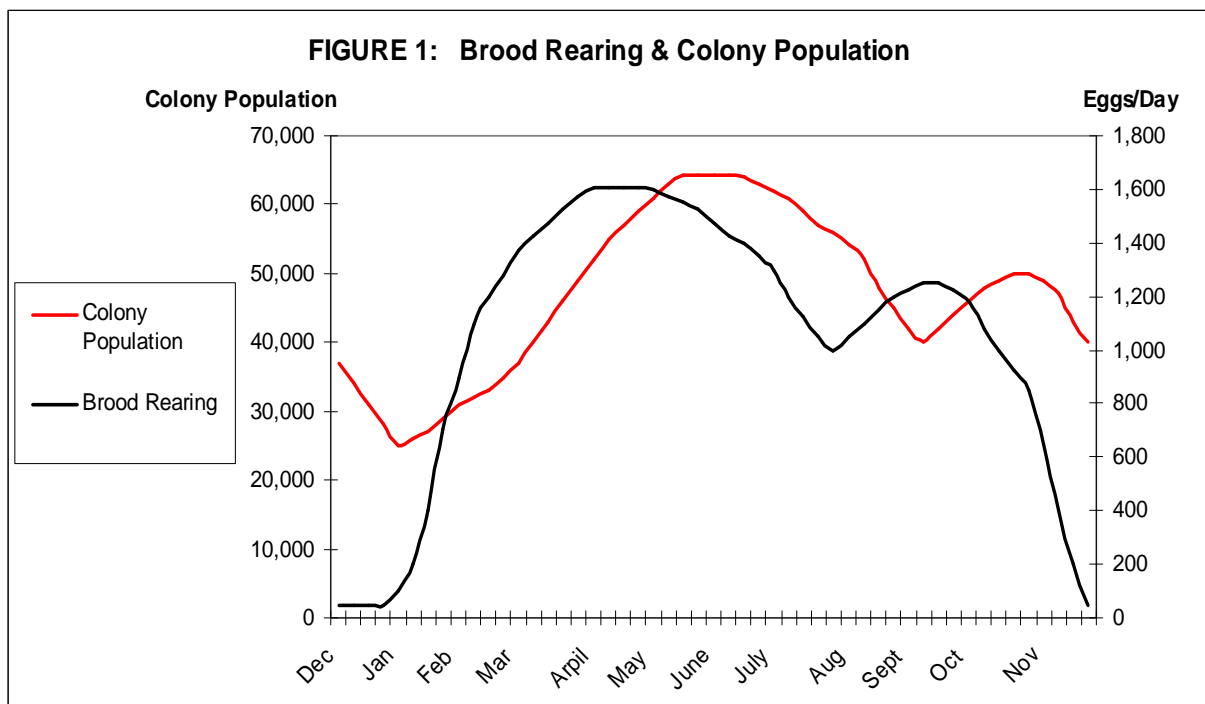


TABLE 1	Frames
January	5 +
March	8 +
May	14 +
November	12 +

**BROOD REARING AND COLONY POPULATION**

Figure 1 shows that by December, brood rearing (black line) has stopped or nearly stopped. The red line shows that the adult population is declining, but doesn't get as low as the lack of brood rearing would suggest. Bees live longer in winter because they don't get worn out foraging.



Notice that in January brood rearing (the black line) begins a dramatic increase. Check the eggs per day column on the right side of the chart to see that the queen begins with less than 100 eggs per day. Days are beginning to get longer and signal the bees to start preparing for spring.

We also see in Figure 1 that the next population increase is in the fall. If the queen has not laid several frames of brood by mid-September, feed 1:1 sugar syrup to stimulate brood rearing. We need as many young, healthy bees as possible for the winter.

### **DISEASE:**

I use chemicals only when necessary. I do not discuss diseases in this article because it requires laboratory analysis to accurately identify even the common diseases such as Nosema, American Foulbrood and European Foulbrood. A microscope is required to identify Tracheal mites. (Grease patties or menthol treatment in the fall will reduce Tracheal mites to a tolerable level.) You will quickly learn to identify the pearly white appearance of healthy open brood and the smooth, rounded tops of healthy sealed brood. If your adult bees appear to be sick or there's more than a few cells of off-color open brood or sealed brood that is sunk in or otherwise looks abnormal, call your apiary inspector for help.

Another reason I do not discuss disease is that members of our association have not had any problems. *Varroa Mite treatment is the only chemical I use.* Some of this may be luck, but I believe that all our bees – kept and wild – have a higher level of hygienic behavior than they did 20 years ago. (Hygienic behavior is the removal of sick or abnormal brood whether infected with disease or Varroa mites.) This was a natural response to Varroa mites and to the efforts of our queen breeders. Only colonies with some level of hygienic behavior can survive today.

**WINTER: DECEMBER JANUARY FEBRUARY**

### **CONDITIONS**

- ❖ **WEATHER:** We have short days and long nights. Even though the average daily temperature in winter is too cold for flight, we seldom have more than 2 weeks without a day or more that is warm enough for the bees to take cleansing flights. (Healthy bees will not defecate in the hive.) It's not unusual to have several consecutive days warm enough for the bees to forage. The fresh pollen perks up the queen and bodes well for the hive.
- ❖ **FOOD STORES:** One of the Beekeeper Tasks in the fall is to be sure each hive has 60 to 70 pounds of food stores before cold weather, so hives should still be heavy from the fall. With minimum activity and minimum brood rearing, food consumption is usually not heavy until late winter when brood rearing increases.

### **HONEY BEE ACTIVITIES:**

- ❖ **CLUSTER:** Honey bees do not hibernate – they cluster during cold weather. As the temperature drops below 55<sup>0</sup> F, the bees stay in the hive. As it gets colder, they cluster closer together and generate heat by 'shivering' - they can vibrate their wing muscles without moving their wings. If there is any brood, it will be in the center of the cluster. In a strong hive there will be a two inch layer of bees around the cluster that serves as insulation. This keeps the heat within the cluster so it is not lost out to the cold environment. Bees from inside the cluster continually replace those on the outside so none of them freeze to death. Even when it's below freezing outside, the bees keep the temperature around the brood nest about 92<sup>0</sup> F!

- ❖ **BROOD REARING:** This far south, brood rearing seldom stops completely. The bees usually keep a hand-sized patch or two of brood to help replace some of the older bees that die. By the middle of January, brood rearing begins to increase in preparation for spring.
- ❖ **POPULATION:** From Figure 1 we see that brood rearing and colony population decrease until mid-winter. As the days begin to get longer, the queen begins increasing her egg laying. She is at first limited by how many adult bees are available to keep the brood warm. Later she will be limited by how much honey and pollen is available.

**BEEKEEPER TASKS:**

- ❖ If we did everything right in late summer and fall, there's not much to do with the hives. Do a 3 day sticky-board count for mites in early December and treat if needed. Be sure to remove the chemical strip after 6 weeks. Lift the back of the hive occasionally to check the weight.
- ❖ This is the time to plan for the coming year. How many hives would you like to have? How much equipment will you need? When you've made these decisions, order the bees, queens and equipment you'll need. Then start getting your equipment ready for the coming season! There is always a swarm to catch and having a hive ready to go sure makes it easier.

**VARROA MITES:**

- ❖ Varroa mites require honey bee brood to reproduce, so there is little or no reproduction in winter. The adult mites cling to the honey bees and feed upon them like ticks sucking blood. When temperatures are suitable, chemical treatments can be highly effective in winter because there are few, if any, mites hidden in honey bee brood cells. See Randy Oliver's web site for details on checking for mites: <http://www.scientificbeekeeping.com/>.

**HIVE BEETLES:**

- ❖ Hive beetles shut down reproduction in winter. The adult beetles survive with the bees, often within the honey bee cluster. On warm days the bees will still chase the beetles so a Freeman Beetle Trap will kill most if not all the beetles over the winter.

**ANTICIPATING THE NEXT SEASON:**

- ❖ It takes 8 or 9 weeks to build a colony population up to full strength for the honey flow – over 60,000 bees. The bees should have all the brood they can cover and keep warm. If there are plenty of bees and not much brood, give the colony a pollen patty.
- ❖ **CAUTION:** If you start feeding sugar syrup, you will have to continue feeding until plenty of nectar is coming in. Monitor food stores closely so they don't run out and starve.

**EARLY SPRING: MARCH & APRIL**

**WEEKLY TIMELINE FOR BROOD REARING**

FEB	MARCH				APRIL			
1	2	3	4	5	6	7	8	9
	Egg to Adult		House Bee		Forager			
	Egg to Adult			House Bee		Forager		
	Egg to Adult			House Bee		Forager		

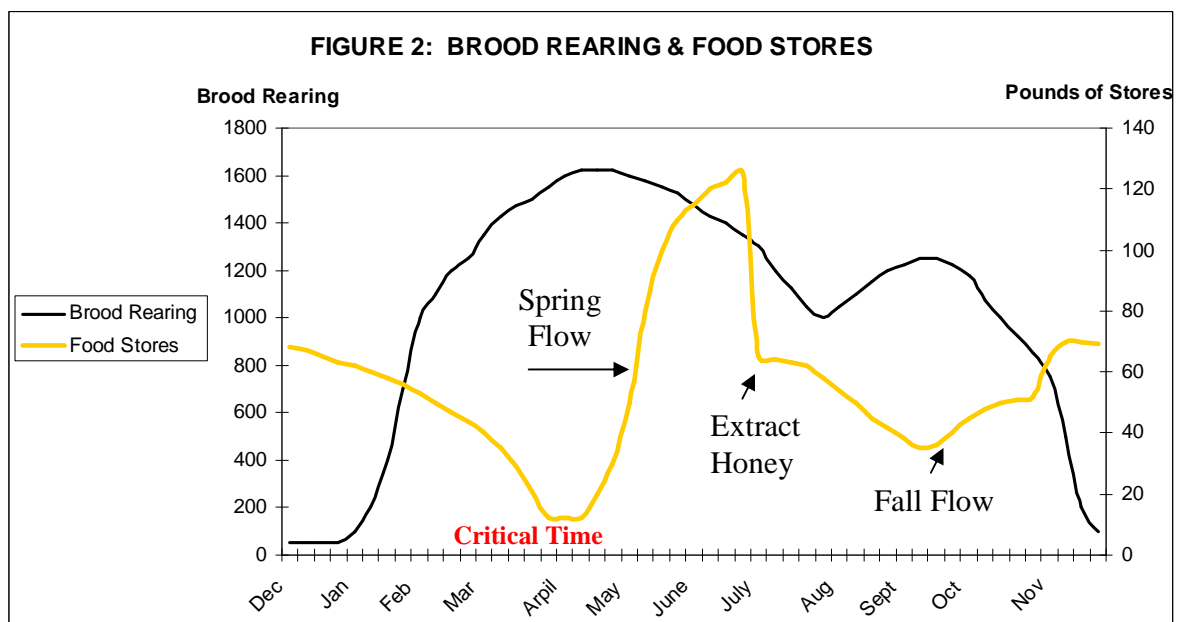
The timeline shows why a sharp increase in brood rearing has to start in February for the population to be strong enough to take advantage of the honey flow the last week of April. Each bee spends 3 weeks in the egg and brood stage, then 3 weeks as a house bee before they become foragers. Only after 6 weeks can an egg become a productive forager.

### FACTORS INFLUENCING EARLY SPRING COLONY GROWTH:

- ❖ **The beginning adult population** determines how much brood can be fed and kept warm. If the adult population is small in mid-winter, brood rearing will begin very slowly.
- ❖ **A shortage of honey stores inside the hive** can limit brood rearing. Throughout mid-winter and early spring, **brood rearing will consume more stores than what is available for the bees to forage.**
- ❖ **The number of days of suitable foraging weather** influences the intensity of brood rearing. Fresh pollen and a little nectar encourages brood rearing. When rain and cold temperatures keep the bees inside, stores must be available inside the hive.
- ❖ **How much nectar and pollen is available** on the days the bees are able to forage also influences brood rearing. Blooming is sporadic in the early spring. Figure 2 shows how food stores decline when brood rearing begins. **Check food stores weekly. Feed if needed.**

### CONDITIONS:

- ❖ **WEATHER:** The weather is unstable in March, but we begin to have more warm days and more sunshine. By April the really cold, rainy days are practically gone.
- ❖ **FOOD STORES: Checking food stores is important right up to the honey flow.** As spring progresses, more nectar and pollen is available but the bees will use more resources for brood rearing than they are bringing in.
- ❖ Watch for signs of swarming, especially queen cells.



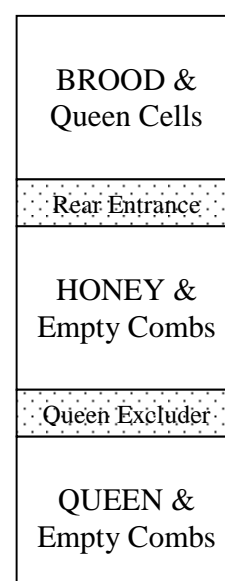
**HONEY BEE ACTIVITIES:**

- ❖ Their first objective is always survival. That means a good population and some stored reserves. When the bees ‘feel’ like they have plenty of bees and resources for survival, they begin to prepare for reproduction – that is, they make preparations to swarm! And they can be very determined in spite of our best efforts to prevent them.
- ❖ **BROOD REARING:** For our hives to reach maximum population by the first of May for the honey flow, the queen has to be laying heavily by March. This creates several critical conditions the beekeeper must watch closely.
  - Keep enough food stores on the hive for brood rearing.
  - Try to keep most of the brood in the bottom box by reversing the boxes.
  - Keep a few empty combs above the brood nest for upward expansion.
  - Add a super before the bees get crowded.
- ❖ **POPULATION:** The bees want rapid population growth in early spring. When they have a lot of bees and whatever they consider ‘enough’ honey, the bees will prepare to swarm. If the beekeeper can avoid swarming until the heavy honey flow begins, the bees will usually turn their focus to storing as much honey as possible. This is where we get surplus honey!

**BEEKEEPER TASKS:**

- ❖ Check food stores weekly.
- ❖ Reverse supers every two weeks to keep the brood in the bottom.
- ❖ Add a super before the bees get crowded.
- ❖ **SWARMING:** Our first defense against swarming is to re-queen in the fall. Young queens less than a year old tend to swarm less than older queens. Even then we need to reverse the top and bottom boxes every few weeks to keep the brood in the bottom box. Again, add a third super before the bees get crowded.
- ❖ **SWARM CELLS:** If you find a dozen or so queen cells near the bottom of the frames, you can bet the hive is ready to swarm. I do not favor trying to remove all the queen cells. It’s usually a losing battle. You may want to try a modified Demaree method. The objective is to separate the queen and foraging bees from the brood and nurse bees - which is what happens in an actual swarm.

Demaree Diagram



**MODIFIED DEMAREE METHOD**

1. Set all the boxes to the side and place a box of empty combs or foundation on the bottom board.
2. Put one frame of honey with pollen and another frame with some open brood in the bottom box. Put a queen excluder on top of that box.
3. Put the queen in the bottom box. If you don’t see the queen, lay a cloth or some type of ‘runway’ in front of the hive so the queen won’t get lost. Gently brush the bees from the combs in front of the entrance so they go back into the hive. Once inside, the queen can’t get through the excluder and stays in the bottom box with most of the foragers.
4. In the second box, put empty combs in the center and some honey on the outside. Some people put a second excluder on top of the second

box. Add ¾” strips on 3 sides to make a rear entrance for the top box.

5. Put all the open brood and queen cells in the top box. If you have more brood than the top box can hold, you can put a few frames of sealed brood in the middle of the second box.
6. If you're lucky, the old queen and bees will think they've already swarmed and start working like crazy to fill the bottom box with brood and honey. The young bees will raise a new queen in the top box. You can then either split the hive or kill the old queen before the honey flow starts and have one super strong hive.

#### **VARROA MITES:**

- ❖ As the weather warms and bee brood becomes more plentiful, the Varroa Mites begin rapid reproduction. If treatment was not applied earlier, March 1<sup>st</sup> is the latest that chemical treatment can begin in order to finish before the honey flow. All chemicals must be removed before honey supers can be put on the hives.

#### **HIVE BEETLES:**

- ❖ Install a Freeman Beetle Trap at least by April. Our area is heavily infested with hive beetles so I'm not bashful about recommending my trap. It keeps the beetle population *inside the hives* to a low enough level that they're not an issue.

#### **ANTICIPATING NEXT SEASON:**

- ❖ Make a thorough hive inspection around the middle of April. Use a detailed checklist (See ABJ July '08) and make good notes for reference. The objective is to have the hive in good shape so the bottom two boxes won't have to be disturbed until after the honey flow.

### **HONEY FLOW: MAY & JUNE**

#### **CONDITIONS:**

- ❖ **THE WEATHER** is fine and the 'white comb' (heavy) honey flow begins around the last week of April. By the end of May the heavy flow is over. Some areas continue to produce through June and even into July, but most areas decline significantly after May.
- ❖ **FOOD STORES** – This is the time that honey bees collect more honey than is needed for their survival. If we have a strong hive – 15 frames of bees – when the honey flow starts and plenty of supers for nectar storage we can average over 60 pounds (5 gallons) per hive. Some of our association members have good areas that produce over 100 pounds. The key to a good honey crop is having strong hives and controlling Varroa Mites and Hive Beetles.

#### **HONEY BEE ACTIVITIES:**

- ❖ Their Primary Objective is to store as much nectar as possible. The urge to swarm becomes secondary, but it's still possible if they get crowded.
- ❖ Brood Rearing peaks early in the honey flow according to the queen's capacity to lay. Queens will occasionally exceed 2,000 eggs per day, but 1,600 to 1,800 is more common.
- ❖ **POPULATION** is maintained at the maximum for the honey flow.  
NOTE: If the population is not near maximum when the honey flow starts, the bees have to

use a lot of *your* surplus honey raising brood! Of course building such a strong population early in the season makes swarm control more difficult. You have to closely watch for swarm cells in March and April so a swarm does not leave with half your bees!

#### **BEEKEEPER TASKS:**

- ❖ Disturb the bees as little as possible. Check or re-arrange the honey supers, but don't go into the bottom two boxes unless you suspect a serious problem.
- ❖ Keep plenty of supers on the hive for nectar storage. Later, there will be empty combs after the bees have evaporated moisture from the nectar and moved some of the honey to different combs.

#### **VARROA MITES:**

- ❖ Use a sticky board in late May or early June to be sure the mite load has not reached dangerous levels earlier than expected. Different people use different thresholds, but if I get 20 mites in 24 hours I consider the hive overloaded. You then have to decide whether you want to leave the supers on for the remainder of the honey flow or take them off and begin treatment. Keep in mind that *you may lose the hive* if you chose to wait on treatment.

#### **HIVE BEETLES:**

- ❖ This is the only time of year that you want more combs and supers than the bees can cover. Normally we don't want any more empty space in the hive than the bees can effectively patrol and keep the hive beetles chased to the bottom. That's why early installation of a Freeman Beetle Trap is critical. The hive beetle population needs to be near zero by the time the honey flow starts.

#### **ANTICIPATING NEXT SEASON:**

- ❖ Make preparations to extract the honey crop.
- ❖ Make plans for Varroa Mite control in the summer. Select and order whatever chemicals, materials (powdered sugar?) or equipment (screened bottom board?) you intend to use.

### **SUMMER: JULY & AUGUST**

#### **CONDITIONS:**

- ❖ WEATHER: Hot and usually Dry.
- ❖ FOOD STORES: Leave enough honey (4 or 5 deep frames) for the summer dearth.

#### **HONEY BEE ACTIVITIES**

- ❖ The bees hang outside the hive to escape the heat. Instead of gathering nectar, some foragers gather water to put on the combs - the evaporation cools the hive. Others line up with their rear toward the entrance and fan their wings to create a cooling air flow through the hive.
- ❖ BROOD REARING: As nectar becomes scarce, brood rearing slows down.
- ❖ POPULATION: The honey flow has stopped, but there's still a large population of bees.

#### **BEEKEEPER TASKS:**

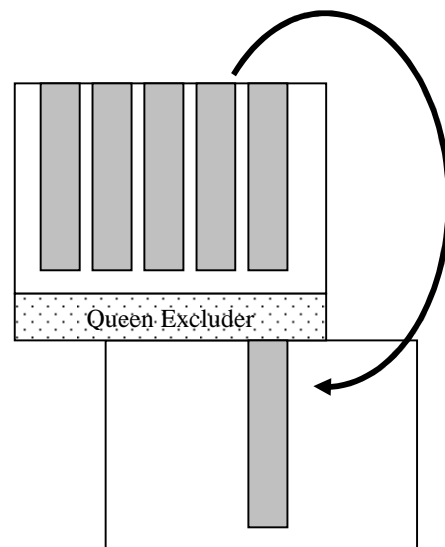
- ❖ Extract honey as soon as possible. Hive Beetles will ruin honey on the hive or in the honey house. Leave enough honey for the bees during July and August when nectar is scarce.
- ❖ Put the wet combs on the hives. When dry, remove the supers and store them with Par-moth. *Do not leave more supers on the hive than the bees can patrol for hive beetles.*



- ❖ Monitor for Varroa mites and treat the colony if mites are present. Use a sticky board, an ether roll or whatever method you like, but don't guess at it! Everything may look good at your July inspection – plenty of bees and plenty of honey for the August dearth. But we cannot see the mites because they are hidden in the brood cells and the underside of the bees.
- ❖ I prefer to re-queen my colonies in mid to late August as soon as I take off the Varroa treatment chemical. It's harder to find the old queen in a large population, but *young fall queens reduce spring swarming to such an extent that it's worth it*. Young queens will also lay more fall brood for the winter months.

### QUEEN FINDER:

- ❖ You can use an empty super and a wood or metal rimmed queen excluder to find the queen. Set an empty super on the lid, and then place the queen excluder so it's about 3 frames off the side of the empty box. This leaves a space you can insert frames from the top box. Set the brood box on top. Lift a frame from the top box and look for the queen. If you don't see her, gently brush the bees off the frame into the top box. Place the clean frame in the bottom box and push it under the top box. Repeat this until all the frames are in the bottom box or you have found the queen. If you still haven't found the queen, slide the empty top box and queen excluder over the full bottom box and puff a little smoke above the excluder. Bees resist going through an excluder to open space, but will go through quickly to their own frames. The queen will be on top of the excluder.

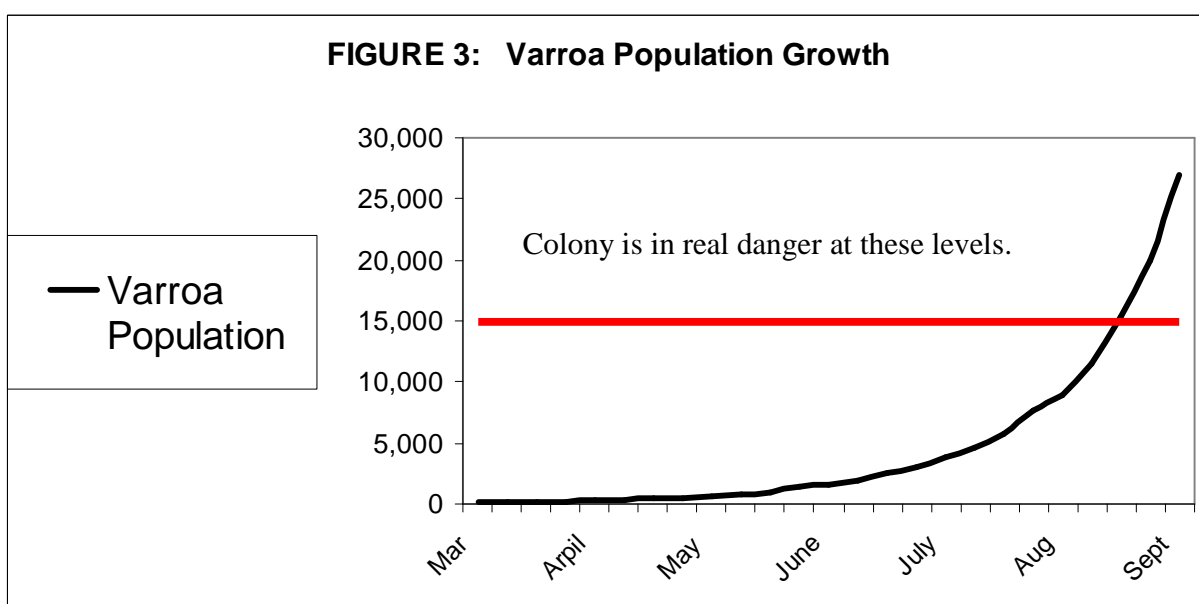


### VARROA MITES:

#### COLONY SURVIVAL AND NEXT YEAR'S HONEY CROP DEPENDS UPON THE SUMMER TREATMENT FOR VARROA MITES.

- ❖ It is critical that beekeepers understand how and why the Varroa Mite population explodes in the summer. Mites require honey bee brood to reproduce. When a lot of bee brood is available and the weather begins to warm up in the spring, **VARROA MITES CAN DOUBLE THEIR POPULATION IN THREE WEEKS**. In early spring, doubling from 50 to 100 mites or even 200 to 400 mites is not a real problem. However, we cannot use chemicals just prior to and during the honey flow, so the mites are free to rapidly reproduce. A strong hive can tolerate several thousand mites, but will not survive if the mite population is allowed to continue to grow. Figure 3 shows how the mite population explodes because of the doubling effect. Even beginning with only a hundred in March, the Varroa Mite population can reach deadly levels by September. Even if the colony survives into fall, the mites will weaken the fall brood so the colony is likely to die off in the winter.
- ❖ My procedure has been to apply Apiguard immediately after extracting in mid-July. Apiguard is not a harsh poison, has less tendency for the mites to develop resistance to it, and has been highly effective. Do your own research and select your own treatment. Be sure to study Figure 3 and understand that the Varroa population will explode in the summer.

- ❖ It's easy to overlook the need for a lot of healthy brood in the fall. Fall brood must produce adults healthy enough to survive into the winter and begin raising next year's brood. Fall brood that has been fed upon by Varroa mites cannot do this. A colony with Varroa mites in the fall is in real danger of dying out in the winter.
- ❖ Rotate the chemical used for treatment to reduce the chance of the mites building a resistance to one chemical. Currently, I use Apiguard in the summer and Apistan in the winter. Other options are available. Be sure to study the directions carefully before using any chemical. The summer treatment with Apiguard – combined with a screened bottom board - was so effective last year I did not have to treat in the winter.



### HIVE BEETLES

- ❖ With the heavy hive beetle infestation in our area, it is important to extract the honey crop as soon as possible. First, there are too many supers on the hive for the bees to effectively protect. Still, if you cannot extract right away, your honey is safer on the hives than in the honey house. Hive Beetles can survive, thrive and multiply in honey supers stored in the honey house. The beetle larvae will defecate in the honey, causing it to ferment and ruin.

### ANTICIPATING NEXT SEASON

- ❖ We want a strong, healthy colony to take advantage of any fall honey flow we might get. We also want to begin arranging the frames and supers for fall and winter. Begin removing empty supers to work the hive down to 2 deep boxes or 3 medium boxes. Begin moving empty frames to the top box for fall honey storage. Leave several empty frames in the bottom for the queen to lay in.

**FALL: SEPTEMBER OCTOBER NOVEMBER**

### CONDITIONS:

- ❖ The WEATHER begins to transition from hot to mild.

- ❖ **FOOD STORES:** We need to help the bees store 60 to 70 pounds of honey. This is one deep super plus 2 or 3 frames in the bottom box. If you're using medium boxes, you need 4 boxes on the hive with the top 2 boxes full of honey. We usually get enough fall honey flow for the winter and sometimes a little surplus. If not, feed 2:1 heavy syrup to fill the top box.

### HONEY BEE ACTIVITIES

- ❖ **FALL BROOD REARING:** The summer treatment for Varroa Mites is critical for having healthy bees in the fall. A high population of mites in the fall will damage the young bees and few are likely to survive or be healthy enough to raise winter brood.

The amount of brood rearing in the fall affects the winter adult population. Review 'Factors Influencing Colony Growth' back in the Spring Season. The more young bees produced in the fall, the more adult bees there will be available for winter brood rearing. The queen begins reducing egg laying in November and may stop completely in December.

- ❖ **FOOD STORAGE:** The bees work diligently at storing as much nectar as possible. They also work at evaporating moisture from the nectar. As the nectar is cured into honey, the bees will move the honey and arrange the stores for winter.

### BEEKEEPER TASKS:

- ❖ First, we want to see 10 or more frames of bees – just count the spaces between frames that are full of bees. Don't count the spaces that are half full. Weak hives – those with less than 6 or 7 frames of bees in late fall probably need to be combined with other hives.
- ❖ Next, we want to see 3 or 4 frames of brood in early fall and plenty of food stores. If you do not see heavy egg laying by mid-September, feed 1:1 sugar syrup to stimulate the queen to lay more heavily. We need to maintain 3 or more deep frames of brood as long as the queen will lay.
- ❖ Arrange the supers for winter. We want brood in the bottom with honey and pollen in the top. In early fall put a couple of frames of honey on the outside edges of the bottom box. If the queen does not move to the bottom box by early October, move all the brood frames to the bottom so honey (or syrup) can be stored in the top box. If the top box is not full, start feeding by the beginning of November.

#### EARLY FALL

Honey	Honey
Pollen	Honey
Honey & Pollen	Honey
Empty	Honey & Pollen
Brood	Empty
Brood	Empty
Brood	Empty
Honey & Pollen	Honey
Pollen	Honey
Honey	Honey

#### LATE FALL & EARLY WINTER

Honey	Honey
Pollen	Honey
Honey & Pollen	Honey
Empty	Honey & Pollen
Patch of Brood	Honey & Pollen
Empty	Honey & Pollen
Honey & Pollen	Honey & Pollen
Honey & Pollen	Honey
Pollen	Honey
Honey	Honey

Now we are back to the beginning – Winter. If your hives look like the Late Fall illustration, you're good to go! With all the background information in this article, you can safely follow the flow chart calendar on the front page. Now you know why these things have to be done at certain times of the year. I suspect honey bees will eventually learn to survive Varroa Mites and Hive Beetles without our help. Hopefully, they will even learn how to survive Colony Collapse Disorder. All that takes time. A lot of colonies will die and there would be very little surplus honey without help from the beekeeper. With this outline, members of our association make good honey crops and have few colonies die out. All that can change at any time – beekeeping is an uncertain venture. Again, if you have suggestions or better ideas, call, write or e-mail. I'm always ready to talk about honey bees! Visit my website at [freemanbeetletrap.com](http://freemanbeetletrap.com).