COOPERATIVE EXTENSION UNIVERSITY OF CALIFORNIA

from the U. C. APIARIES University of California

Sept/Oct 2009

Newsletter E-mailed to You

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Guttation – New Pesticide Concern?

What is guttation? It is a mechanism by which a plant can secrete water, taken up by the roots, which is excess to the plants immediate needs for growth and biochemical processing. Guttation is not pure water, but is mixed with materials we refer to as plant sap, often containing sugar. Guttation normally occurs over night, but it can be a daytime phenomenon.

The secreted droplets form along the edges and tips of leaves through pores called hydathodes. To the casual observer, this might look like dew. However, dew forms by condensation, all over the surface of the leaf.

Guttation droplets can be collected and analyzed for presence of systemic agricultural chemicals, such as herbicides, fungicides, and/or insecticides.

Recent colony collapse disorder (CCD) problems have led to various studies as to possible causes. In this case V. Girolami and eight other researchers in Italy teamed up to determine the amount of neonicotinoid that would be found in young corn plant guttation secretions from plants germinated from thiamethoxam, clothianidin and imidacloprid coated seeds and from untreated controls.

Seeds were planted in the field and in greenhouse pots. Guttation droplets were collected over three weeks and divided into two groups: one for chemical analysis and one for feeding to bees.

Bees in cages were fed known quantities of the insecticides in 15% honey syrup to determine the effects on the bees. Intoxication was observed at three successive levels. Least affected bees showed a "jerky inward arching of the abdomen." Second was paralysis of the thoracic muscles, inhibiting flight. Finally, the bees died.

Imidacloprid moved into the field and lab droplets in the highest concentration, followed by clothianidin, then thiamethoxam. Interestingly, toxic effects of consuming the guttation liquid developed in the exact opposite order, thiamethoxam paralyzing the bees quickest and imidacloprid slowest. All residues were lethal.

Since newer varieties of corn can be planted early in the season, the corn plants and guttation droplets are available before flowers come into bloom. Water-foraging bees may collect that liquid (not analyzed for sugar content in this study). So, the authors concluded: "Regardless, the presence of a source of water carrying in solution neonicotinoid concentrations up to the levels shown in the current study, and persisting for weeks on more that a million hectares in the sole northern Italy, is a threatening scenario that does not comply with an ecologically acceptable situation."

For details see: "Translocation of Neonicotinoid Insecticides from Coated Seeds to Seedling Guttation Drops: A Novel Way of Intoxication for Bees," Journal of Economic Entomology 102(5): 1808-1815, 2009.

In a separate study on rapeseed treated with a chlorpyriphos/cypermethrin mix in the Czech Republic it was determined that the secreted guttation droplets did not contain enough of the chemicals to damage the bees acutely, or enough to be detected by instrumental residue analysis. But, guttation fluid put into the sugar syrup reduced syrup consumption significantly.

Bee Trucks

Things are changing for those who use trucks in their businesses. I'll mention the easier one first.

Beginning last July, the State of Nevada instituted "New Temporary Permit Requirements" for single-day trips into the state for out of state drivers. "Out-of-state commercial vehicles with a Gross Vehicle Weight of 10,001 pounds or more are now required to get a temporary registration permit before entering Nevada."

"Out-of-state truckers should obtain all necessary permits before entering the state." "DMV Motor Carrier offices issue

24 hour permits for temporary registration and special fuel taxes. Fees for registration are $5 plus 15 cents per mile. Special fuel permits are a flat $30.

In case you forget to obtain the permit and someone notices, the fines are: first offense, $500; second offense, $1,000; third offense $1,500; and fourth and subsequent offenses, $2,500.

It looks as if you can get the permit by calling (775) 684-4711 and trying to determine which choice to select. Or, you can select from a number of companies ("wire services") listed on the Nevada Department of Motor Vehicles Web page: www.dmvnv.com/mc/permits.htm.

Now, for the California Air Resources Board (ARB). Concerned over the levels of small particulate matter (PM 10s) that are in the air Californians breathe, the ARB "approved a new regulation to significantly reduce emissions from existing on-road diesel vehicles operating in California. The regulation requires affected trucks and buses to meeting performance requirements between 2011 and 2023."

There is a table that lists the emission requirements, but overall, it means retrofitting diesel vehicles with pollution control devices, unless the engines operate at brand new engine levels.

As one might guess, there are some exceptions for "agricultural vehicles" but they are pretty limited:
1. a vehicle with a hazard material placard and used exclusively for delivering fertilizer or pesticide
2. a vehicle used exclusively for farming operations: pick up supplies, mend fences, move cattle, etc.
3. a vehicle used exclusively for farming but generates some income, like manure spreaders, feed mixers, bale processors, or water trucks
4. a vehicle used to deliver unprocessed commodities to the first point of processing, such as cotton to cotton gins or logs from forest to sawmill.

There are provisions for low mileage ag vehicles – "Vehicles qualifying for the lower mileage vehicle exemptions are limited to the number of qualifying vehicles initially reported and must be labeled. Starting January 1, 2010, agricultural vehicles that operate below the annual mileage thresholds shown in Table 1 (below), based on engine model year, are exempt from the PM filter and vehicle replacement requirements until January 1, 2017. By January 1, 2017, these vehicles must comply with the regulation like non-agricultural vehicles."
2006 or newer engines: <25,000 miles per year
1996-2005 engines: <20,000 miles per year
Pre-1996 engines: < 15,000 miles per year.

There are three California "Incentive Funding Opportunities" to help in these retrofits. Probably the Carl Moyer Program for small fleet owners is the one for beekeepers. Grants can be used to help with costs or replacing older trucks with newer ones or for exhaust retrofits (for 1993 and older trucks, up to $50,000 for replacements). There also is a loan guarantee program, PLACE.

The least red tape is involved with the voucher program. "The Carl Moyer Voucher Incentive Program targets funds to class 8 trucks and provides a (Cont. page 6)

California State Beekeepers' Association
120th Annual Convention
2009 Tentative Convention Program
Hilton Resort & Spa, San Diego
November 17-19, 2009

Tuesday, November 17

8:00 am	Registration & exhibits open	
8:30-10:00	Opening Ceremonies & Reports of Standing Committees	
	National Anthem & Flag Salute	Gene & Christine Brandi
	Welcome & Call to Order	Brock Ashurst, President CSBA
	Invocation	Richard Ashurst
	President's Message	Brock Ashurst
	Memorial Service	Gene Brandi
	Reading of Rules	Dr. Eric Mussen
	Reports of Standing Committees	
10:00-10:30	Exhibitors' Break	
10:30	"Glimpses of California's Beekeeping Future" – Dr. Eric Mussen, UC-Davis	
11:00	"Effects of Fungicides on Pollen Digestability in Honey Bees" – Dr. Gloria DeGrandi-Hoffman, Carl Hayden Bee Research Center, Tucson	
11:30	"Update on Stock Improvement Project" – Susan Cobey, UC-Davis	
12:00 p.m.	Lunch	
1:30	"California's New Diesel Truck Rule" – Cynthia Cory, Director Environmental Affairs, Calif. Farm Bureau Federation	
2:10	"Comparing Pollen Substitutes" – Dr. Frank Eischen, USDA, Weslaco, TX	
2:40	"Africanized Honey Bee: Threat or Opportunity?" – Maryann Frasier, Penn State U.	
3:10-3:30	Exhibitors' Break	
3:40	TBA – John Miller, Beekeeper	
4:00	Platinum Advisors (lobbyists) Update	
4:15	Migratory Beekeeper Panel	
6:30-8:00	Welcome to San Diego & New Member Reception – Sponsored by San Diego & Imperial Valley Beekeepers	

Wednesday, November 18

7:00 – 9:00 a.m.	American Sioux Honey Assoc. Member Breakfast Meeting
8:00	Registration & Exhibits open
8:30	"Introduction to UC Davis' New Native Pollinator Specialist" – Dr. Neal Williams, UC-Davis

9:00 a.m.	"Impact of *Nosema* on Almond Pollination" – Dr. Frank Eischen, USDA Weslaco, TX
9:30	National Honey Board Update – Bud Ashurst, Chairman
9:45	American Beekeeping Federation
10:00-10:30	Exhibitors' Break
10:30	Proposed U.S. Honey Board – Jerry Brown
10:45	American Honey Producers – Kenny Haff, President AHPA
11:00	Washington State Univ. Bee Research Program – Eric Olson, Washington beekeeper
11:10	"Sub-lethal Effects of Pesticides in Honey Bee Brood Comb" – Judy Wu, Washington State U.
11:30	"*Nosema ceranae:* Experimental Investigation of Pathogen and Parasite Interactions" – Matthew Smart, Wash. State U.
12:00 Noon	Research Luncheon – **"Latest on Pollinator Decline & CCD"** – Dr. Maryann Frazier, Penn State
2:00 pm	Research Auction
4:00	Free Time

Thursday, November 19

8:00 am	Exhibits open
8:30	**CSBA ANNUAL BUSINESS MEETING**
10:15 -11:45	Exhibitors' Break
10:45	Apiary Board Update – Jackie Park-Burris
11:00	"Mating Quality of Commercial Queens" – Dr. David Tarpy, North Carolina State U.
11:30	"Sky-Fishing with Beekeepers: Research Adventures in Determining Sperm Viability of Drones & Mating Frequency of Queens" – Dr. Marla Spivak, Univ. Minnesota
12:00 p.m.	Lunch
12:30-2:00	**CSBA Ladies Auxiliary Business Meeting & Luncheon**
1:30	"Project *Apis m*" – Christi Heintz
1:50	"2010 Almond Pollination Update" – Dan Cummings
2:15	Almond Pollination Panel
3:30	TBA – Dr. Dewey Caron, President Western Apicultural Society
6:30	Social Hour – No Host Bar & Silent Auction
7:30 p.m.	Annual Banquet, Awards & Auction

(cont. from page 3) qualified trucker with $35,000 to replace a pre-1991 truck or $30,000 to replace a 1991-1993 truck." Reminds me of the Cash for Clunkers program, but there is nothing said about mandatory recycling of parts and disposal of the old trucks. No matter how you do it, these new emissions restrictions are going to cost you money. Take a very good look into the alternatives and choose what seems to be the best, long-term solution.

Queen's Age Matters

German honey bee researchers, H. Al-Lawati and K. Bienefeld, conducted studies to determine if the age of a honey bee queen affected the quality of her offspring. In brief, it did. As queens aged from one, to two, to three years old, their eggs decreased in size, as did the embryos inside. Correlated with this decrease in size was an increase in embryo mortality.

Apparently, the larvae of older queens were more delicate (expressed as "much more sensitive to stress") because many of them did not survive the manipulations of laboratory rearing.

I wonder if some our queen breeders, who like to hold on to certain really top-notch breeder queens, have seen this phenomenon?

This information was reported in: "Maternal Age Effects on Embryo Mortality and Juvenile Development of Offspring in the Honey Bee (Hymenoptera: Apidae), Annals of the Entomological Society of America 102(5): 881-888, 2009.

Nosema in Canada

A few results of a two-year study of the seasonality of nosema disease in Canada were published in Volume 3, Issue 3, Summer 2009, of The Manitoba Beekeeper, by David Ostermann. Although the spores observed were thought to be of *Nosema ceranae*, that is not confirmed.

Three of 12 participating beekeepers had colonies with typical *N. apis* graphs – high in early spring, then dropping off the rest of the season. In four other cases, the spore counts went up later than expected in the spring, but still dropped off, eventually. Two sample sets showed no infection throughout the year. The remaining three samples showed levels that bounced around with more than one peak a year, and with peaks in August. Nearly every set of samples was spore-free in October. Perhaps this is due to chemical treatments, since later in the article it states that the fungus is susceptible to fumagillin.

Varroa in Manitoba

Davis Ostermann also reported on the changes in level of *Varroa* infestations over the years in Manitoba. In Manitoba they have categorized *Varroa* infestations into four groups: none; < 1 million; 1-5 million; and >5 million.

Over the years the percentage of samples without spores has declined from around 73 to 30. The lowest infection level remains in the 20-30% of colonies range. The moderate level has grown from about 12-40% of the samples. The heaviest infestation rate now includes around 10% of

colonies, up from about 1% just five years ago.

Based on the possible consequences of infestations over the season, the guidelines for spring treatment are pretty conservative – at 1 percent or more (one mite per hundred bees), treat the colonies.

Fall (September 1) treatments are a bit more lax – up to 3% infestation levels: do not treat in fall, but treat in spring. Three to 100% must treat, but spring treatment may not be needed.

Fall (mid-September to October 31st) up to 10%, do not treat and check next spring. Greater than 10%, must treat and check next spring.

What treatments are available in Manitoba? They include Apistan® strips, CheckMite+® strips, Apivar® (amitraz strip), formic acid (Mite Away II®), and oxalic acid. They all have a few pluses and more than a few minuses, but the beekeepers are holding their own.

CCD – Why Bees Leave

There are a number of us, including me, who have stated that sick honey bees leave the colony (hive) permanently to avoid making its hive mates sick. Of course, we aren't suggesting that the bees know that they are sick and should leave, but the anthropomorphic justification sounds good.

Researchers F-J. Richard, A. Aubert and C.M. Grozinger published a research paper in BMC Biology (from BioMed Central), 2008, 1741-7007/6/50 that sheds some light on why some bees leave and don't return.

The researchers inoculated (by needle and syringe) honey bees with a solution of bacterial coat proteins (lipopolysaccharides – LPS) that stimulated the immune system of the bees. The response was measured by analyzing the fat body cells of the inoculated bees for mRNA related to activated *Defensin* 2 gene. The inoculations did not seem to hurt the bees, directly. However, in cages with nest mates, the nest mates antennated them a lot more than normal. That appears to be due to the changes in proportions of the cuticular hydrocarbons on the outsides of the inoculated bees.

Cuticular hydrocarbons were extracted in pentane from bees inoculated with water and with LPS. The extracted hydrocarbons were applied to some bees and they were put back into cages with their nest mates. The nest mates became very aggressive, biting and stinging their "contaminated" nest mates. This may be why the bees leave and do not come back. But, why, with CCD, would they ALL go? Who throws the last batch out?

Farm Service Agency Programs

The USDA has had financial assistance programs available to farmers for decades, but most of them were not of much use to beekeepers. However, if you wander through the list of alphabet soup, here are possible opportunities:
ELAP (Emergency Assistance for Livestock, Honey Bees, and Farm-Raised Fish Program)
NAP (Noninsured Crop Disaster Assistance Program)
MAL (Market Assistance Loans)
LDP (Loan Deficiency Payments)
FLP (Farm Loan Program).

Apparently, the application forms required for submission for claims of colony losses due to CCD over the last few years, under ELAP, have been developed and can be picked up at your local FSA office. After completing the forms, you are required to request a supporting document for the claim from an acceptable agent, including Extension Apiculturists. So, I have written a few letters, already.

I will be happy to continue that assistance. Be forewarned, however, that I will discuss your losses and beekeeping practices in detail before I write the letter of support. Only the losses specifically dealing with CCD will be included. Losses due to failure to use sound beekeeping practices to maintain the populations will not be included.

Sincerely,

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