

CAPA Statement on Honey Bee Wintering Losses in Canada (2014)

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In 2014, the Canadian Association of Professional Apiculturists (CAPA) National Survey Committee developed a core set of questions that the Provincial Apiarists surveys could use to report on honey bee wintering losses in their province. The following report is a summary of the reported winter losses from the provincial surveys.

Over the winter of 2013/14, the average level of wintering loss of honey bee colonies (i.e. colony mortality or colonies too weak to be commercially productive at less than 3 frames of bees) across Canada was 25.0% (Table 1). Ontario experienced 58.0 percent winter mortality. When Ontario's numbers are removed from calculation the national mortality drops to 19.2 percent. This level of winter loss is considered a high winter loss for most Canadian beekeepers in comparison to long term acceptable level of winter losses (15%), as described by beekeepers. The level of winter loss varied among provinces, regions within each province and from beekeeper to beekeeper within each region.

Table 1. Gross Wintering Losses by Province, 2013/14

Province	Number of Colonies Wintered Fall 2013	Number of Dead or Unproductive Colonies Spring 2014*	Percent Wintering Loss (%)
British Columbia	39,047	5,858	15.0
Alberta	282,000	52,170	18.5
Saskatchewan	100,000	18,880	18.9
Manitoba	71,000	17,040	24.0
Ontario	100,000	58,010	58.0
Quebec	50,000	9,000	18.0
New Brunswick	10,282	2,700	26.3
Nova Scotia	18,500	4,200	22.7
Prince Edward Island	6,995	1,338	19.1
Newfoundland and Labrador	Date Not Available		
CANADA	677824	169,196	25.0**

*Note: calculated from the percent winter kill reported in the survey of beekeepers multiplied by the total number of colonies reported to Statistics Canada in the fall of 2013.

** Note: Calculated as total estimated mortality in Canada divided by the total estimated number of colonies in Canada wintered.

Factors Cited by Beekeepers:

Weather was seen as a major factor contributing to winter loss for many beekeepers across Canada. The winter of 2013/14 was cold and long. The spring weather was cold and wet in many areas which created unsuitable conditions for honey bee colonies to develop. Common starvation (lack of feed), cold starvation (inability of bees to access stored honey in the hive) and colonies which were weak in the fall not surviving the winter were most commonly reported as problems across Canada. Poor spring build-up may have a longer lasting effect as weaker colonies at the time of honey flow will reduce the total honey crop for 2014. Other concerns cited by beekeepers included poor queen health, *Nosema* in Alberta and Saskatchewan and unknown causes. Additionally, in Ontario and Quebec, some beekeepers cited acute and chronic pesticide damage or lack of sufficient recovery from a pesticide incident the previous year as a contributing factor in winter mortality.

In a pattern that is similar to the 2012/13 report, it is worth noting that although Varroa is still understood to be a serious problem in beekeeping, there were fewer concerns cited by beekeepers, indicating that many of the treatment options can work well when properly applied. When products are not used in a timely manner, mortality can still be elevated as is evidenced by individual beekeepers reporting high winter losses attributed to Varroa mites.

Varroa control:

The vast majority of beekeepers in Canada are managing Varroa levels at regular intervals through chemical and cultural means. The continued management of Varroa in honey bee colonies is widely recognized as one of the primary goals with respect to maintaining honey bee health. There are a variety of chemical options available to beekeepers. Beekeepers in Canada are still regularly using organic acids as part of the rotation of chemical treatments, but continue to rely heavily on synthetic treatments, particularly Apivar. In some provinces beekeepers use more organic acids or essential oils and less synthetic miticides. The efficiency of these chemical options can be affected by several factors including; time of treatments, pattern of use, ambient temperature, and resistance levels in Varroa mite populations. The development and use of new methods of Varroa control in an integrated pest management framework is therefore essential to the sustainability of mite control for the beekeeping industry in Canada. The promotion of monitoring and using effective control options continues to be the focus of many extension and education programs to keep a healthy honey bee industry. Beekeepers' awareness of these principles and the adoption of best management practices that incorporate good food safety practices are regarded as the future direction for this industry.

Nosema:

Nosema is still considered a serious pathogen across Canada that can influence colony survival. In Saskatchewan, for example, the prevalence of *Nosema spp.* was cited as one of the major reasons for colony mortality in some beekeeping operations. In past years the dominant species of this parasite, *Nosema apis*, was recognized as causing mortality over winter, with levels increasing in severity as the winter progressed, peaking in early spring. Fumagillin treatments have been demonstrated to suppress levels of *Nosema apis* and also have been shown to affect spore production with the more recently-discovered and now dominant species, *Nosema ceranae*. Seasonal relationships between *Nosema ceranae* and its impact on colony health continue to be investigated.

Pesticides:

There are still many concerns amongst beekeepers regarding the potential chronic and sub-lethal impact of pesticides and agrochemicals (particularly systemic insecticides such as neonicotinoids). Documented incidents of pesticide exposure and colony damage during the regular season in recent years (2009 to 2013) in the provinces of Quebec, Ontario, and Manitoba have contributed to these concerns. There are concerns amongst some beekeepers, particularly in Ontario and Quebec, that exposure to neonicotinoid insecticides during the spring and summer may lead to increased stress to colonies contributing to winterloss.

Further Work:

CAPA continues to be in close contact with scientists from various countries around the world including the U.S. working on colony losses and bee decline. Members of CAPA have also been actively monitoring the status of bee health across the country and are sharing scientific information. Researchers within CAPA are active in evaluating alternative control options for Varroa mites, methods of integrated pest management (IPM) for honey bees and the breeding of queen stock more tolerant of diseases and mites. In several regions of Canada workshops have been conducted to promote IPM practices to beekeepers with particular attention given to surveillance programs to monitor pests and diseases, with emphasis on Varroa mites and *Nosema spp.* Attention has also focussed on proper disease identification, winter management, rotation of treatments and discouraging off-label use of control products.

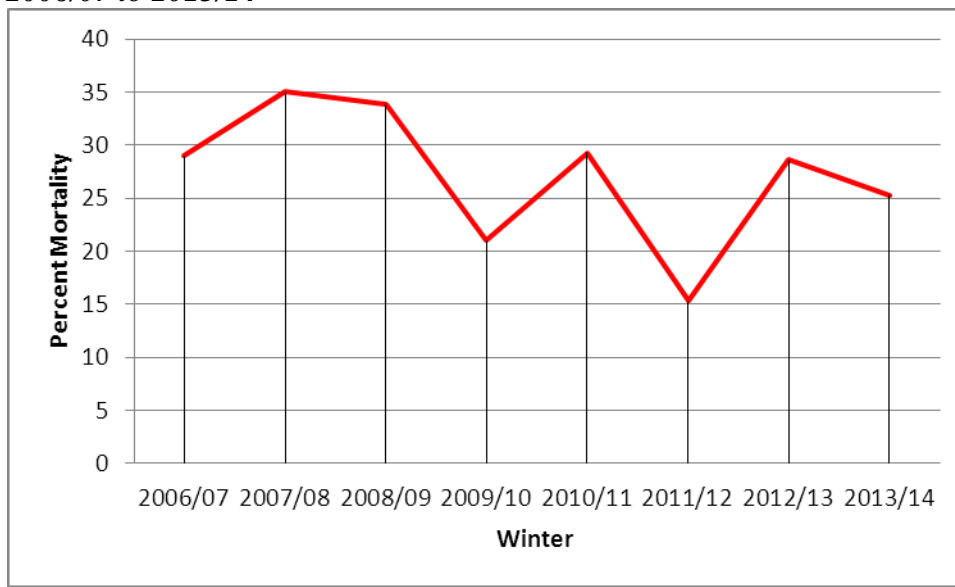
Members of CAPA, in cooperation with the Canadian Honey Council, are also pursuing the registration of alternative products for Varroa control in Canada. Other areas of research that CAPA members are currently pursuing include studies of Varroa control measures, Nosema treatment, honey bee immunity, honey bee viruses, genetic expression of honey bee responses to disease, the impacts of neonicotinoid pesticides on the short and long-term health of honey bees, the biology of new and emerging bee pests, best management practices to promote the health of colonies and nation-wide surveillance of honey bee pests and diseases.

Conclusion:

The level of mortality for honey bee colonies over the winter of 2013/14 was high at 25.0 percent, although when Ontario is removed from the calculation the winter mortality is 19.2 percent. Preliminary analysis of mortality in Ontario indicates that a proportion of beekeepers had much lower level of mortality (9 to 22%) compared to provincial average. Further analysis by the Ontario government will be conducted for the Ontario 2013/14 wintering data. This year winter mortality across Canada follows an elevated year of colony winter mortality compared to 2012/13. It should be stressed that it is important to look at the long term, multi-year trend of winter mortality in Canada (Figure 1.). It is important to consider variations, by region, beekeeping operations and year. It is notable that the winter losses has been reduced by 25 per cent, going from as high as 35% from 2007-2008 down to on average 20 percent since 2009/10.

Responses from provincial surveys indicated that weather, poor queens, weak colonies in fall, Nosema, Varroa and pesticides were possible causes of reported wintering losses. Clearly the impacts of pest, pathogen and environmental factors continue to be a challenge through the year to beekeepers across Canada. There are a variety of strategies that have been pursued to address these challenges including applied and basic research, biosecurity practices, pest and pathogen monitoring and surveillance, and responses to pesticide kill incidents through incident reports and data collection. There are also regulatory actions to address bee pests and pathogens that may threaten the industry are considered. Technology transfer and extension services to beekeepers promoting best management practices have been supported. The future of beekeeping will depend on a multi-factorial approach to address risks associated with honey bee health and industry development and sustainability in Canada.

Figure 1. Average National Wintering Mortality Percentage in Canada for winters of 2006/07 to 2013/14



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