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Disappearing Disease Hits UCD

When I began my career as Extension Apiculturist at UC Davis in 1976, Dr. Christine Peng had just filled the position vacated by the resignation of Dr. Harry Laidlaw. The Bee Biology program was the largest, state-supported honey bee research program in the country.

Dr. Robbin Thorp was studying various factors involved with honey bee pollination of almonds and kiwi fruit.

Dr. Norman Gary was studying bee behavior, the possibility of developing a hand-held "sniffer" for detecting of the odor of American foulbrood at the hive entrance, and the effects on honey bees of

pesticide spraying for Medfly eradication programs.

Christine was conducting research on the effects of feeding honey bees various diets at specific times of the year. We also became involved in studying the effects of chlortetracycline and tylosin on larval honey bees and on foulbrood control.

Periodically, the University finds itself very short on funds, due to the unpredictable and substantial fluctuations in the state budget. That was true in the early 90's, when Drs. Gary and Thorp took advantage of a "Golden Handshake" offered to faculty members to induce a number of them to leave the University payroll and move onto the pension plan.

The approaching Africanized honey bees (AHBs) were enough of a concern that the University concurred with our Department's desire to hire one replacement apiculturist to study the AHBs. We hired Dr. Robert Page, and Rob was provided support for his AHB program for five years. Approximately half of those funds were supplied by beekeeper and grower organizations with a vested interest in honey bee pollination. The other half of the funds were supplied by the California Department of Food and Agriculture. Although we did not determine how to stop AHBs from spreading through California, we did learn many things about their biology and behavior. That information still is very useful in our educational efforts with beekeepers and the general public.

A while ago, Dr. Peng's health took a significant turn for the worse. She is working hard to recover from a stroke, and she is on a year's leave from service. It is likely that she will retire at the end of calendar 2004.

Dr. Page was informed of an opportunity to become Foundation Professor and Founding Director of the School of Life Sciences at Arizona State University. He would be working a new group of academicians who will be

dealing with neurophysiology, neuroanatomy, and neurochemistry of honey bees, in the broader context of studies on social insects. After saying, "Thanks, but no thanks," the recruitment gained momentum. Rob negotiated, perhaps more to find an excuse not to go, but the offers just became better and better. They got so good that he decided to go Arizona State University in Phoenix to be surrounded by a group of academicians with whom he had been working, already, as co-investigators.

That leaves one pay-rolled faculty member in Apiculture in the Department - me. Our bee biology program has about 250 hives of honey bees spread around the campus and on nearby off campus sites. They house the genetic strains currently being studied by Dr. Page to determine the genetics of physiological thresholds for behavioral responses. Those colonies are being operated by Kim Fondrk, Rob's SRA. The bees and Kim are expected to be here for a while. That's good, because Kim maintains all the colonies, maintains the grounds at Bee Biology, maintains the observation hives, and takes care of a million other things. It won't be the same without him around here.

Rob intends to remain on the faculty, and continue

serving as Department Chairman, either until he retires at the end of June or until a replacement Chair is selected. His current field experiments will end around September, and that is when Rob and Kim are likely to leave.

If, and when, a replacement apiculturist can be hired are interesting questions. Vacated faculty positions revert back to "central control." They used to stay in the departments. New hires are based on priorities of the College, and molecular biology has a much better chance than production agriculture.

Thus, I will become the only active faculty member dealing with honey bees. This is a decrease from three professors of apiculture and an extension specialist to just an extension specialist in 27 years.

I am not totally alone out here in the Facility, because Robbin Thorp (housed across the hall) is still very involved in non-*Apis* bee studies. It appears that the introduction of *Varroa* onto the island of Santa Cruz did what he and Dr. Adrian Wenner could not do manually - finished off the honey bee populations on the island. However, the introduced "weeds," fennel and yellow starthistle, seem to be sur-

viving well with pollination by native pollinators. Maybe the starthistle actually is surviving from its "seed bank" and it eventually will disappear from the island, too. Time will tell.

Robbin also is involved in studies to determine how well non-*Apis* pollinators can perform commercial pollination on small sized farm locations in California where natural populations of wild pollinators are prevalent. Those bees are doing quite well.

My greatest concern is whether or not we will be able to keep the Dr. Harry H. Laidlaw, Jr. Honey Bee Research Facility open. The costs of heating/cooling, lighting, maintaining the phones and computer lines, irrigating and mowing the patch of grass that we maintain around the facility, have to come out of either the Departmental budget or professor's grants. Without Rob around, funding may be too limited to sustain the Facility.

Dealing with American Foulbrood

This information was shared with us at the combined AAPA/CAPA meeting last January in Niagara Falls, Canada.

Dr. Steve Pernal, who works in one of the last Canadian government funded bee research facilities in Beaverlodge, Alberta, Canada, arrived at his job when American foulbrood (AFB) was really causing problems for some commercial beekeepers.

He first looked at possible ways to decontaminate woodenware from hives containing dead larvae, scale, and contaminated food stores. 1. Scorching and Virkon S[®] were about 84% effective. 2. Powered water was 81% effective. 3. Scrubbing was 77% effective. 4. Steam and lye were nearly 100% effective, as is irradiation.

He has been checking bee stocks for hygienic behavior and there are some pretty good stocks around. Queens from hygienic colonies are being traded among bee breeders, and their stocks are beginning to look pretty good. He has been encouraging beekeepers with persistent problems to irradiate their equipment, or at least burn the worst of it. Levels of AFB in his area have diminished from 40% of the colonies to 25%. It is headed in the right direction.

Steve also found that the best sample to take for AFB spores in a colony is the

nurse bees. They turn out to be very good indicators of the level of contamination in the boxes. In some cases, 100% of the bees in a sample were contaminated. A few samples had no contamination, but averages around 25-50% were common. That is a lot of inoculum to try to keep in check with prophylactic treatments with antibiotics.

California Visitors

In order to assist Dr. Frank Eischen in obtaining data for a scientific paper, CDFA prepared a list of states of origin for honey bees entering California in 2003. They recorded a total of 745,105 hives from 21 states and 1 Canadian province (Saskatchewan), if I read the results correctly. Some of the bees (7,833) originated in CA. They must have found a shortcut through a neighboring state and had to come back in.

The largest number of imports (137,745) arrived from North Dakota. Second largest (110,155) was from Idaho. Next was a large group (98,851) from South Dakota. Between 66,000 and 82,000 came from Washington, Oregon, Nebraska, and Montana. The rest of the bees came in amounts ranging from 888 to 30,000 from the remaining states west of the Mississippi River.

Blueberries

I always thought of blueberries as plants that grew in sandy and acidic conditions (low bush) or on the edges of wetlands (high bush) in New England, etc. But, it appears that blueberries are an important up and coming crop in the Central Valley of California.

Volume I, 2004, of the Small Farm News, published by UCD's Small Farm Center, features the fundamentals of growing blueberries in our hot, arid climate.

The market for blueberries is expanding rapidly because of the news that blueberries contain anthocyanins that promote healing and preserve health.

If you wish to grow blueberries, site selection is critical. A gentle rolling slope is good, because blueberries are "sensitive to standing water." They require good surface and internal drainage. Sandy soil is best. And, blueberries do require acidic soil to prosper - optimum pH is 4.8 to 5.2. Acid-reaction fertilizers or agricultural sulfur can help, but some soils are really too alkaline. Soil pH adjustments, tiling, ditching and water development should be done a year ahead of planting. Perennial weeds can be induced

to grow, then eliminated with herbicides. A green manure crop can be turned over to improve soil tilth.

Check with your local Farm Advisor to find out which cultivar(s) does well in your area. The plants have to be ordered a year in advance. Growers usually prefer two-year-old containerized plants due to their increased survival. But, rooted cuttings and two-year-old bare-rooted field-grown plants are available.

After providing all that useful information, they failed to mention that you won't get a crop without adequate pollination. In most cases, that means honey bees. So, if you are in the pollination business, keep your eyes out for blueberries. The plants require two or three years to grow and mature, then start producing berries on the third or fourth growing season.

Firefighters' Breakfast

Would you like to show your volunteer firefighters how much you appreciate them? By helping conduct a Honey and Biscuits breakfast for the community, you can assist the firefighters in obtaining funds for fire-fighting supplies and equipment.

Whether or not you have ever organized such an event, the National Honey Board has materials to share with you that will make the whole event enjoyable and nearly foolproof. But, you need to respond soon to keep this program flourishing. Please contact the National Honey Board and express your interest in the program before **May 15**. The Honey Board can be reached at: (888) 682-2337 or by email at: breakfast@nhb.org.

IPM with Varroa

Dr. Keith Delaplane shared some of the results of studies conducted in Georgia to determine what impact various non-chemical treatments might have on *Varroa* populations in beehives. In his studies, an average of 60-190 naturally falling mites per day was their treatment threshold.

Impacts of screened bottom boards alone, and in conjunction with other treatments, were: 1. Amount of brood could be greater than, less than, or equal to the controls; 2. *Varroa* numbers were either the same or a bit lower (not significant); 3. combined with hygienic bees, mite levels were reduced, 25% fewer mites dropped, and it took two months longer to build to

treatment thresholds; 4. with SMR queens, there were 30% fewer mites dropping. However, the colonies did eventually reach the treatment threshold and Keith suggests rotating among Apistan[®], CheckMite+[®], and a third potent treatment to prevent selection for resistance.

More on Screened Bottoms

Dr. Tom Webster also studied the effects of screened bottoms on *Varroa* over a 15-month period. The space under the screen has to be pretty deep if the debris is allowed to accumulate - it reached over a 1/2 inch in this study and usually rears wax moths.

He found that 40-50% of falling mites are alive. They tend to fall less in the winter, when the bees aren't moving much. They fall in much greater numbers when the temperature exceeds 95 degrees in the summer. His data demonstrated a reduction of 14-42% in mite fall over a couple months (suggesting that the mite populations in hives with bottom screens are smaller).

When Apistan[®] is introduced into the hives, many mites drop but most of them are only stunned by exposure to a sublethal dose. This is when the bottom

screen trap became extremely effective. CheckMite+, on the other hand, drops mostly dead mites. Are the remaining live mites the ones that lead to resistant populations?

Tom noticed that the screens tended to reduce early and late season brood rearing, but not significantly. At the end of the 15 months, using a CheckMite+ treatment to knock down the mites, Tom found a 57% reduction in mite numbers in colonies hived over screened bottoms. Tom would like to see novel, fairly non-toxic compounds developed that would just cause large numbers of mites to drop to their deaths in bottom traps. Articles on using powdered sugar for that purpose have been published.

Ultrafiltered Sweetener from Honey

A number of laboratories across the country are trying to find a way to identify the presence of sweeteners, extracted from water-diluted honey, then added back to regular honey.

The ultrafiltration process probably does not involve molecular sieves. Some of the finest sieves can remove enzymes (about 100,00 Daltons), but chloramphenicol is about 300(?) Daltons.

Small things can be removed from diluted honey with activated charcoal or through ion exchange. Those processes can remove antibiotics. However, such stringent treatments remove volatile (flavor) compounds, as well. They also appear to remove 9 of 10 non-volatile chromatographic peaks. For some reason, ultrafiltration tends to increase the concentrations of metals by 10-40 times, too. Perhaps some of these traits will be used in analyses to identify honey contaminated with this sweetener.

P.S. on AgraQuest

I wrote previously on the efforts of Pam Marrone and her company in Davis to get environmentally friendly, natural (not bioengineered) pest management products on the market.

One of their products, Serenade Garden - Ready to Use[®], is going on sale to the general public as an exclusive with Wal-Mart at their Elk Grove, Folsom, Roseville, and Rancho Cordova stores (not Woodland and Dixon). The product is a biofungicidal concoction that controls bacteria and fungal diseases of plants "while providing unsurpassed plant, human, and environmental safety." It is listed by the Organic Materials Review

Institute, so it is OK for organic growers.

This next quote by Pam probably still requires scientific verification: "But, there is one particularly innovative use. You know the disease that kills cherry trees and plum trees by causing them to ooze sap? Serenade controls it, really dries it up. It saved one of my cherry trees."

Sincerely,

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