COOPERATIVE EXTENSION UNIVERSITY OF CALIFORNIA

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2012 Plans

Now that the shortest day of the year has passed, temperate-climate honey bees are beginning to start brood rearing or waiting for the first pollens and warmer weather of the year before the colony bursts into full-blown brood rearing. They are ready for the coming spring, but are you?

How did last year turn out? Yes, the weather was quite different over most of the country. It seemed like the seasons were delayed by about two or three weeks. Cool weather limited potential early honey flows. Early spring plants became spring plants and provided food for the bees later into spring than usual. Swarming was delayed, but it happened.

If spring of 2012 also is delayed, do your bees have enough stored food so that they will not run out while they rear significant amounts of brood? Are you planning to divide your colonies this spring? Do you have the equipment on hand and replacement queens ordered, if that is what you intend to do? If the weather is exceptionally nice, do you know how you would deal with a bumper honey crop? How will you harvest, handle, package and disseminate your honey? Are you familiar with the laws pertaining to packaging and labeling your product to meet all federal and state regulations? Will you be dealing with certified farmer markets or county health boards? It is better to start now with those activities than to be caught flat-footed in the middle of your busiest times.

What about repeat problems like high levels of varroa mites? There is no one answer to this question. If you wish to eventually select for naturally occurring resistance or tolerance to the mites, you can do nothing. If the bees and mites can come to a truce, both will survive in your hives. If you have been trying various methods to reduce the numbers of mites in your colony populations, did they work? You would think it is easier to determine, "No," than to determine, "Yes." If the mites are still there, then the approach did not work – or did it? There are many beekeepers who have had the same experience as we did on the Davis campus when the mites were getting pretty heavy. We experimentally removed older Apistan strips and placed two new strips in a couple hives every month for a year and monitored the mite drop on sticky boards. There were some mites in the spring, but basically none through the summer. Then, in mid-September, when robbing started and heavily infested colonies began to die off, we found sticky board counts that were impossibly high for mite reproduction within the colonies considering the previous mite levels. We went from practically none to thousands of dropped mites within a week. So, if you saw heavy mite populations in the fall after you treated, it does not necessarily mean that your treatments didn't work. It could be that your strong colonies robbed dying, heavily infested colonies and brought back the mites. Or, collapsing colonies flooded your colonies with heavily infested bees that were trying to find a better home.

There is one thing to keep in mind about late-season upswings in mite numbers. If you are able to keep the mites pretty well suppressed from mid-August through October, then you will have the least amount of mite damage to your winter bees. Those bees should have fewer viruses in them and more nutrients in their tissues and hemolymph (blood). Those fat bees can tolerate late mite pressure a lot better than bees that already have been fed upon by mites during their developmental stages.

You still have a few, but not too many, weeks to ponder what you will attempt to do with your bees next year. Try not to let things get ahead of you.

Nuisance Beekeeping

Many decades ago, a large number of U.S. families lived on farms. Keeping bees was part of farming, providing essential pollination and perhaps some honey and other hive products. As the nation became more industrialized, rural folks moved to the cities and suburbs. Most of them left their bees behind. With time, folks lost their affinity for honey bees. Sometimes, bees caused problems for urban and suburban residents, so they found it easiest to deal with the somewhat complex problems by instituting severe restrictions or prohibitions on beekeeping.

More recently, honey bees have enjoyed an increase in popularity, due to the doom-and-gloom stories in the media dealing with unexplained losses of hundreds of thousands of colonies and the threat that poses to our food supply. Suddenly, beekeeping has become the latest fad. The numbers of new small-scale beekeepers is staggering. The ability of many beekeeping groups to approach municipal leaders and obtain permission to keep colonies legally in the cities is remarkable. But, with this new freedom comes major responsibilities, the most important of which is to be a beekeeper, not a bee-haver.

There are many ways to maintain colonies of honey bees. On one extreme end is to place the bees in a hive and walk away, leaving the bees to fend for themselves. This laissez-faire, every-bee-for-itself,

attitude may be appropriate for colonies kept in areas isolated from humans and domestic animals, but it is irresponsible in areas where the apiary is surrounded by neighbors or other beekeepers.

The first issue is water. Honey bees require water every day. They normally find the sources nearest to the hive and will continue to return to those areas, even if the water has been removed for weeks, then re-established. If that water source is someone's pool apron, irrigation system, hanging laundry, bird bath, swamp cooler, dog dish, leaky hose connection, fountain, etc., your bees may become an irritation to the neighbors. Neighbors may be afraid of stinging insects, despite how gentle you say your bees are. A swarm of bees in the air frightens nearly everyone who sees one, except honey bee-knowledgeable people. When the swarm forms a cluster, nearly everyone is afraid to go anywhere near it. The exception may be some kids who will try to poke and throw things at them "to see what happens." Finally, some of those swarms may take up residency in a neighbor's chimney, between the chimney and the wall of the house, in the soffit, under a deck, around the clothes dryer vent, in the water meter box, in a barbecue grill, an old wine barrel, in the bushes, etc. It won't take too many of this type of complaints to get prohibitions on beekeeping re-instituted.

Laissez-faire beekeeping also can lead to serious problems for nearby beekeepers. If colonies are not going to be examined periodically for signs of American foulbrood, then an infected colony is likely to dwindle and die. Yes, it is obvious that the stock in the hive was not genetically equipped to deal with the disease, and therefore not fit to remain alive. But, what about the other colonies in the area that were healthy? They are apt to find and remove the spore-contaminated honey from the hive of the dying or dead bees. That can inoculate all the other colonies with an overwhelming dose of spores and many of them will become diseased. Is it appropriate for one beekeeper to provide disease inoculum for the surrounding beekeepers?

A similar question holds for varroa mites. If a colony cannot contend with an infestation of varroa mites, it will be overwhelmed and die. Obviously, that stock was not suited for survival in the mite-infested area. As a laissez-faire beekeeper, is it appropriate to allow colony dwindling to continue to completion? Robbing bees from stronger colonies will become infested with mites when they interact with bees in the dying colony. As the heavily infested colony dies off, hundreds of adult bees carrying large numbers of mites will fly from the hive in search of a better place to live. They are attracted by the odors of other colonies in the area and try to merge into the populations. Even if the foreign bees do not become incorporated, the mites have been provided an opportunity to enter a new colony and start reproducing, as is mentioned in the previous article. Is this an appropriate manner in which to treat other neighboring beekeepers who are trying their best to keep their colonies alive and healthy?

If beekeepers do not assume some responsibility for their bees and the bees' activities, complaints will mount and prohibitions will be re-instituted. Most of the things to consider are not difficult, but require a bit of time and effort. Provide water for your bees on your property. Use fencing or bushes to get the bees to fly up, first, then away from the apiary. They will attain that altitude on return flights also. Bees flying over people's heads are out of sight and out of mind. Use gentle stocks and "work" the bees during warm, nice mid-days. Use smoke and slow, gentle movements. Inspect the brood periodically (twice a month) to be certain that the queen is laying a good pattern, that the brood is

healthy, and that there are adequate food stores for the time of the year. If you need to feed the bees, start feeding after flight ends for the day, to help prevent robbing. If robbing starts, immediately place robbing screens in front of the entrances (see my web page under *Bee Briefs* for details).

Finally, keep this in mind. One normally cannot tell what the disposition of a colony is going to be based on the behavior of a swarm cluster. If cluster bees start stinging before being disturbed much, then it is not the type of colony you will wish to keep around people. If it offers no resistance to being collected, that still does not predict its future behavior. Frequently, Africanized honey bees will not demonstrate overly defensive behavior until they have more or less filled up their first deep super. To suggest or even help a novice beekeeper to hive a swarm of bees collected in an area known to contain Africanized honey bees is totally inappropriate. It is difficult enough for an experienced beekeeper to work with a "hot" colony. But, it is completely irresponsible for anyone to put an unknown colony of bees in the backyard of a brand new beekeeper and hope that when the hive is touched, the bees will not fly out *en masse*, sting the beekeeper, sting the neighbors, and perhaps kill the pets of the beekeeper or their neighbors. Such practices have been going on in southern California in the name of "saving the bees."

DPR Worker Safety Information

While your colonies are working the almond orchards, this would be an excellent opportunity to read up on the expectations of the California Department of Pesticide Regulation concerning the safety of your employees. Begin on the home DPR web page (www.cdpr.ca.gov) or, to save lots of time, find the last URL **in bold** above, and click the link to "Programs and Services" beneath Jerry's beaming photo. From there, click on "Worker Health & Safety Programs and Services" way at the bottom of the page. Next, under the Human Health Mitigation Program (HHMP) click on the "farm worker and safety outreach and education" link. If you are still with me, the next link to click is the "Employer compliance assistance booklets." Now you have reached the point where actual information becomes available. The URL for that page is: **http://www.cdpr.ca.gov/docs/enforce/cmpliast/bkltmenu.htm.**

All beekeepers who hire employees to work for them in the State of California should read the nine separate documents that describe employment information that must be posted at the warehouse; instructions for seeking medical assistance that must be posted; requirements for annual safety training; and forms that must be signed by employees and kept on file that document annual safety training, as well as MSDS (material safety data sheets) for ALL pesticides that employees handle. Personnel from the county agricultural commissioner's office may request to review those documents upon any routine or complaint visit. Penalties for non-compliance can be extremely severe and expensive, especially if an accident involves pesticides. This is a word to the wise – please be wise!

Rough Communications

Students of honey bee behavior have noted an interesting form of inter-bee communication that is quite physical – the head butt. It is a form of "stop" signal. So far, it has been observed when foragers return and dance to a dwindling or exhausted food source. They are told to stop dancing to that source. The stop signal is used by certain bees to try to limit or extinguish dancing on the swarm cluster that would lead the bees to a competing new hive

location. And, when the "decision" is made where to go, the stop signal is used to close down dancing on the cluster so that the bees can shake other bees and get the cluster to swarm to its new home.

Small Hive Beetle Publication

Small hive beetles (*Aethina tumida*) are a serious pest of honey bee colonies in areas of the country where the weather is warm and humid during substantial parts of the summer. Fortunately, most of California does not fit that mold. Dr. Mike Hood and his students at Clemson University, in Clemson, South Carolina, have spent many seasons studying the biology of the beetle and methods of keeping the numbers of beetles in colonies at sub-economic levels.

In October of 2011, the researchers compiled all the information and generated Extension Bulletin 160, titled Small Hive Beetle IPM. The color photo on the cover shows a bee trying to grasp a beetle in its mandibles to remove it from the hive. There are about eight other beetles around the bee. Inside the 20-page, 50 color illustration, 8x11" booklet, the text begins with an Introduction, followed by articles on the History of the US invasion, small hive beetle Biology, Economic Importance, and a 12-page article on Small Hive Beetle Control that includes the subtopics: *Acceptable Pest Levels, Preventive Control Practices, Monitoring Practices, Genetic Control (honey bee hygienic behavior), Mechanical Control, Physical Control, Biological Control, and Chemical Control*. The publication ends with references to 30 scientific publications on this pest.

The bulletin is available for free as a PDF download at: *www.**clemson**.edu/psapublishing/Pages/Entom/EB**160**.pdf*.

NY Pumpkin Pollination

Over a two-year period, researchers at Cornell University in western New York State visited pumpkin fields of various sizes, collecting 900 sets of data concerning visitations of honey bees and native pollinators with and without the addition of supplemental honey bee colonies.

The only three bees that were in the fields in high numbers were honey bees, a bumble bee species (*Bombus impatiens*), and the squash bee (*Peponapis pruinosa*). Interestingly, there were more total visits of all pollinators in the blossoms in 2008 than in the following year, whether extra honey bees were used or not.

Individually, the squash bees visited the male and female blossoms roughly in proportion to the blossoms numbers in the fields. The female blossoms vastly outnumbered the males. The squash bees usually avoided blossoms with honey bees and bumble bees in them, regardless of whether the tenants were alive and moving or dead experimental bodies.

Honey bees and bumble bees visited female blossoms, preferentially, since they provided the most nectar per visit. Bumble bee visitation did not vary when supplementary honey bee colonies were placed around the fields, but the presence of honey bees suppressed the number of squash bee visits. Interestingly, the presence of supplemental honey bee colonies actually depressed the total numbers of all the bees in the blossoms on a daily basis, including honey bees.

The authors concluded that, in a number of cases on the smaller fields in the study, bumble bees and squash bees together were abundant enough to set the commercial crop. On larger fields, it did not seem to matter if the squash bees were fewer when

additional honey bees were added, because bumble bees picked up the slack. It did not seem that the addition of more honey bees, while increasing honey bee counts on blossoms, increased the yields on the fields.

The reference to this study is: Artz, D.R. et al. 2011. *Influence of honey bee, Apis mellifera, hive and field size on foraging activity of native bee species in pumpkin fields*. Environ. Entomol. 40(5): 1144-1158. Also: DOI: http://dx.doi.org/10.1603/EN10218.

Beekeeping in the Clouds

When I accepted an invitation to speak at the Wyoming State Beekeepers' Association, I had no idea that I would be introduced to a working, electronic, high tech equipment, data storage and manipulation system for colony management. Brady Bryant described a system that his family uses to enter data on the hives in their yards using a type of rugged, reliable, wireless, field tablet computer (such as the Panasonic Toughbook, the military RuggedTabletPC, etc.) (see a host of such equipment at www.groupmobile.com) and their own (adaptable to your own specific desires) software templates and have it immediately sent to a server (the cloud). It is then downloaded to the office computer within minutes. Apparently, that has reduced the number of cell phone calls between Dad in the office and Sons (Brady and Brandon) in the apiaries by about 90 percent. Dad knows where people are (real time GPS, of course – also lets you find almond sets at night) and what they have observed and done in each apiary within minutes. This system does require connection through a high speed, broadband data package provider. The Bryants are using a Verizon plan, at about $30 a month, which allows the system to be shut down to save money at times it won't be used.

The data is entered in such a manner that it can be teased out in any way you wish – yard history of production over time or *versus* weather, snapshots of bear damage, queen sources, number of colonies requeened and when, mite treatments used and when, etc. It is similar to storing a whole bunch of yard books, but no clutter, not even CDs. Brady has two goals remaining that will require time and effort. He wishes to download the information from decades-worth of yard records into the cloud and also to entice other beekeepers who keep yard records to join him in the cloud. The information on the server (operated by another company, not Brady) is confidential and password protected. Only you can see your information.

If you decide to look into this, Brady will be very excited to hear from you. He feels that the changes of real-time data collection and review in the office, and voiceless communication, have increased efficiency and reliability of communications immensely. He would like to share this opportunity with others. Bryant Honey, 111 Tabi Drive, Worland, WY 82401-9569; (307) 347-2526. You are likely to reach Dad (Don) at that office number. Or, you can email the operation at Don Bryant dbryant@rtconnect.net.

Bee Behavior and Disease Spread

Dr. Naug Dhruba and his student Chris Mayak, in the Department of Biology, Colorado State University, have been studying behavioral changes in honey bees that were starved or well fed and that were infected or not infected with *Nosema ceranae*. One of the first questions was, "Which bees actually interact with each

other very much?" They found that older, foraging bees preferred each other's company most, nearly exclusively, based on attractiveness of cuticular extracts. Middle-aged and young bees showed the same type of bias, but not so strongly. Young bees will interact with bees of any age, but they don't encounter foragers very often under normal hive conditions. This keeps the queen pretty well isolated from the foragers. Another finding of practical interest to beekeepers is that heavy syrup tends to stay in the crop longer than thin syrup. Thus, medicines or infectious microbes in heavy syrup get spread to many more hive mates than similar components in thin syrup. Also, some old foragers seem to be "super spreaders" that contact a lot of hive mates compared to most other bees. That can be good with bees carrying food and medications, but not so good with diseases and toxins.

Nosema-infected bees are damaged physiologically. They seem to be constantly hungry and interact with other bees very often. Apparently, they are being fed and not passing disease in the other direction. *Nosema*-infected bees seem to have trouble with thermal regulation, but they do a lot better when they are wellfed. They tend to forage at younger than normal ages, fly under cold/wet conditions, and live only half as long as normal. Comparing starved or *Nosema*-infected bees to control bees revealed that levels of hemolymph glucose were the same in all three treatments. Levels of trehalose, the blood sugar of honey bees, dropped in both treatment groups. This stimulates the bees to forage. Outside the hive, stressed bees did not return to the hive. In the lab, stressed bees could have their trehalose levels returned to normal by feeding to satiation. The experimentally "starved" bees actually were fed sugar syrup, but the sucrose was replaced by sorbose (tastes sweet to flies, but not sure about honey bees). Those bees moved around less, took fewer foraging trips but stayed out longer on each trip, did not put any energy into recruitment, and increasingly failed to return the hive in a few days.

Related studies determined that it takes quite a bit of energy for a bee to learn something, like extending its proboscis (tongue) in response to certain odors. [An interesting aside – "smart" (trained) bees die earlier.] Do infected bees actually have so much trouble generating energy to learn landmarks that they fly off and cannot find their way back? A similar consequence is noted when honey bees are inoculated with bacteria. Their immune system is activated which is energy expensive. Starved bees inoculated with bacteria could not learn well, either.

Dr. Dhruba feels that colony collapse disorder (CCD) is the "Perfect Storm" of many factors that we already know. But, he has added OVER MANAGEMENT. In particular, he reported on studies by David Hawthorne and Galen Dively (University of Maryland) that demonstrated that previous exposure to oxytetracycline hydrochloride (Terramycin®) significantly reduces the ability of a honey bee to detoxify either coumaphos or fluvalinate (http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0026796).

Honey and Infant Botulism

The US National Honey Board (NHB) and the National Association of Pediatric Nurse Associates and Practitioners (NAPNAP) recently developed a honey education program. If you are asked about the safety of honey for infants, this is their prepared statement that covers that topic: "Because infants' gastrointestinal systems are immature and thus susceptible to contracting infant botulism if spores are present, the Centers for Disease Control, the

American Academy of Pediatrics, the California Department of Public Health and other health associations recommend that certain foods not be fed to infants under one year of age, including honey. After 12 months of age, honey may be introduced to a child's diet. Botulism spores occur in nature, but honey is one of the potential dietary sources for infant botulism." This information was gleaned from the November 2011, issue (Vol. 24, No. 4) of "Hive Lights," published by the Canadian Honey Council.

Bee Schools

Two one-full-day beginning beekeeping classes will be conducted by Gary McClaughry on Jan 14 and Feb 11, 2012. The classes will be held at the Holiday Inn Express in Grass Valley, Calif. Classes begin at 8:30 am and end at 4 pm. Each class costs $30 and is limited to 40 participants. For reservations, please contact Dan Wheat Sr. at A to Z Supply, 13396 Ridge Road, Grass Valley, CA, 95945; (530) 273-0892. Store hours 7:30-5:30 M-F, 8-5 Saturday, and 9-4 Sunday.

Happy New Year,

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