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Colony Collapse Disorder (CCD): An Update

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Subsequent to the CCD workshop held in Stuart, Florida last month sponsored by The Foundation for the Preservation of Honey Bees,[1] there have been several research initiatives about the disorder and new reports about its effects. According to its Winter 2007 Newsletter, The Eastern Apicultural Society[2] has provided $5,000 in addition to that already donated by the Florida State Beekeepers Association, the Tampa Bay Beekeepers Association, the National Honey Board and others. The total is now in excess of $40,000 and climbing. In addition, The American Beekeeping Federation's (ABF) delegation visiting Washington got a sympathetic ear about the disorder, and a hearing was held on this issue by the House Subcommittee on Horticulture and Organic Agriculture on 29 March 2007, chaired by Dennis A. Cardoza, (D-CA): The jurisdiction includes fruits and vegetables; honey and bees; marketing and promotion orders; plant pesticides, quarantine, adulteration of seeds, and insect pests; and organic agriculture. See the House web site for members of the Subcommittee.[3] Now is the time to contact your congressional members via phone (Senate 202-224-3121; House, 202-225-3121) or via the Internet[4] on this issue.

The written transcript of the hearing is available at **http://agriculture.house.gov/hearings/statements.html** and you can listen to the entire hearing at **http://bee-quick.com/ccd/**

According to its March 12, 2007 Legislative Update, the ABF urges beekeepers to check colonies, feed and evaluate locations more often in an effort to stave off the disorder. In addition, there may be some disaster relief available in the future, so beekeepers should ensure that any losses are well documented. There also may be some research funding from this initiative. New documents at the Mid Atlantic Apiculture Research and Extension Consortium[5] include the following advice:

"1. DO NOT combine collapsing colonies with strong colonies.

Why? We do not currently know the cause of CCD. If an infectious agent causes it and you combine a collapsing colony with a healthy colony, the healthy bees may succumb to the illness and you may lose both colonies.

"2. When a collapsed colony is found, store the equipment where you can use preventative measures to ensure that bees will not have access to it. Put the equipment in this storage area within TWO WEEKS of collapse to prevent robbing by neighboring colonies. CCD colonies tend not to be robbed out by colonies immediately after collapse. When you take this equipment out for reuse, wear a protective face mask to prevent the inhalation of any mold spores that may grow on the comb.

Why? The CCD team is currently investigating various sterilization techniques that allow for comb reuse. We are hopeful that we will soon have a sterilization technique in place to treat equipment before it is reused. We DO NOT recommend burning infected equipment at this time. Keep it in storage (with necessary wax moth and SHB precautions) for the time being.

"3. If you feed your bees sugar syrup, use Fumagillan.

Why? At this time the CCD working group does not believe that nosema disease is the underlying cause of CCD. However, infection with nosema is a stressor that can reduce the bees' tolerance to other disease agents. Treating for nosema helps reduce colony stress.

"4. If you are experiencing colony collapse and see a secondary infection, such as European Foulbrood, treat the colonies with Terramycin, NOT TYLAN.

Why? The effectiveness of Terramycin has been well documented, while Tylan has not been tested as an EFB control agent. We know that Terramycin works for the treatment of EFB.

"5. If you observe high levels of *Varroa* mites, treat them using soft chemicals, such as Apiguard, Apilife VAR, or MiteAway II. We DO NOT recommend the use of oxalic acid, or home made hard chemical mixtures.

Why? Colonies experiencing CCD have been shown to have kidney (Malpighian tubule) problems similar to those seen in colonies treated

Richard Adee, left and Jim Doan testify before the House Subcommittee on Horticulture and Organic Agriculture.

with hard chemicals. There are some reports that Oxalic acid may damage bee Malpighian tubules. Also the harder chemicals (fluvalinate, coumaphos, and amitraz) may have a sub lethal affect on bees which may add additional stress on the bees. By treating for *Varroa* mites with soft chemicals, you are helping to keep the colonies mite population low while avoiding the potentially negative effects of hard chemicals.

Finally, these recommendations will probably change as understanding of this disorder evolves."

All researchers on colony collapse disorder advise beekeepers to complete the survey devoted to this phenomenon[6]. This information will be valuable and treated confidentially. Every beekeeper should participate whether or not they believe their colonies are affected.

David Hackenberg, one of the first people to lose hives to the CCD phenomenon, has sent a letter to all his pollination customers making some of the following points:

"First, some people referred to this as 'disappearing disease' because the bees literally disappeared. The second symptom is that bees left behind frames of brood (young baby bees) and boxes filled with honey that no other bees came in and robbed out as normally happens. The third symptom is that the small hive beetle and wax moth would not move into the hive for at least three weeks as if something toxic was in the hive. When you place a dead CCD hive on top of a live hive nearby you kill the hive below. This makes us think that there must be something toxic in the hive from CCD. But when aired out for several weeks the toxicity levels seem to go away. The last symptom is that the dead bees always seem to have a fungus found in the bee's mid-gut and sometimes through their entire body.

"Preliminary work has identified several likely factors that could be causing or contributing to CCD. Among them are mites associated diseases and viruses, some unknown pathogenic disease and pesticide contamination or poisoning. I have been in CCD group discussions from the beginning. I have had detailed talks with affected beekeepers, researchers, bee inspectors, growers, farmers, seed company representatives and anybody that might be able to contribute any useful information. The picture that has emerged so far has many people in this industry extremely concerned.

"Beekeepers that have been most affected so far have been close to corn, cotton, soybeans, canola, sunflowers, apples, vine crops and pumpkins. In conversation with farmers, growers and seed and spray company representatives we have learned that there has been a big change in pesticides used to treat these crops. From what I have learned so far, I am convinced that neonicotinoids may play a role in CCD and exposure to these materials is something that is under our control. From research on the internet I have learned that neonicotinoids are systemic insecticides used to control sucking insects on plants, everything from corn, tree crops, most vegetables, cranberries, blueberries, strawberries, cotton, canola, ornamentals, forestry and turf.

"I think that the reason neonicotinoids may be so damaging to honeybees is that they are found in fairly low "sublethal" levels in the pollen and nectar of the plants. The field bees often do not die when working on plants treated with these products. Instead they may bring the pollen and nectar back to the hive and store it in their comb to use later. The young bees raised on this (contaminated) food may exhibit memory loss and impaired immune response. Of course, these symptoms appear several months after exposure to neonicotinoids and up until recently the cause of effect appeared unrelated."

Mr. Hackenberg concludes his letter with a plea to growers to use something beside the following products this season: imidacloprid[7] (brand names: Confirdor, Merit, Admire, Legend, Provado, Encore, Gaucho, Premise); thiamoxetham (Actara, Platinum, Helix, Cruiser, Adage, Meridian, Centric, Flagship); acetamiprid (Pristine, Tristar, Assail, Intruder, Adjust); clothianidin (Poncho, Titan, Clutch, Belay, Arean; thiacloprid (Calypso); and dinotefuran (Dinotefuran).

Because so little is known at the present time about CCD, skeptics remain. Some call this nothing more than the inevitable consequence of beekeepers pushing their colonies to the point of collapse, exacerbated by their own pesticide use (organophosphates particularly) inside colonies for *Varroa* control and malnutrition while on pollination contracts. Others suggest that so-called "disappearing disease" has been with us for many years in a variety of forms, and that this is nothing more than the consequence of inadequate mite control.

In the latter case, Dr. Bromenshenk, one of the prime investigators of CCD, stated in a response:[8] "Please be careful of sweeping generalizations. There are beekeepers who have experienced CCD and who have also had problems controlling mites. We've

also seen tracheal mites in high levels in recovering hives (but these mites were not in the same hives before collapse). We've seen CCD in operations with no evidence of mite problems.

"I just saw a new collapse in CA where aggressive mite treatments were used in the fall, repeated in Jan when a few mites were found. Colonies were strong, wall to wall bees, four to five frames of brood, no evidence of mites (two weeks ago). Yesterday, out of 400, only 30 were strong enough to shake bees from, and the majority had collapsed down to three to four frames or less of bees, with lots of brood, 40 lbs honey, and frames of fresh pollen.

"Finally, most of the CCD work is still unfunded – we all have to prioritize which samples we're going to take, analyze – just don't have the funds to check every sample offered – and at this point, we're not short of operations from which to obtain samples, so we're trying to take samples in ways that will allow us to make comparisons within a beeyard or operation, and among yards and bee operations."

One observer remarked on the Bee-L list that there seems to be a remarkable similarity between the symptoms of CCD and those of "Marie Celeste Syndrome" in the UK.[9] He referenced an interesting and comprehensive set of minutes of the annual meeting of the Department of Environment Food and Rural Affairs (DEFRA) with beekeeping organizations dated 9 December 2005.[10] This is a must read for anyone comparing the European and U.S. beekeeping situations.

In that document, a Mr. Craig reported that beekeepers in Scotland who had been treating *Varroa*-infested colonies (usually with Apistan) had been finding hives empty of bees, but not winter stores. Together with these unexplained colony losses ("Marie Celeste" Syndrome) there were failures in queen mating. These events were happening particularly in oilseed rape growing areas. While acknowledging that these could possibly be explained by the effects of viruses, for which the *Varroa* mite provides a vector, he was concerned that we might be observing sub-lethal behavioral effects of systemic insecticides such as imidacloprid, causing disorientation in the bees leading to an inability to return to the hive. He quoted the losses of French bees in the late 90s and the subsequent banning of imidacloprid by the French Government.

This brings us to the Melksham Beekeepers publication known as *Beelines* and "Chuckle With Chad." His response in part to the Marie Celeste Syndrome is:

"I feel that, yet again, I need to give a new personal perspective on an old theme, that of Mary Celeste Syndrome. For the beginners, the characteristics of this syndrome are startling; seemingly healthy colonies of bees will disappear over night, leaving no trace or clue as to their disappearance. Scientists' heads are being scratched all over the country as theories of varroosis or environmental factors affecting queens' fertility are expounded.

"The problem is, of course, that the majority of beekeepers are too well-meaning, straight laced and altogether too wholesome for their own good. One needs only look at the strong tradition of beekeeping in the clergy, to realize that the majority of beekeepers are a decent bunch. However, Reverend Digges would have had a truly different outlook on life if he'd grown up on a housing estate in the suburbs of Manchester.

"Let me shout it loud so that you hear me, Mate, your bees have been nicked! Closer scrutiny of data will show that Mary Celeste Syndrome has never been reported in hives that are inaccessible to the public. I bet you the bees in my bedroom observation hive won't suddenly vanish, 'without a trace.' The thing is, of course, that the venerable Rev. Digges could not have entertained the thought that his neighbor might be so brazen as to break the Eighth Commandment. But, as I say, the beekeeping community must drag itself into the modern mind set; there are baddies out there."[11] BC

References:

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