May/June 2000

Tucson Conf. - 2nd Installment

This time, I will report on various aspects of Africanized honey bees (AHBs). In one study area in Mexico, it appears as though the AHB/EHB ratio stabilized at about 85% AHBs in three years. Since AHBs were more successful, studies were conducted to determine whether or not the metabolic and working rates of the races differed. AHBs and EHBs were cross-fostered (emerged into a colony of the other race) and examined in observation hives.

For the first three weeks or so, young bees of both races behaved the same. When they started foraging, more AHBs gathered pollen while the EHBs favored nectar. Also, when they started flying, the metabolic rates of both races increased, but with the AHBs considerably more. AHBs made more round trips per hour than their EHBs counter parts.

In northeastern Brazil, AHBs make use of their old migratory behavior to move between areas that supply forage based on seasonal weather conditions. During the dry season, only about 10% of the AHB colonies stick around. The researchers trapped about three swarms per day during the dry season, but 15 to 30 at the end of the wet season. The three main stimuli for absconding were: ant attacks; shortage of nectar; shortage of water.

Studies conducted to determine the effects of colony population size on swarming of AHBs led to the following conclusions:

1. Despite the amount of extra space, AHBs swarm when they reach about ten frames of bees.
2. Larger colonies have a greater percent of drones

and larger numbers of queen cells (thus, after swarms) than smaller colonies. Therefore, larger colonies have the best chance of producing the most "offspring" (swarms).

3. AHBs frequently nest in small cavities, which results in slower colony reproduction.

A beekeeper in Costa Rica, who wasn't too happy with the performance of EHBs in the tropics, just captures swarms and never requeens. His stock is basically AHB and he gets an average honey yield of about 88 pounds a year. The bees are kept in two deep Langstroth boxes as a hive body. The frames have reduced width end bars, so that 11 frames fit per box. The frames are filled with Apis cerana (much smaller cell sized) foundation. During the wet season (July-November) sugar syrup is trickled in at a rate of 4.4 pounds every two weeks to keep them from absconding. During the honey flow, supers are added (by the box, not by the frame) above a queen excluder. Apiaries are surrounded by thick groves of trees/shrubs so that the bees fly far above any domestic animals or humans in the area, and their defensive territory is limited to the space inside the grove. AHBs appear to be able to tolerate Varroa, AFB, Nosema and Malpighamoeba better than EHBs in Costa Rica.

In Tucson, Arizona, the percentage of AHBs in collected swarms is about 98%. The "swarm season" now is bi-modal with peaks in spring and fall, corresponding to best foraging times. Currently, there are 32 bee removal companies advertising their services. Some representative costs of services are:

- $100 to remove an easy swarm;
- $50 to eliminate a swarm from subterranean water meter box;
- $100-$300 per month to protect a property with nursery pot bait hives;
- $100-$200 to kill bees in place in a building (many of these individuals are structural pest control operators who do only honey bees);
- $500-$1,000 for "bee removals" from buildings.

Outside of Tucson, in caves in cliffs, researchers found that feral colonies fluctuate between 87 and 100% AHB, according to mitochondrial DNA analysis. Beginning in 1995, there were 200 feral colonies in 247 nest sites being monitored (probably EHB). The number has been as low as 12 colonies, but following El Niño there were 98. Now there are only 48. These bees were also monitored for tracheal and Varroa mites. Before tracheal mites, colonies persisted an average 36.5 months. After

tracheal mites, they lasted 12.6 months. Varroa reduced colony longevity to 6.7 months. AHBs are persisting longer.

An educated estimation of honey bee sting-induced human deaths in Mexico is about 30 per year. Before AHBs, it was about four. In places where natural selection has determined the outcome, 96% of sampled colonies have "sub-Saharan" (AHB) mitochondrial DNA. In one commercial operation, bees were sampled and only bees with long wings and good honey production were used for rearing replacement stock. After five years, instead of the average 34% honey decrease in unselected stocks, the selected stocks were 15.9% better than original stocks. Worker wing length increased, AHB sub-Saharan mito-type was down to 7.5%, and stinging behavior was better. However, this has to be an ongoing program because the life expectancy of newly introduced queens is only 7.5 months.

AHBs worked their way into the Yucatan Peninsula of Mexico over the last 13 years. The region was very heavily populated with EHBs. Three years after their arrival in the area as feral bees, AHBs had not altered the genetic makeup of EHBs. But, by 1998, 61% of the hived bees and 87% of the feral bees were AHBs.

Another study of AHBs suggests that you have to be very careful how you dissect DNA when you use it to analyze honey bee samples. The current CDFA procedure can differentiate between carnica/ligustica; mellifera; lamarkii; and sub-Saharan races. However, if you chop up the sub-Saharan DNA in a different way, it suggests that at least 25% of the AHBs in Argentina are not from Apis mellifera scutellata origins. Also, African type genes show up in samples of bees taken from Spain, Morocco, Portugal and Turkey.

Visitors from Africa discussed how African honey bees are handled. Some unique ideas were presented. Since humans have been decimating African colonies for years to get the brood for food and honey for beer making, the bees are attuned to two pheromones: honey bee alarm and human body odor. To reduce the former, it is best to collect smoke from the smoker into a modified pop can. Put the pop can over the entrance and let the bees bring the smoke in with them. As for the human odor, the beekeeper must wash thoroughly, then refrain from perspiring. Thus, no clothing (including underwear) can be worn under the bee suit. The brood nest is never disturbed except when the colony is to be requeened (every 18 months). The hive boxes are modified so that combs can be removed "out the back door." Honey is taken off in 2-3 minutes. To find the queens, the hive is smoked vigorously from the back. The

bees are driven out the front through a bunch of holes (a regular entrance allows "to much ventilation"). Old queens are located (with smoke) on removed combs and are replaced. The cluster of workers is "pushed" back into the hive (otherwise, they will abscond).

Apparently, African bees build populations fastest during heavy flows, unlike EHBs. You really have to make sure there are enough empty combs for all the brood. The triggers for defensive behavior include; robbing, inadequate empty spaces, failing queens, disagreeable odors, noise (vibration) and colors. Apiaries have no more than 20 colonies and are located 200 to 500 meters (215 to 542 yards) from dwellings and footpaths.

Studies directed at trying to find the genes responsible for defensive behavior of bees led to a closer look at five areas. Eventually, areas called sting 1 and sting 2 were isolated. They were found near the "x" allel for sex determination. They don't mean too much to AHBs because they are so defensive, but in EHBs, sting 1 is important in determining guard behavior and in numbers of stinging bees. Sting 2 is important to numbers of stings, also. If only bees were tomatoes! We could reverse the gene sequence and produce honey bees that refuse to sting.

When a colony becomes queenless, it is expected that the worker bees will notice the condition and try to do something about it. One thing that has been noticed is that time for egg hatching can be extended to three days (must let the brood nest temperature drop down). Eventually, some workers start laying. In AHBs 57% of the workers normally have some ovarian development. A few will start laying while there is uncapped brood and queen cells were being reared. EHBs didn't lay eggs until after most or all of the existing brood had emerged.

More interesting, five to ten percent of AHB workers could lay in queen cells and produce a female larva (a trait thought to be limited to the "Cape bee," Apis mellifera capensis). After the new queen was up and going, other cells were torn down and the workers quit laying. Another interesting observation, that frustrates beekeepers who requeen periodically to keep their colonies EHB, "Queens don't last a year in Africanized honey bee colonies in this area." They replace our queens and they replace their own, regularly.

Crop Pollination Data

Just about anyone in the bee business is asked about the value of bee pollination, at one time or another. It takes a lot of time and searching to

find data on U.S. crops - I know, I did it for a presentation at a beekeepers convention.

Drs. Roger Morse (recently deceased) and Nick Calderone, from Cornell University, scoured the databases for information and wrote a 14 page article that was published in the March 2000 issue (Vol. 128, No. 3) of Bee Culture magazine. The article is sprinkled with color photos of bees, blossoms, fruits and vegetables. There are also graphs of changes in crops over the decades. And, as might be expected, there are statistics for the value of crops in 1999. Briefly, about 2.5 million colonies are rented annually for crop pollination. Obviously, some of the colonies are rented 2 or 3 times, so less than 2.5 million colonies are involved. It is interesting to note that the statistics show 950,000 colonies rented for almond pollination. That is 38% of the total U.S. rental for a year.

The next question is "What are the 51 reported crops worth?" The answer is "$14.6 billion." This is an increase of 36.3% since similar data was collected in 1989 ($9.3 billion).

Reprints of the article are available, for sale from Bee Culture magazine, 623 W. Liberty Street, Medina, OH 44256. Call (800) 289-7668, Ext. 3220 or email: beculture@airoot.com. The full color article is also available on the web at: http://bee.airoot.com/beecultur e/ pollination 2000/pg1.html.

Fipronil (Regent®)

One of the newer insecticides that is enjoying expanded use is fipronil. In my latest Farm Chemical Handbook, there are no "Environmental Guidelines," which is where the bee, fish, bird, etc. toxicities are addressed. None the less, although fipronil is used at doses of grams per acre, it is a Group I material (Highly Toxic to honey bees) and will kill bees that get into it during the first 3 hours after it is applied in the field. After that, it neither appears to present problems to the bees nor to reduce their foraging on the treated crop.

For details of the studies leading to these conclusions, find a library that carries the Journal of Apicultural Research. The article is: Mayer and Lunden. 1999. Field and laboratory tests of the effects of fipronil on adult female bees of Apis mellifera, Megachile rotundata and Nomia melanderi. J. Apic. Res. 38(3-4):191-197.

More on Tylosin

A recent study, conducted in Argentina, compared the

effectiveness of tylosin, erythromycin and Terramycin® to control AFB and how long the tylosin residue can be detected in honey. In the first studies, all the treatments were delivered in extender patties. In the second study, the antibiotics were delivered in sugar and cherry jelly. Colonies were inoculated with portions of brood combs containing AFB scales. Just like in our studies, signs of disease didn't appear until more than 30 days later. Then the diseased colonies got their treatments. Forty-five days later, the colonies were inspected for disease. Further, every 15 days after that, the brood nests were examined for disease.

Control colonies died in 3-4 months. Erythromycin did not impact AFB at all, but appeared to be toxic to bee brood. The jelly treatments were consumed within 42 days, but the extender patties stayed around for 120-180 days (these were fall treat-ments). Disease signs were not seen for 9-10 months following Terramycin treatments. Following tylosin treatments, no disease signs were seen in over a year. Over all, the tylosin was determined to provide a "16-25% longer effective control period" than Terramycin in the fall and a "50-58% longer effective control period" in the spring.

Tylosin residues in honey degraded to below the limits of detection (2 ppm) in 60 days. We often look for residues in ppb, which is 100 to 1,000 times less than ppm. For details see Alippi et al. 1999. Comparative study of tylosin, erythromycin and oxytetracycline to control American foulbrood of honey bees. J. Apic. Res. 38(3-4):149-158.

Remember, I don't think it is a good idea to have an antibiotic available to honey bees month after month if you want to use it very long before selecting for resistant microbes.

NHB PRIDE Package

As part of its large package on marketing honey, the National Honey Board includes the "PRIDE" package. However, everyone who packages honey for sale to wholesale or retail outlets would benefit from reading this information (actually, only 3 pages and a self-evaluation form). I believe the information also would be of value to hobby beekeepers and that each beekeeping club should have a copy and devote at least a portion of a meeting to discussing the information.

The publication briefly mentions where food safety requirements originate. The importance of retaining samples of "lots" sold, and the value of a recall plan, if your product is deemed unmarketable. There is an explanation of the

federal food safety control system, call HACCP (Hazard Analysis and Critical Control Points). This system was developed to minimize contamination of meat, poultry and seafood with pathogenic organisms, but its principles are applicable to honey.

An HACCP approach includes the expectation that GMPs (Good Manufacturing Practices) will be followed. Also, there is a set of Sanitation Standard Operating Procedures included. There are references to find all these documents, and a quick and easy self-evaluation form to see how well your honey handling equipment and facility stack up to regulatory expectations.

The PRIDE Package is free to anyone who calls for a copy. To make an order, call toll free: (888) 421-2977 and when the "voice mail" starts up, press in 10 (it won't be an option on the voice mail, but it will get you exactly where you want to be).

Gardening/Landscaping CD

Are you still indulging in the nearly prehistoric art of plant culture, while your desk supports the finest in state-of-the-art computing? If the answer is, "yes," then we have a deal for you. Coordinators in UC Cooperative Extension gathered the best information on pests and pest control from the University of California, Oregon State and Washington State Universities. The information covers plant health, pesticides, and pesticide safety in addition to detailed write ups on specific insects, mites, snails, slugs, nematodes, plant diseases, environmental disorders, weed control and vertebrate pests. Peripheral essentials, such as tree pruning and fruit storage are included. This lavishly illustrated CD-ROM has 2,800 "screens" and 4,800 high-quality photographs. Is there a hard copy (book) of this information? No. [This is just the beginning! Journals are going online and disappearing from library shelves. We will be pushed into the electronic world whether we like or not.]

To order the Mac and PC compatible (same disk) CD-ROM, call (800) 994-8849 and have your MasterCard or Visa card handy. If you prefer to write a check and wait a while for the CD, make the check payable for $46.25 (if I did the math correctly - tax and shipping included) to UC Regents and send the order for the UC Guide to Solving Garden and Landscape Problems: An Interactive CD-ROM, DANR Pub. #3400, to: University of California, DANR, Communication Services, 6701 San Pablo Avenue, Oakland, CA 94608-1239. If you are interested in other UC publications, their catalog is on line at: http://anrcatalog.ucdavis.edu.

2000 WAS Conference

It seems like a well-kept secret, but this year's WAS Conference is scheduled for the 13-15th of July in Anchorage, Alaska. Members who were going to the meeting were supposed to pre-register months ago, at $200 per person. That still can be done by anyone, write a check payable to WAS and mail it to George Steffensen, Treasurer, P.O. Box 956, Grants Pass, OR 97528-0956.

The Conference is being held at the Westcoast International Inn, 3333 W. International Airport Road, Anchorage, AK 99502. A block of rooms is on hold, and everything else in the area is sold out! It will cost approximately $150 per night. To save a few pennies, their toll free number is (800) 544-0986.

In northern California, flights from San Francisco, are around $375 round trip, from Sacramento, $560 round trip. You can get a bit of a break by making your reservations through Aventuras Mexico, in Albany, OR. Fern Anderson or Paul Heins will help you at (514) 924-9210 or (800) 900-1062.

The Conference program has some time allotted for local tours, presentations on bee-keeping in Alaska and a good blend of bee topics from Mike Burgett (Oregon State), Nick Calderone (Cornell), Steve Sheppard (Washington State), Mark Feldlaufer (USDA, Maryland), and Eric Mussen (UC Davis). It hasn't rained for a while and the mosquitoes are few. It is an excellent time to visit Alaska!

Another 200 Conference

Thinking ahead, they already are taking reservations for this years California State Bee-keepers' Association Convention which will be held November 14-16th at The Pine Resort on Bass Lake which is right on the edge of Yosemite National Park. Nearly all of the rooms (84) are 2-story chalets. They are up in the hills, so call soon if you want one that is just up the hill a little. Call even sooner if you need or prefer one of the 20 lakeside suites, with fireplace and spa tub. CSBA will have the whole resort to ourselves! For reservations, call (800) 350-7463.

Sincerely,

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