Honeybee 'Varroa' Mite Control Research and Langstroth versus Top Bar Hive Economics

2000 Final Report

Project Number : FNC98-238
Type : Farmer/Rancher Project
Region : North Central
SARE Grant : $4,797.00

Coordinators:

Robert Cessac
2362 State Rd O
Higbee, MO 65257
660-248-1076

Summary

PROJECT BACKGROUND
My ranch consists of 320 acres of rolling hills and creek bottomland in northeast Howard County, Missouri. It is a cow/calf and stocker operation. Approximately 280 acres are in grass and grass/legume mixtures with the rest in scattered woods and hollows. Three years ago I bought two bee hives to help pollinate my legumes in my pastures. By having my legumes pollinated better, I do not have to buy legume seed every couple of years. I find beekeeping fascinating and an enjoyable enterprise. I made splits and caught swarms to increase my hive count to nine in 1998. Also I learned of the top bar hive from the Bee-L listserve on the Internet. I built two top bar hives that year and they produced some comb honey for me. It appeared to me that this would be an economical way to pollinate my legumes and produce comb honey for sale.

With my SARE grant in 1995, I expanded my intensive grazing capability, enhanced my Intensive Grazing software with budget data and proved the benefits of retained ownership through the stocker phase of cattle production. In 1996 I received another SARE grant to conduct on farm systems research to raise slaughter ready beef on pasture and grain and market development. In 1995 and again in 1996, I had received two Missouri Sustainable grants; one to do a solar powered watering system for intensive grazing and another for Beef cattle improvement in a sustainable management intensive grazing system. I continue to practice intensive grazing and marketing natural beef to individuals. Now I have honey and wax products as an enterprise.

PROJECT DESCRIPTION AND RESULTS
According to a Cornell University study, honeybee pollination adds $10.7 billion to the value of crops they pollinate. One third of the total U.S. diet is derived from insect-pollinated plants. And more of these plants are not being pollinated properly. In 1984 the tracheal mite was discovered in Texas and in 1987 the Varroa mite was first discovered in Wisconsin. These two mites have decimated the wild bee population in the United States and continue to cause economic losses for the managed apiaries. Sense the Varroa mite is becoming resistance in Florida to Apistan use (the only approved miticide in 1999). My first goal was to see if (FGMO) Food Grade Mineral Oil could be used as a miticide to replace Apistan. The first objective

was to compare the effectiveness of Food Grade Mineral Oil versus Apistan strips. Managed colonies have gone from 5.9 million in 1945 too only 1.9 million today. The average age of the commercial beekeeper keeps increasing every year as it is increasing more difficult to enter into beekeeping due to the mites. The agriculture production of the many crops and home gardens that depend on pollination from honeybees will continue to decline if more people are not encouraged to begin beekeeping. My second goal was to find a more economical way for producers to begin beekeeping. At the present time it is costly to get started into beekeeping using the standard langstroth beehive. The second objective was to compare the economics of keeping bees in Top Bar hives Versus the Langstroth hives.

In the early spring of 1999, I ordered six langstroth hives, which included two brood boxes and four supers for a total of $1263.68. This came to $210.61 for each hive not including labor or paint. The lumber I purchased for eleven top-bar hives cost $480.93, so each hive cost $43.72 for new materials. This does not include the table saw cost. Even if one would include $300 for a saw, this brings the cost to only $71 each. I proceeded to put the hives together and finished before my bees arrived. The video included shows the different materials needed for each type of hive.

Due to the lost of five of my hives in the winter of 1998, I had to order twenty bee packages to replace these losses and add bees for my new boxes. I split each of the hives that had bees to make ten hives. This gave me a total of 30 hives to start the spring season. All of the packages arrived in good condition, but the weather turned cold and rainy. I lost two queens and some of the bees because of the cold and had to order replacements. Because of the cold, they clustered and did not go to the sugar water in the baggies at the bottom of top-bar hive. This required me to put in extra frames of honey I had left over from hives that died and this provided food until it warmed up enough for them to feed on baggies. I had treated my old hives with Apistan and each package came with an Apistan strip so I did not have to treat packages in spring. Continued to feed sugar water until June 1 when the white clover began to bloom in earnest. The packages built up numbers well in 1999. The top-bar hives built up just as fast as the langstroth hives on foundation even though they have to build the own comb from scratch. By the first of September, the top-bar hives had 12-15 combs of brood with 2-3 of honey. The langstroth hives had two brood boxes full of brood and honey. I had four hives, two top-bar hives and two langstroth hives as controls set about ¼ mile away from bee yard. I treated five top-bar hives and five langstroth hives with mineral oil from June 1 to October 1 as often as possible. Due to the fact that I broke my wrist in the summer of 1999, I did not get to apply mineral oil as often as I wanted to and do much varroa testing. The hives I split in spring had the most varroa in late August because they built up numbers quicker than the packages. All these hives produced very little honey or wax in the 1999 season due to being splits and packages. I requested an extension to continue my research in the following summer. See Attachment “A” –SAREBEE GRANT 1999-work schedule.

During the winter of 1999 and early 2000, I lost six hives. Two top bar hives, three langstroth hives and one Nuc that I tried to overwinter. The other hives came through the winter in fair to excellent shape. Beginning in March 2000, I fed extra sugar to those hives that required it. On April 1, I installed 4 strips of Apistan (two in each broad box) on 13 hives and applied a 1/8 stream of mineral oil on each bar in five top bar hives and five langstroth hives. On August 14, I installed 4 Apistan strips again in the hives that did not get mineral oil. Every two weeks after that, I applied mineral oil to those ten hives until September 4, 2000. On May 1, I started to count varroa mites and each month after that. See Attachment “B” –SAREBEE GRANT 2000 work schedule.

The one major problem I had with top bar hives was over heating and the full combs of brood or honey would break off of the top bar and crush some bees and stress the hives so that they had a tendency to swarm. If comb fell flat on floor of hive, bees would seal most of it to the hive floor and that required major disturbance to hive to repair. To solve this problem, as I replace the top bars, I will notch each bar in the

middle instead of every fifth one for more ventilation and add end bars so the bees can attach combs to the side bars instead of the side of box. This will also make it easier to examine the brood area when needed because one will not have to cut comb from the inside of hive box and will also strengthen the frames of comb. This will add $6.25 cost to each top bar hive, but will more than be offset by having a more contented hive which will build more comb and be less likely to swarm.

Melvin Brees, Farm Management Specialist with the MU University Extension System assisted me in planning and evaluation of this project. Art Gelder, a beekeeper, President of our Boone County beekeeping association and his wife assisted me during my field day.

In my opinion, the food grade mineral oil I used will control the varroa mite population just as well as the Apistan strips. One has to put the mineral oil on every couple of weeks to obtain this control which requires manipulating the hives down to both brood boxes. This is easier early in the season with no supers on, but as one adds more supers that fill up with honey, the task gets labor intensive. It took five minutes per hive to apply mineral oil beginning in April and at least 15-30 minutes later in season. This would be impractical for a large operation. The Apistan only takes 10 minutes twice a year. See Attachment “B” for the differences in mite counts between the two systems.

To calculate the mite count in the top bar hives, I used the sealed drone brood method. Number of drone cells infested divided by number of drone cells sampled times estimated total number of sealed drone cells in colony times 10.
To calculate the mite count in the langstroth hives, I used ether roll test of bees from brood area. Numbers of bees infested divided by number of bees sampled times total number of bees in colony time 2.9. These two equations were obtained from the web from research done by Dr. Stephen Martin in the United Kingdom. He also developed an equation to convert daily natural mite drop into estimated numbers of mites in a colony. For the different times of the year, it goes as follows:
Nov. to Feb.: E = D * 400
May to Aug.: E = D * 30
Mar, Apr, Sept, Oct: E = D * 100
where E = estimated number of mites in colony, D = daily mite fall times factor for different seasons. Based on these numbers, one can determine if treatment is needed or when to treat using this varroa chart, See Attachment “C”.

This would work only in the Northern Hemisphere and climate similar to the UK. Missouri’s climate is just a bit colder, but the figures should not be much different. I plan to try this approach this coming year.

I had one control top bar hive which controlled the number of mites in the hive without mineral oil or Apistan to an acceptable level. I may have a hygienic group of bees that can be maintained without chemicals or mineral oil. I plan to raise queens from this hive next year if it continues to control mites.

The economics part of my research did not turn out as I had hoped. The swarming of the top bar hives and the comb breaking cut into their honey and wax production. I did manage to get 50 nice squares of 4-inch by 4-inch comb honey to market. I obtained 12 quarts of chunk comb from the frames that broke. I fill quart jars about ¾ full with chunks and then pour liquid honey on top. I obtained 24 gallons of liquid honey or 276 pounds from the top bar hives and 72 gallons or 828 pounds from 14 langstroth hives. My top bar hives produced 15 pounds of wax and the langstroth hives produced 10 pounds of wax. Two of each kind of hive were late swarms so they did not produce much excess honey or wax. As I find more ways to utilize the wax, such as shoe polish and hand creams from my hives, I should get more gross income from my top bar hives. Using $5.00 per pound for wax and $1.50 per pound for honey, which is my goal to obtain when marketing my hive products, my hives will gross as follows:

Top Bar Hives, Langstroth Hives
Liquid honey-------$414 , Liquid honey-----$1242
Wax----------$ 130 , Wax----------$ 50
Comb Squares-----$200
Chuck comb-------$ 72
Total----------$816 , Total----------$1292

Once I finish modifying my top bar hives, I feel they will be just as productive as the langstroth hives. One does not have to find storage space for his supers if using top bar hives. They do take more management during the early part of the season. With the average price of a top bar hive at $50-$80, I feel that this would be the system to use for a person that wants a few hives to pollinate his garden, or just enjoy beekeeping, or for a beginner to learn about bees without major expense.

OUTREACH
I had a field day for our Boone County Regional Beekeepers Association on September 19, 1999 at my farm to explain the management of the top-bar hive and the research on varroa. Fifteen members came and enjoyed the day. The Association provided the drinks and buns and I provided the hamburgers and hot dogs. This field day is also included on the video. On November 15, a University of Missouri Extension Specialist Don Day and myself conducted an Internet class for the Association at the Columbia Extension Office with 13 in attendance. Sense most of the class was already on the Internet, Don Day explained how to use the search engines on the Internet and I showed the class all of my favorite beekeeping sites. There was plenty of interest. Our Beekeeping Association has its own web site sponsored by COIN (Columbia Online Information Network) which I generated and maintain at http://beekeeper.missouri.org/. As I complete my video, which will show candle making and wax ornaments, I will provide copies to our beekeeping association for distribution to our members.

Total Number of Pages : 4