Canadian Association of Professional Apiculturists
L'Association Canadienne des Professionels de l'Apiculture

CAPA Statement on Honey Bees Losses in Canada (2009)

Over the winter of 2008-09, losses in Canadian commercial beekeeping operations exceeded one-third of the number of colonies that were wintered, or more than twice the normal rate of mortality. A similar high number of colonies were lost compared with the same period in 2007-08

Based on producer surveys, gross Provincial losses have been reported as follows:

Province	Number of Colonies Wintered	Number of Colonies Dead[1]	Wintering Losses (% of Provincial Total)
British Columbia	36,574	8,778	24
Alberta	235,000	98,700	44
Saskatchewan	104,500	24,130	25
Manitoba	80,000	25,440	32
Ontario	80,000	24,800	31
Quebec	33,800	10,800	32
Nova Scotia	19,500	5,694	29
New Brunswick	10,400	4,455	43
PEI	4,050	1,620	40
CANADA	**603,824**	**204,417**	**33.9% (of National Total)**

[1] Overwintering losses and spring dwindling as of 30 May 2009.

In the years subsequent to the introduction of the mite *Varroa destructor* into Canada, normal long-term overwintering mortality is regarded as being 15%. This year, mortality due to wintering losses and spring dwindling is 33.9%, or 2.3x the normal rate. This loss is similar to the 2007-08 winter mortality figure of 35.0 % and exceeds the 2006-07 rate of 29.0%. Successive annual colony losses at levels exceeding the long-term average are unsustainable by Canadian beekeepers and likely to lead to decreased honey production and shortages of colonies available for pollination. Indeed, more demand than supply has been evident for pollination services in British Columbia during the spring of 2008 and 2009.

Regions suffering high losses during the spring of 2009 included Vancouver Island (40%), New Brunswick (42.8%) and Prince Edward Island (40%). Across the Prairie Provinces (Alberta, Saskatchewan and Manitoba), rates of loss for indoor wintered colonies appear to be lower than average at approximately 20%, whereas those of outdoor wintered colonies are higher, and more variable.

Across the country any unusually high losses have been investigated by provincial apiculture specialists. Initial indications suggest that these losses may be attributed to the five principal causes, listed in descending order of importance:

1. Ineffective control of the parasitic mite, *Varroa destructor*. In many regions, mite populations have developed resistance to the chemical compounds fluvalinate and coumaphos. Some producers did not detect mite control failures before winter, leading to high levels of mites and high losses by spring. Others waited for an alternative miticide, amitraz, to become available through emergency use registration. In Canada, this product only became available by mid-September of 2008, somewhat late for fall applications against *Varroa*. Though mite levels were effectively reduced in colonies treated with this product, the damage to bees destined to survive the winter had already taken place. Consequently, many of these colonies perished in early winter.

   The stress caused by high densities of *Varroa* feeding also has the potential to activate or spread the distribution of several honey bee viruses, which exacerbate losses.

   The efficacy of remaining registered control options available to beekeepers are highly temperature dependent and require more intensive management. Cool weather in the fall of 2008 in some areas also resulted loss of efficacy of organic acid treatments during the fall.

2. Harsh weather conditions. Long periods of cold winter weather and a cool spring in most regions of the country contributed to increased mortality and prevented small colonies from building up to productive sizes during spring 2009.

3. Inadequate *Nosema* control. Many beekeepers do not have the ability or the extension support necessary to sample or diagnose the two species of internal *Nosema* parasites, *Nosema apis* and the newly-introduced *Nosema ceranae.* These organisms, if not controlled before winter months, will significantly increase rates of colony mortality. Moreover, little is know about effective management of *N. ceranae*, which was only discovered in Canada in 2007.

   Many beekeepers treated for *Nosema* using the only registered product, Fumagilin-B, during the fall months of 2008, with many reporting *Nosema*-like symptoms in the spring of 2009. It is conceivable that spring treatments may also be required for managing *N. ceranae.*

4. Starvation. Inadequate nectar flows, insufficient fall feeding and prolonged harsh winter and cool spring are all factors that contributed toward increased rates of starvation.

5. Queen failure. Higher than normal rates of queen failure or supersedure have been reported from all provinces for domestic and imported queen stock. Though a common cause has not been identified, it is known that colonies with high levels of *Nosema* infection do suffer from higher rates of queen loss.

Overwintering Losses in the U.S. (Spring 2009) [2]

The information for U.S. losses is derived from surveys commissioned by the Apiary Inspectors of America (AIA) and the USDA-ARS Beltsville Honey Bee Lab between September 2008 and April 2009.

A total loss of 28.6 % for managed honey bee colonies in the U.S. was recorded, compared with losses of 35.8% and 31.8% recorded for the winters of 2007-08 and 2006-07, respectively. While the rate of loss appears to have subsided slightly from last year in the U.S., the year-to-year rate of loss continues to remain unsustainable.

The survey commissioned by the AIA was not able to differentiate between true cases of Colony Collapse Disorder (CCD) and colonies lost due to causes that share the "absence of dead bees" symptom, typically associated with CCD. Only 15% of all of the colonies lost in the U.S. perished with symptoms of CCD in 2009-09, in contrast to 60% of colonies that died during the winter of 2007-08 with CCD-like symptoms. This continues to underlie the need for research, not only into CCD, but into pollinator health in general.

Is CCD in Canada?

The symptoms by which CCD is being characterized in the U.S. have not been diagnosed by professional apiculturists in Canada. Though Canadian bees do not seem to be experiencing classic CCD-like symptoms, it is important to emphasize than higher levels of wintering and spring mortality in Canada may be related to the same casual factors as CCD losses in the U.S. Because longer winter conditions preclude the active brooding and flying of colonies found in early-season pollination areas of the U.S., colonies in Canada may not exhibit similar colony-level symptoms. Instead, it is conceivable that Canadian producers may simply see these effects as higher numbers of dead colonies following winter or those described as dwindling during early spring.

Most scientists in the U.S. and Canada would agree that what is being described as CCD in the U.S. and the high winter losses seen in Canada are likely being caused by several common interacting stress factors acting on honey bee colonies. Researchers in both countries are examining similar root causes of these stresses and their effects on bees.

What is being done in Canada?

Researchers in Canada remain in close contact with principal scientists participating in U.S. Working Groups on CCD. Members of CAPA have also been actively monitoring the status of bee health across the country and are sharing scientific information.

In 2009, the Canadian Pollination Initiative (CANPOLIN) was launched to address the growing problem of pollinator decline in agricultural and natural ecosystems in Canada. This initiative, funded as a five-year NSERC Strategic Network, includes researchers at 26 universities across the country that are working with government agencies, NGO's and industry to deliver critical insights and sustainable solutions to the pollination problem. The Scientific Director of CANPOLIN is CAPA member, Dr. Peter Kevan, of the University of Guelph. Other CAPA researchers comprise key working groups including those on managed pollinators. Refer to the CANPOLIN website for further updates: http://www.uoguelph.ca/canpolin/

Work toward understanding the impact of *N. ceranae* in Canada also continues. Based on efforts in 2007 and 2008, it was determined that the parasite was present in all Canadian provinces, with *N. ceranae* and *N. apis* found in approximately similar proportions. This is in sharp contrast to the U.S. where *N. apis* is now seldom found in samples. Changes in the distribution and prevalence of these species will continue to be monitored. Infections of *N. ceranae* and *N. apis* can be found in the same colony.

The impact of *N. ceranae* on honey bees is not well understood and it is likely a factor in the survival of colonies already under multiple stresses. Currently, CAPA members employed by federal and provincial governments, as well those in Canadian universities, are undertaking research projects to better understand this parasite. Aims include determining the seasonal occurrence of *N. ceranae* in Canada, developing strategies for effectively managing this parasite as well as evaluating the use of novel therapeutic agents. Current indications suggest that *N. ceranae* is susceptible to fumagillin, the only registered therapeutic agent against *N. apis*. Nevertheless, much work is needed to determine best management practices to control this organism.

Researchers within CAPA are also evaluating alternative control options for *Varroa* mites, methods of integrated pest management (IPM) for honey bee colonies and the breeding of honey bee queen stock more tolerant of diseases and mites. Members of CAPA, in cooperation with the Canadian Honey Council, are also pursuing the registration of alternative products for *Varroa* control in Canada.

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[2] van Engelsdorp, D., Hayes, J. and J. Pettis. 2009. Preliminary Results: A Survey of Honey Bee Colonies Losses in the U.S. Between September 2008 and April 2009. http://maarec.cas.psu.edu/pdfs/PrelimLosses2009.pdf.