COOPERATIVE EXTENSION UNIVERSITY OF CALIFORNIA

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Newsletter E-mailed to You

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Fall Management

I received a request for some fall colony management information in this issue. The topic generally would be more appropriate for a workshop or short course, but I will mention a few key elements.

Fall management actually begins in late summer. The goal is to raise as many healthy bees as possible to be your wintering population. Three crucial considerations for population buildup are: 1. adequate pollen supplies, 2. large numbers of week old to two week old nurse bees, and 3. lots of empty space in the brood combs to accommodate egg laying.

If the bees are short on food, consider feeding BOTH sugar syrup and supplemental protein.

If the brood nest area is pretty much filled up with honey, remove combs and replace them with combs that are practically empty. Brood rearing naturally wraps up, or tapers way off, by the end of October, so the colony needs space dearly during the next month.

As for bee health, honey bees infected with diseases, fungal and/or

bacterial, or that have been fed upon by *Varroa* mites while pupating, will not be able to survive the four to six months expected of healthy winter bees. You should have an idea of your colonies' mite populations through periodic monitoring with sticky traps. *Nosema* spore counts are not technically difficult to determine (see the instructions at Randy Oliver's website: www.scientificbeekeeping.com). Interpreting the counts and deciding how to treat, if deemed necessary, can be a bit dicey.

Finally, the bees should have produced enough honey for winter survival and for you to take some. Try to leave 30-60 pounds for the bees. Fully filled deep combs contain about 5 pounds of honey and medium-depth combs between three and four pounds each. If the bees read the textbooks, they will have put the honey above and to the sides of the brood nest, leaving many empty cells in the bottom box for late summer (then early spring) brood rearing. You may have to help the bees redistribute their stores to acquire that arrangement.

Having accomplished the things previously mentioned, you and your bees should be able to take a break for awhile. With almond pollination prices remaining substantial and demand for very populous wintering (yes, February is winter to European honey bees) colonies remaining high, many US colonies will not really have a winter.

Preventing Robbing

We are rapidly approaching a time of the year when robbing becomes problematic for beekeepers. When the weather allows for forager flight, but plants are not providing nectar and pollens, honey bees are apt to drop by next door and see what they can steal from the neighbors. The length of time that bees rob depends on the climate. Here, in the Davis area, we have nectar and pollen dearths in late spring and a big one in late summer and fall. We can have flight conditions throughout the winter, but the worse problem spans the time from mid-September to November.

Robbing is a problem for honey bee researchers, small scale beekeepers and beekeepers with thousands of colonies. At UC Davis, we still have the portable, four-sided, eight foot tall, folding screen cage that Dr. Harry Laidlaw would wrap around him and a hive so that he could work in the hive, unmolested, during the fall. Otherwise, he no sooner would have the cover off the hive than hordes of robbers would descend on the combs.

Some beekeepers are convinced that if you remove all the covers (lids) from the hives at once in an apiary, robbing isn't a problem. I'm going to try that in Davis, sometime, to see if it works as well as the Canadian proponents claim that it does. I'll never hear the end of it from Susan Cobey and Elizabeth Frost if it doesn't work!

I believe that the better choice, feasible at least for those with fewer hives, is the use of robber screens. These screens interfere with robbing bees yet provide wide expanses of the entrance to be used for hive ventilation. Serious ventilation is critical on our hot fall days.

The original robber screen that I saw being used at UC Davis was a wooden-framed section of screen that covered about half of the entrance. A slot cut in one end held a piece of lath that could be slid down the entrance to reduce the entrance to zero, if necessary. Normally, it was left with about a 1.5 to 2 inch hole for the bees to

defend. Still, if the colony behind the screen was weak for some reason, it really got targeted. A pile of freshly killed bees would be lying on the ground every day for weeks.

Then, we learned a bit more about robbing behavior and a new screen design became possible. Robbing honey bees tend to hover in front of a neighboring hive, swinging to the left and the right, as if trying to find an unguarded opening through which to enter quickly and undetected. Robbing foragers fly with their hind legs dangling down, similar to the way paper wasps dangle their legs. It does not appear that robbing honey bees enter the hive by landing on it and walking in.

Therefore, if you place a full-length screen across the front of the hive, you can block out the robbers. But, what about the hive inhabitants? Would they be screened in? Yes, if you fit the screen tightly, everywhere, top and bottom, to the hive body. Instead place a four-inch-high robber screen across the body of the hive, leaving an opening at the top two inches wide between the screen and the hive, so the resident bees can crawl or fly over the screen. If you install the screen in the morning, the resident bees learn within hours to crawl up over the screen to get out and get back in. Eventually, a number of them learn to fly diagonally across the hive entrance and not touch the screen. And, the bees have no difficulty carrying bodies of dead bees and other debris over the screen.

Intuitive behaviors are interesting. Potential robber bees leave their original colony by going over the robber screen, but don't do the same when they try to enter a neighboring hive. They hover around the fronts of screened hives and never get in; then, they go back home over the top of their own screen. We aren't sure, but it appears that these robber screens also deter marauding yellowjackets, that can kill and eat a surprising number of honey bees around the hive entrance. Yellowjackets appear not to access this type of robber screen, either. I am still waiting for reports on the value of this screen from some beekeepers experiencing severe problems with yellowjacket predation.

It may be a bit difficult to visualize the screen I have described, so I am including a few photos (below) that should clear things up. The screens can be nailed to the fronts of the hives or held on with hook and eye latches. If nailed on, use nails with two heads on them (8d 2¼ inch bright duplex), so that the screen can be nailed solidly into the hive front but the nails can easily be grabbed when you wish to take them out.

You can tell from the photos that this screen was made by hand with simple tools (hacksaw, wood glue, beehive frame nails, drill, hammer, Arrow stapler and ¼ inch staples, white spray enamel paint). The bees do not have problems negotiating my crooked apparatus, as long as it is bee-tight in the right places and lets them get out behind it.

Robber Screen

Open Top

Hook and Eye Latch

Missing WAS Members

Most of this edition will be devoted to happenings surrounding the just completed Western Apicultural Society annual conference held in Salem, Oregon.

During the transition between WAS Treasurers, it appears as though names and contact information for some new members may have been misplaced. If you became a WAS member but did not hear from the organization for a year (hard or electronic Journal deliveries), please contact the current WAS Treasurer, Jim Bach, at: jcbach@fairpoint.net and tell him what has transpired. If you are aware of anyone complaining about being dropped by the organization, please have him or her contact Jim. Unlike the membership year, that matches the calendar year, Journal subscription years run for 12 months from receipt of the first subscription payment.

WAS Talk on Seed Pollination

Mike Weber, manager of Central Oregon Seeds Inc., has to devote his winter, spring, and summer to planning and managing pollination on nearly 50 carrot and onion seed fields. The certified fields require one or two mile isolations between them. Carrots bloom for six weeks and onions for four, so timing of bee delivery and removal is critical.

Mike has an experienced bunch of beekeepers who bring populous colonies to the fields and remove them from the fields on 24 hour notice. The seeds planted under Mike's scrutiny often arrive from foreign breeders. They are hybridized in Oregon because the growing conditions are nearly perfect. Then the hybrid seeds are distributed mostly overseas for crop production.

Over a 2-3 week period Mike orchestrates the delivery and removal of 12,000 colonies. He does not like to stress his beekeepers, so he usually asks them to bring ½ fields worth of bees on one day and take the next day off. During that day off, someone else delivers that other half of the required colonies to that field. The next day, the original beekeeper delivers another load of bees – either a first half or second half, depending upon the field. The beekeepers

are provided maps and directions ahead of time. Mike tries to keep compatible beekeepers together. Mike also has to pay attention to the crop varieties. Pollen viability varies immensely from one variety to another. For example, white carrot umbels normally attract many more foragers than green colored umbels.

Drip irrigation maintains continuous bee visitation. But, always trying to get better performance from the bees, Mike's cooperators will be studying the effects of applications of synthesized brood pheromone to the colonies. They already know that attractants sprayed on the bloom increase visitation some, but only for two to three days.

Nuclei Utilization

Many commercial beekeepers will have a few "nucs" going most of the year to replace sputtering or dead colonies they find, occasionally. However, Harry Vanderpool uses his 325 colonies mainly for crop seed pollination and he actually schedules the times that he will be making nucs. Harry uses his five-frame nucs to keep as many colonies as possible at the optimal strength for seed pollination throughout the season.

Beginning July 1, and over the next two weeks, nucs are made up with one frame of brood and bees, one frame of honey and bees, one frame of drawn comb, and two frames of foundation. Those nucs likely will be pressed into action in the fields. They have to be used in about 14 days or they become too strong for the nucs.

A bit later in the season, around August 1, Harry starts nucs as two frames of brood and bees, two frames of honey and bees, and one frame of drawn comb. Many of these nucs are planned to be wintered. Harry feeds the wintering nucs until they are pretty plugged with syrup, then he shakes the nuc boxes full of bees. The older foragers return to their hives and the nucs head into winter with fairly young bees.

If there is an immediate need for later season nucs, Harry puts three frames of brood and bees, one frame of honey, one frame of drawn comb, and one shake of bees from the brood nest of a strong colony into each nuc. These nucs also have to be used quickly to prevent the bees from out growing the nucs.

A fourth strength nuc is sometimes readied for delayed use in the fall. Those are started as two frames of brood and bees, one frame of honey and bees, and two frames of drawn comb. When nucs require chemical treatments, the doses are reduced to one-quarter (25%) strength.

Harry purchases a large number of queens for these nucs. In the summer, when it is warm, the bees can chew through the softened queen candy very quickly. Instead of poking a hole in the candy to get things started, Harry wraps the queen cages with inexpensive masking tape to keep the queen in a bit longer. He checks for release ten days following installation.

If the queens cannot be used immediately, they are placed in a queen bank consisting of a substantial number of nurse bees. This time, the queens are supposed to remain confined, so Harry wraps the cages lengthwise with two layers of cellophane tape. The cages are arranged so that the screen sides are open to the nurse bees. If the cages have accompanying attendant bees, they are placed in the holding comb candy end up. If there are no attendants, they are placed candy end down.

The many overwintered nucs come to California with the colonies rented for almonds. When he encounters a "deadout or a dud," in goes a nuc. Harry estimates that he loses around 7% of his queens when he ships bees to almonds.

Gordy Wardell's Almond Work

Paramount Farms, one of the state's huge almond producers, hired Dr. Gordon Wardell to help ensure that honey bees and other pollinators would be available to pollinate the crop well into the future. Thus, another research hub joined the bunch.

Paramount Farms currently will be harvesting almonds from 45,000 acres running from Fresno to Bakersfield with a 100 mile breadth. Next year there will be about 50,000 acres requiring pollination.

The company uses its own staff for colony strength inspections. The acceptable base colony size is eight frames of bees for which the beekeeper was paid $130 this year, with a bonus of $2.50 for each frame greater than eight. Next year, the company intends to pay $135 for the base unit and a bonus of $5 a frame for larger colonies. Gordy is trying to entice his beekeepers to hit twelve frames of bees next year and be paid $155 per colony.

Three teams of inspectors were assigned to sample 15percent of the colonies (between 30,000 and 40,000), but finished about 17,000. The colonies average 9.5 frames of bees and two-thirds of them were above the eight frame minimum. During the inspections, correction factors were used based on temperature. If the temperature was below 50^{o}F, a frame of bees was added to the visual count. If the temperature was 60^{o}F or above, a frame was added to the visual count. Inspectors changed gloves and cooked their hive tools in their smokers between beekeeping operations.

The inspectors are converting over to recoding all the data on the inspected hives on data recorders. The device selects which colonies to inspect through a random number generator. Along with the rest of the collected data, the recorder enters a GPS location, so that everyone can go right back to that hive. The inspection results also are written on the cover of the hive.

It became very obvious from inspecting bees in their holding yards that despite the origin of the bees, when they hit the holding yards, they required feeding. The bees coming from cooler climates acted like they were just coming out of winter and looking for spring flowers. The bees coming from warmer climates came in with quite a bit of brood, but the holding yards basically had no food plants available to keep brood rearing going.

The colonies seemed to respond pretty well to carbohydrate feeding. The effects of adding additional lipids were debatable, but additional canola, corn, and other vegetable oils increased patty consumption. Many of the colonies were fed Megabee® to keep brood rearing going. For about three weeks the fed and unfed colonies looked pretty similar. By six weeks, bees analyzed from the unfed group had much less protein in their bodies than did the fed bees. It appears that adult bees live longer in the fed colonies. Besides shortened life spans, the unfed colonies just seemed to "lose their vigor."

Paramount Farms is cognizant of the potential problems that fungicides can cause with bees, but this was a damp spring and chemicals were used to protect the crop.

Gordy is working with *Osmia lignaria* (the blue orchard bee) to see if it can become a supplemental almond pollinator, perhaps decreasing the number of honey bee colonies required per acre. But, Gordy is the first to admit that the fungicides have to be kept away from blue orchard bees if the bees are to be successful at nesting in the orchards.

Colony Health

Dr. Diana Sammataro began her presentation listing some of the manners in which honey bees and honey bee colonies are protected against disease-causing microbes. These include living in a hive lined with the antibiotic propolis, having an impervious exoskeleton, moderating temperature (such as running a fever to reduce growth of *Nosema*), stimulating production of antibiotics in infected cells, stimulating blood cells to engulf and eliminate invading microbes, while serving as a host to a number of microbes essential to the health of the bees.

We still believe that honey bees have a sterile intestinal tract before they emerge from the cells as adults. By exchanging food and eating stores that have been manipulated by previous bees, they become inoculated with bacteria (and fungi?) essential for their existence. Diana referred to this concept as the bees having a "social stomach."

Researchers at the USDA Tucson honey bee lab have devoted significant time and energy trying to isolate and determine what microbes are necessary for honey bee health. It turns out that the *Lactobacillus* species are some of the most important, as they are to mammals. In honey bees they are important in digesting pollen and releasing essential nutrients. One of the species of *Lactobacillus* apparently has been found in every species of honey bee analyzed. It appears to be the same species that kills fungi in wine production. Twelve other *Lactobacillus* species have been identified in the honey stomach contents (nectar). Combined, these bacteria are going to be marketed as a honey bee probiotic. These bacteria release protective antibiotics, enzymes and fatty acids, and break down starches, proteins and carbohydrates, etc.

Feeding studies, somewhat similar to those of Gordy Wardell and conducted over extended periods of time, determined that without inoculated pollens to consume, only the queen would continue to function somewhat normally. Eggs were being laid but no bees were feeding the larvae. Adding a bit of previously stored bee bread led to restoration of brood rearing. Preliminary studies determined that antibiotics, high fructose corn syrup and old honey appeared to vastly reduce the number of microbes in laboratory cultures. Different sugars had varying effects on microbial make up. The next step is to try to determine how much impact oxytetracycline, tylosin, and fumagillin have on honey bee intestinal microbes. A follow up study will determine if the intestinal flora can be re-established using the probiotic.

In case you were thinking of trying this, yogurt made from cows' milk or cream has a high level of the sugar lactose, which is toxic to honey bees. As I have often counseled before, if you are going to try anything new on your bees, be sure to keep the number of experimental units limited, in case you lose them. According to Wikipedia, there is a soy-based yogurt.

Ant Problems?

I am sorry that I am not going to remember who provided this gem at the WAS conference, but apparently there is a

cleansing product on the market called, Orange Power™, 'The Greener Cleaner.' Spray it on the ants and their trails. Said to eliminate ants for weeks.

Pollination Taxes

Beekeepers renting bees to pollinate crops in California are expected by the state to pay a 7percent tax on that income.

Apparently, you can pay the tax yourself, but in order to prevent the grower or broker from having to withhold that 7 percent from your check, you must fill out CA Franchise Tax Board form 588 (waiver request) and send it to: Withholding Services and Compliance, Franchise Tax Board, P.O. Box 942867, Sacramento, CA 94267-0651.

Sincerely,

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