September/October 1994

Varroa Resistance

The long term solution to Varroa control is expected to be genetic, not chemical. In a recent issue of Bee World (Vol. 75, No. 2, 1994), from the International Bee Research Association, Ralph Büchler working at Hessian University in Germany, reviewed the literature dealing with mechanisms of honey bee tolerance of the parasite. Many comparisons are made to Apis cerana, the original host of the parasite. Apis mellifera simply falls short in all categories. But it is interesting to understand what traits are involved.

Grooming is important with Apis cerana. The bees remove mites from themselves or recruit help getting mites off. Many mites are bitten hard enough to break their exoskeletons. Some European bees show this trait, but they are quite inefficient.

Apis cerana workers also uncap brood, remove mites, and recap their brood. They also will remove mites from combs of A. mellifera brood, but often the brood is removed and it is never recapped.

Brood attractiveness seems to be important to a certain extent. When laboratory arena tests show some larvae to be more attractive than others, reproductive rates on brood combs show parallel correlations.

Perhaps the factor that may be of most use in the future is the rate of fertility of the mites. Theoretically capable of much higher levels, documented rates of mite reproduction are only 0.8, or so, offspring per visit on an immature host bee. Infertility varies with season and with host bee genetic stocks. Host bees that do not supply the right nutrients or hormones for mite reproduction would be an ideal find.

The last mechanism discussed is the length of the postcapping period. Theoretically, even a relatively small difference in the time it takes to develop from a capped larva to an emerging adult can make a big difference in mite numbers over a period of months.

In a paper related to that topic, John Harbo reported on his studies to determine variability of lengths of postcapping periods of

European honey bees. His report, in Vol. 85, No. 6, page 2126 of the December 1992 issue of the Journal of Economic Entomology, stated that the postcapping period averages 285.4 hours, give or take 5.1 hours. Interestingly, it was not the genetics of the larva (therefore, directly, the queen) that were responsible for the differences. It was the genetics of the worker bees that reared the larva. Theoretically, selective breeding from 10% of the population could reduce the mean capped period by 5 hours in a single generation. It would be interesting to know what temperatures the different clusters maintained during these studies.

Avocado Pollination

California avocado growers have begun to notice the decline in numbers of feral honey bee colonies. Avocado pollination has been slipping and so have the crops. California beekeepers will be providing more bees for avocado pollination in the future.

Avocado pollination is a bit peculiar. It is described in detail by Ish-Am and Eisikowitch in a recent issue of the Journal of Apicultural Research.

To avoid being pollinated by its own pollen, the flower opens the first time for half a day as a female flower. The next day, after being closed for the night, the flower opens for a half day as a male flower shedding pollen. Pollen from another flower on the same plant would be the same as "selfing". So, in order to prevent selfing, the female and male flowers open only during the opposite halves of the day -- morning or afternoon. Although cold weather can reverse the schedule by delaying it half a day, certain varieties are morning females and the others afternoon females. By knowing the flowering schedules, you can plant to purposely obtain cross-pollination as a bee visits between the plants.

The authors also include minute detail about the postures taken by honey bees foraging on flowers opened to various degrees. They document specific sites on the bees where pollen collects in greatest amounts and is moved to the stigmas of the flowers.

If you are a beekeeper providing pollination services for avocados, both you and your grower should read this information. If you are interested in pollination ecology for more aesthetic reasons, this well-written and diagrammed article is still worth a trip to the library. The full bibliographic reference is Ish-Am, Gad and Dan Eisikowitch. 1993. The behaviour of honey bees (Apis mellifera) visiting avocado (Persea americana) flowers and their contributions to its pollination. J.A.R. 32(3/4):175-186.

Cotton Dangers

Many beekeepers operating out of the San Joaquin Valley of California are attracted to the potential honey crop that can be produced from cotton. Cotton plants have extra-floral nectaries on leaf veins and produce nectar in their flowers. Cotton honey is not premium grade, but it is a good "blending" honey that can be produced in substantial quantities.

Over the years, beekeepers have learned where cotton pest pressures are highest and

insecticides are most likely to be used. Because of their expense, "sprays" are used by growers only when pests exceed their "economic thresholds". This season aphids, mites, and in some cases, Lygus bugs required treating. Beekeepers who have become somewhat complacent around cotton may find their colony populations were depleted this year more than they thought. I asked field and row crop extension entomologist, Dr. Larry Godfrey, to describe the most common pests of cotton and their damage to the crop. I also asked him to list the insecticides most likely to be used to control these pests. Finally, I tried to describe the possible consequences of exposure of honey bees to those chemicals.

"The 1994 cotton growing season was one of the worst years in recent memory for cotton insect and mite pests. Cotton aphids and spider mites were particularly severe and lygus bugs, thrips, whiteflies, and worms were problems in some areas. Cotton aphids can build to damaging levels during any part of the growing season. This year, high aphid levels were seen in many cotton fields in July and August. These aphids reduce cotton yields by sucking juices out of the plants, therefore competing with the plants for these photo-synthates. Naturally occurring biological control agents did not appear to be as prevalent in 1994 as in previous years; insecticides were used to reduce cotton aphid densities. Insecticides such as bifenthrin, chlorpyrifos, naled, endosulfan, oxydemeton methyl, amitraz, and dimethoate were used. Although not a concern in 1994, cotton aphids may also be prevalent in late August and September. Aphids at this part of the season may contaminate the lint with honeydew.

Spider mites reached damaging levels in many cotton fields in the southern part of the San Joaquin Valley in 1994. Mite feeding causes the leaves to turn reddish to yellowish and eventually to fall off. Yields can be severely impacted. Mite infestations can develop anytime from plant emergence to August. Miticides used included propargite, abamectin, amitraz, and dicofol.

Lygus bugs were not widely distributed in 1994, but did reach damaging levels in some areas. This insect feeds by piercing cotton squares (flower buds) and bolls. This feeding causes the squares to fall off and can discolor cotton lint in bolls. Lygus bugs also may destroy plant terminals. The most critical time for lygus damage is late May to early August. Cultural control methods help to manage this pest, but in some areas insecticides were also used for control. Insecticides such as acephate, bifenthrin, dimethoate, and methamidophos were used.

The silverleaf whitefly is a relatively new insect pest of cotton in the San Joaquin Valley. Damaging populations of this pest are mostly restricted to Kern county at this time. Whiteflies suck plant juices, therefore stunting plant growth. The sticky honeydew released by this pest is also a concern. Silverleaf whiteflies may reach damaging levels in cotton late-season (August to September). If needed, insecticides such as endosulfan, acephate, and fenpropathrin can be used for control." (See table after convention schedule.)

Excepting Penncap-M, it does not appear that contaminated stores are a concern with cotton. Many of the chemicals break down rapidly, but they are highly toxic to bees if they have not dried thoroughly before the bees arrive. Dimethoate and acephate often have some systemic activity in plants, killing bees on immediate contact and later producing toxic nectar. It is a wonder that honey bee colonies located near cotton fields late in the season can persist and be useful for almond pollination the next spring.

Look Tough?

Our scientists still rely pretty heavily on morphometrics (body measurements) to differentiate between AHBs and EHBs. With parental stocks, this approach is quite reliable. With "hybrid" crosses between the two, more emphasis is being placed on analyses of DNA to determine categories such as "European with Africanized introgression". To us that latter category means a European supersedure queen gets "mismated" by Africanized drones during her mating flight.

I already reported that the percentage of mismatings could be estimated by the stinging behavior of the bees. Drs. Robert Page and Ernesto Guzman showed that defensiveness is a dominant genetic trait. They also showed the majority influences the minority when it comes to colony defense.

The question is, "Can you predict defensive behavior from morphometric traits?" Rob felt that forewing length was as good an indicator as any other measurement, but he didn't think the correlation was very reliable.

Looking at this question in the reverse direction, Dr. Anita Collins and four colleagues studied Africanized bees and European bees in Venezuela. They found that the most defensive bees were not necessarily the "most Africanized". That fact seems to be true in the U.S., also. Many of the multiple sting incidences in Texas and Arizona that made the national news actually involved "European" bees. But, I don't think that these were our typical European bees.

Supersedures occur in feral and managed colonies much more often than most of us think. In areas where AHBs occur, mismatings will take place proportionally to the population types of the drones. These "hybrids" are causing the problems in commercial hives and feral colonies, not true "AHBs". All beekeepers operating in areas with AHBs should examine their colonies often. Changed behavior can be detected before the colonies become problematic. Very few beekeepers will ever have AHBs in their hives, but mismated supersedure queens will be a problem for a while.

The paper by Dr. Collins et. al. is in the Journal of Apicultural Research, Vol. 33, No. 1, 1994.

Colony Crowding

Is it harmful or helpful to keep bees pretty crowded in their hive? We are all aware of the connection between "congestion" in the brood nest and swarming in the spring. But, what else is going on? John Harbo conducted some experiments to find out. Using three different sized hives, with enough worker bees to produce 150

or 550 bees per liter, wintering bees consumed less honey under more "crowded" conditions. However, the crowded bees also reared less brood and had shorter life spans than their roomier counterparts.

In the spring, six different sized hives were populated with 9,600 bees each. More crowded bees produced less brood during the warmer seasons, also, but they produced better honey yields. (Hmm. I thought more bees = more honey).

These bees were subjected to one last indignity, the addition of extra boxes with no comb. The results showed that extra space stimulates brood rearing and reduces honey production. Earlier studies by Tom Rinderer demonstrated that adding extra drawn comb increases honey yields.

A discussion with Dr. Harry Laidlaw the other night led to an interesting management idea. Dr. Laidlaw proposed that colonies should have an empty shallow box of drawn comb below the brood boxes all year. The idea is to give returning foragers a spot to cluster outside of the brood nest. Returning foragers will not climb all the way up to an empty top super for this purpose. Theoretically, the lower density of bees in the brood nest will inhibit swarming. It is an interesting idea. If you give it a try, let us know what happens.

A Different AFB

Researchers working at the University of Wales, College of Cardiff, in England tried to find a difference between regular strains of Bacillus larvae and strains that produced an orange pigment in laboratory culture. Signs of AFB in larvae infected with the pigment-producing strain differ from classical AFB in that: 1. cappings over diseased larvae do not turn dark, 2. decaying larvae are light brown or grey and they are not ropy, 3. scales do not stick to cell walls, and 4. some white larvae protrude out of uncapped cells.

Both strains of Bacillus larvae grow similarly in laboratory cultures on different media and at varied temperatures. They produce the same fatty acids, are attacked by the same bacteriophages (viruses), share the same plasmids (free-floating strands of DNA), and produce no catalase. The only difference of note is that the pigment-producing strain was found only in areas of Varroa jacobsoni activity. Very interesting! Seen any of this in California?

Beekeeping Tour - Brazil

Dr. David DeJong, Genetics Department, University of Sao Paulo, is leading a tour of beekeeping operations in Brazil in January. He writes, "Greetings from Brazil! What is the real story about the Africanized honey bees? Do they produce honey? Is migratory beekeeping possible? Can they be used to pollinate crops? Can they be managed?

The answers to these and many other questions will become apparent when you visit Brazil to see first hand what Brazilians have learned from over 35 years of living with Africanized bees. You will meet and talk to successful beekeepers, including large scale commercial operators, sideliners as well as those that keep bees for a hobby."

Space does not permit me to list all the places and sights to be seen during this 12 day tour, but here is a smattering: preliminary lecture on beekeeping in Brazil, a visit to the campus where AHB originated, visits to area beekeeping and honey handling operations, a day at the national bee research center (museum, park and research facilities), a detour to world famous Iguassu Falls (hotel right there), and touristing in Rio de Janeiro.

CONDITIONS

Cost: Double.....$2,500
Single Supplement $ 740

Cost of tour is included; i.e. transportation, meals as indicated, accommodations, taxes and transfers, from Miami, Florida.

A DEPOSIT OF $200 PER PERSON IS REQUIRED BY AUGUST 1, 1994.

FINAL PAYMENT IS DUE BY NOVEMBER 1, 1994.

Any questions about this trip should be directed to Harold Liberman at Global Nature Tours,(301) 627-4777.

Sincerely,

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