SENATE SÉNAT
CANADA

# The Importance of Bee Health to Sustainable Food Production in Canada

## Report of the Standing Senate Committee on Agriculture and Forestry

The Honourable Percy Mockler, Chair

The Honourable Claudette Tardif, Deputy Chair

May 2015

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*Ce rapport est également offert en français.*

The way humanity manages or mismanages its nature-based assets, including pollinators, will in part define our collective future in the 21st century. The fact is that of the 100 crop species that provide 90 per cent of the world's food, over 70 are pollinated by bees. (Achim Steiner, UN Under-Secretary-General and UNEP Executive Director, United Nations Environment Programme)

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## MEMBERS

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The Honourable Claudette Tardif, Deputy Chair

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*Ex-officio members of the Committee:*

The Honourable Senators Claude Carignan, P.C., (or Yonah Martin) and James S. Cowan (or Joan Fraser).

**The committee would like to recognize the following Honorable Senators who are no longer serving members of the committee whose contribution to the study was invaluable.**


JoAnne L. Buth


Nicole Eaton


Michel Rivard


Fernand Robichaud, C.P.

***Other Senators who have participated from time to time in this study:***

The Honourable Senators: Ataullahjan, Bellemare, Callbeck, Cordy, Demers, Fortin-Dulpessis, Hervieux-Payette, Hubley, Housakos, Johnson, McIntyre, Munson, Plett, Raine, Seth, Tkachuk.

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***Senate Committees Directorate:***

Kevin Pittman, Clerk of the Committee

Mélanie Moore, Administrative Assistant

## ORDER OF REFERENCE

Extract from the *Journals of the Senate*, Thursday, November 21, 2013:

The Honourable Senator Mercer, for the Honourable Senator Mockler, moved, seconded by the Honourable Senator Moore:

That the Standing Senate Committee on Agriculture and Forestry be authorized to examine and report on the importance of bees and bee health in the production of honey, food and seed in Canada. In particular, the Committee shall be authorized to examine this topic within the context of:

(a) the importance of bees in pollination to produce food, especially fruit and vegetables, seed for crop production and honey production in Canada;

(b) the current state of native pollinators, leafcutter and honey bees in Canada;

(c) the factors affecting honey bee health, including disease, parasites and pesticides in Canada and globally; and

(d) strategies for governments, producers and industry to ensure bee health.

That the Committee submits its final report to the Senate no later than June 30, 2014 and that the committee retains all powers necessary to publicize its findings until 180 days after the tabling of the final report.

After debate, the question being put on the motion, it was adopted.

Gary W. O'Brien

*Clerk of the Senate*

Extract from the Journals of the Senate, Thursday, June 12, 2014:

The Honourable Senator Mockler moved, seconded by the Honourable Senator Boisvenu:

That, notwithstanding the order of the Senate adopted on Thursday, November 21, 2013, the date for the final report of the Standing Senate Committee on Agriculture and Forestry in relation to its study on the importance of bees and bee health in the production of honey, food and seed in Canada be extended from June 30, 2014 to December 31, 2014.

The question being put on the motion, it was adopted.

Gary W. O'Brien

*Clerk of the Senate*

Extract from the *Journals of the Senate*, Thursday, December 4, 2014:

The Honourable Senator Mockler moved, seconded by the Honourable Senator MacDonald:

That, notwithstanding the order of the Senate adopted on Thursday, June 12, 2014, the date for the final report of the Standing Senate Committee on Agriculture and Forestry in relation to its study on the importance of bees and bee health in the production of honey, food and seed in Canada be extended from December 31, 2014 to May 31, 2015.

The question being put on the motion, it was adopted.

Gary W. O'Brien

*Clerk of the Senate*

## FOREWORD

Today we have a dilemma in the Canadian agricultural sector. It has been said that some of our current practices can be harmful to pollinator health. A balance must be found whereby we maintain the health of our bees while, at the same time, continuing to produce the crops we need to feed ourselves. This is what our committee set out to do when it began this study.

"[O]f the 100 crop species that provide 90 per cent of the world's food, over 70 are pollinated by bees". To put it simply, we need bees if we are to continue to grow the food we eat. This quote from Mr. Achim Steiner, UN Under-Secretary-General and UNEP Executive Director, United Nations Environment Programme, found at the beginning of this report is a good summary of why bee health should be important to all Canadians.

Keeping in mind the need of pollinators for crop production, we must also recognize that it has been predicted that by 2050, nine billion people will need to be fed. Our crop yields must rise to feed our ever increasing population and therein lies the dilemma.

The Committee appreciates the time all stakeholders took to talk to us about this very important issue. We would like to thank all who contributed to this study. The committee had the privilege to meet many dedicated professionals who strive to achieve success in their respective fields. We hope the findings and recommendations that can be found within this report will serve as a roadmap that will allow for the coexistence of all stakeholders that have been heard on the importance of bee health to sustainable food production in Canada.

We would also like to thank all of our colleagues who have participated in this study as well as the administrative staff from both the Senate and Library of Parliament who have helped in the preparation of this report.

Percy Mockler, Chair

Claudette Tardif, Deputy Chair

## ACRONYMS AND ABBREVIATIONS

**AAFC:** Agriculture and Agri-Food Canada

**AEM:** Association of Equipment Manufacturers

**APVMA:** Australian Pesticides and Veterinary Medicines Authority

**CAPA:** Canadian Association of Professional Apiculturists

**CCD:** Colony Collapse Disorder

**CESD:** Commissioner of the Environment and Sustainable Development

**CFIA:** Canadian Food Inspection Agency

**CHC:** Canadian Honey Council

**COLOSS:** Prevention of honey bee COlony LOSSes

**D.C.:** District of Columbia

**EFSA:** European Food Safety Authority

**EPA:** Environmental Protection Agency

**EU:** European Union

**IPM:** Integrated Pest Management

**MBA:** Manitoba Beekeepers' Association

**Neonics:** Neonicotinoids

**OIE:** World Organization for Animal Health

**OMAFRA:** Ontario Ministry of Agriculture, Food and Rural Affairs

**PMRA:** Pest Management Regulatory Agency

**U.S.:** United States

**USDA:** U.S. Department of Agriculture

## EXECUTIVE SUMMARY

The Standing Senate Committee on Agriculture and Forestry undertook a study on the current status of bee health and strategies for its improvement. During its study, the Committee went on fact-finding missions in Ontario and Washington, D.C. These fact-finding missions allowed the Committee to visit a beekeeper and a corn farmer in Ontario, and to meet with government officials and various stakeholders in Washington, D.C. Through its hearings in Ottawa, the Committee heard from 85 witnesses over 8 months. Witnesses included officials from the federal and provincial governments of Canada, the European Union, and Australia, as well as representatives from agriculture and agri-food associations, civil society, and academia. The purpose was to hear witnesses' perspectives on the challenges facing bee health and how governments can help stakeholders address these challenges.

The report consists of two parts. The first part provides information on the structure of the Canadian beekeeping sector, current state of honey bees, the importance of pollinators, and consequences of bee mortality. Although the European honey bee (*apis mellifera*) is the main commercially-managed pollinator in Canada, leafcutter bees and bumblebees are also used commercially to pollinate certain crops. Canada is also home to over 800 species of native (i.e. wild) pollinators, but these species are difficult to rear in large enough numbers to cost-effectively pollinate crops.

While overall colony numbers have been increasing, the annual percentage of bee colony losses has been consistently above the norm of 10% to 15% since 2006/2007. Witnesses identified a number of stressors that may explain these losses, namely weather and climate change, transportation of bees, diseases and parasites, disease and parasite treatments, a lack of floral diversity, and neonicotinoid pesticides. These factors likely interact and combine to cause the high levels of bee mortality.

Pollinators play an important role in the environment, food and seed production, and honey production in Canada. They provide an important ecosystem service in the reproduction of plants. About one third of the human diet comes directly or indirectly from insect-pollinated plants. The commercial value of bees to crop pollination in Canada is estimated at over $2 billion annually.

Given the importance of pollinators to food production, the second part of the report addresses strategies to ensure pollinator health. The federal government, in collaboration with stakeholders and the provinces, is working on a number of measures to improve pollinator health such as the Bee Health Forum, the National Bee Farm-Level Biosecurity Standard, and the re-evaluation of three neonicotinoid pesticides.

However, additional efforts need to be pursued as challenges were also identified. While it is important to ensure the health status of bees in Canada, some witnesses stated that they would like to import honey bee packages from the United States to meet their needs. Beekeepers would also like quicker access to disease and parasite treatments that are already available in other jurisdictions. Although the PMRA has made significant progress in reducing the duration of new conditional registrations, the length

of some conditional pesticide registrations was questioned. Witnesses also identified the need to increase the amount and duration of research funding to improve knowledge about pollinators. Research results need to be transferred into the field and shared with beekeepers and growers in order for them to implement innovative management practices that will improve bee health. Finally, witnesses highlighted the importance of improving the floral diversity of the Canadian landscape to enhance bee nutrition.

## LIST OF RECOMMENDATIONS

**Recommendation 1 (page 19)**

The committee recommends that:

- Health Canada and the Canadian Food Inspection Agency amend the *Honeybee Importation Prohibition Regulations, 2004* in order to allow the importation of bee packages from the United States while developing additional methods and tools to improve the inspection of imported honey bee packages.

- Agriculture and Agri-Food Canada implement the bee health surveillance project on a continuous basis rather than a four-year period in order to set, in the long term, an overall picture of the health of Canadian bee colonies and in order to take appropriate long term actions to maintain the health of Canadian bee colonies.

**Recommendation 2 (page 20)**

The Committee recommends that Agriculture and Agri-Food Canada, in conjunction with the provinces and territories, and in collaboration with industry stakeholders, accelerate the implementation of the National Bee Farm-Level Biosecurity Standard through adequate funding and management activities.

**Recommendation 3 (page 22)**

The Committee recommends that the Pest Management Regulatory Agency accelerate its conditional registration process in order to reduce the current number of conditional registrations granted to neonicotinoid active ingredients.

**Recommendation 4 (page 22)**

The Committee recommends that the Commissioner of the Environment and Sustainable Development conduct a follow-up audit to verify whether the Pest Management Regulatory Agency has implemented the recommendations described in its 2008 audit report.

**Recommendation 5 (page 23)**

The Committee recommends that the Pest Management Regulatory Agency take the necessary actions to accelerate its pesticide registration process, especially in relation to new products intended to control mites and diseases affecting honey bees. Any changes in the registration process should also take into consideration the safety of humans, plants, and the environment.

**Recommendation 6 (page 26)**

The Committee recommends that:

- The Pest Management Regulatory Agency keep monitoring pollinator mortality during the spring of 2015 to assess whether the protective measures adopted for the 2014 planting season were efficient.

- The Pest Management Regulatory Agency conclude, without delay, its re-evaluation of neonicotinoid insecticides based on evidence and sound scientific principles with an objective of protecting the health of bees.

**Recommendation 7 (page 30)**

The Committee recommends that Agriculture and Agri-Food Canada, Health Canada, and the Department of Finance Canada through the Bee Health Forum, and in collaboration with the provinces and territories, increase the amount and the duration of research funding in order to undertake long-term research projects which contribute to the preservation of pollinator health.

**Recommendation 8 (page 34)**

The Committee recommends that Agriculture and Agri-Food Canada, through the Bee Health Forum, and in collaboration with the provinces and territories, adopt initiatives aiming to improve management practices of hobbyist beekeepers and growers while minimizing the use of chemical products and ensuring the availability of untreated seeds.

**Recommendation 9 (page 35)**

The Committee recommends that Agriculture and Agri-Food Canada, through the Bee Health Forum, and in collaboration with the provinces and territories, adopt initiatives to improve pollinator habitat such as the planting of selected wild flowering plants on median strips and highway shoulders, and on marginal land around all developments including airports and shopping centres.

## INTRODUCTION

Between 2006 and 2014, annual bee colony losses in Canada were higher than the normal rate of 10% to 15%, reaching a high of 35% in the winter of 2007/2008. These losses have been attributed to such factors as abnormal temperatures, viruses, parasites (mites), hive management, and pesticides (neonicotinoids).

In the spring and summer of 2012, Health Canada's Pest Management Regulatory Agency (PMRA) received a significant number of pollinator mortality reports, mainly from the **corn-growing** regions of Ontario, Quebec, and Manitoba. Of the dead bees that were sampled, approximately 70% tested positive for residues of neonicotinoid insecticides used to treat corn seeds. Measures were taken to reduce bees' exposure based on best management practices for seed planting. However, in the spring of 2013, the PMRA continued to receive numerous reports of instances of bee mortality from both corn and soybean growing regions of Ontario, Quebec, and Manitoba. Following these reports, the PMRA concluded that agricultural practices implemented and related to the use of neonicotinoid treated corn and soybean seeds are not sustainable.[1]

The possible correlation between bee mortality and the use of neonicotinoid insecticides has also been identified in foreign jurisdictions such as the European Union (EU) and the United States (U.S.). In the EU, the introduction of a two-year moratorium on certain uses of neonicotinoid insecticides has prompted some Canadian stakeholders to also call for similar action in Canada in order to preserve bee health.

The commercial value of bees to the pollination of crops in Canada is estimated at over $2 billion annually. Worldwide, their contribution to human food is estimated at about US$200 billion. Aware of the contribution of bees to the food system, the Standing Senate Committee on Agriculture and Forestry (referred to as the "Committee") decided to undertake a study to examine the importance of bees and bee health in the production of honey, seed, and food in Canada. It is important to mention that the production of seed and food relies greatly on bee pollination.

In this regard, Part 1 of the report presents background information on the structure of the Canadian beekeeping sector, and the current state of honey bees and other pollinators in Canada, while describing factors that influence bee health. Part 2 of the report examines strategies for Canadian governments and industry stakeholders to ensure bee health. In particular, the focus is on enhancing bee health and potential areas of improved cooperation between the public and private sectors.

1 Health Canada, *Notice of Intent, NOI2013-01, Action to Protect Bees from Exposure to Neonicotinoid Pesticides*, 13 September 2013.

# Part 1
# Pollinators in Canada

## PART 1 – POLLINATORS IN CANADA

### A. Structure of the Canadian Beekeeping Sector

#### 1. Commercially-Managed and Native Pollinators

In Canada, the main commercially managed pollinator is the European honey bee (*apis mellifera*), which was first introduced to North America hundreds of years ago by settlers. The honey bee is easier to manage than other bee species and conveniently stores honey. To a lesser extent, leafcutter bees and bumblebees are also used as commercial pollinators. Leafcutter bees are typically used for alfalfa and canola seed production, while bumblebees are often used for greenhouse tomatoes and cranberry production.

Canada is also home to over 800 species of native (i.e. wild) pollinators, such as mason bees, carpenter bees, sweat bees, miner bees, and squash bees. Each native bee species has unique characteristics, often specializing in the pollination of a specific plant and living in a particular habitat.

These native bees are difficult to rear in large enough numbers to cost-effectively pollinate a crop; this is the main reason why they are not used as commercial pollinators. As explained by Paul van Westendorp, Provincial Apiary Specialist from the Government of British Columbia, "the wild pollinators are sometimes far better as pollinators in certain crops because of certain morphological characteristics, but the problem is that you never have the numbers."

Witnesses generally recognized the importance of pollination services from native bees although the degree of pollination available from native bees can vary significantly from year to year, and it is difficult to time the shorter life cycle of wild bees with the bloom of the crop needing pollination.

#### 2. Jurisdiction for Regulating the Sector

Regulating bee health issues is a joint responsibility between the federal and provincial governments. The federal government regulates chemicals such as the neonicotinoid insecticides used on certain crops as well as chemicals used in bee disease treatment; only chemicals that are federally registered can be imported, sold, or used in Canada.[2] Through the Canadian Food Inspection Agency (CFIA), the federal government regulates international imports of honey bees and related by-products. Agriculture and Agri-Food Canada (AAFC) also operates the National Bee Diagnostic Centre in Beaverlodge, Alberta, which provides diagnostic services to the beekeeping industry and conducts scientific research.

Provincial governments may have requirements for beekeepers to register or obtain a permit and may also impose additional import controls to prevent the introduction and spread of bee diseases. For example, Newfoundland and Labrador has regulations prohibiting the import of honey bees from other

[2] Commissioner of the Environment and Sustainable Development [CESD], "Chapter 2: Pesticide Safety and Accesibility," *Status Report of the Commissioner of the Environment and Sustainable Development to the House of Commons,* Office of the Auditor General of Canada, March 2008.

provinces or countries without a strict veterinary certification in an effort to protect its varroa mite free status.

Provinces can also offer inspection services to beekeepers to help track and evaluate pests and diseases in bee colonies, though witnesses explained that the availability of inspectors can vary from one province to another. Some provinces also provide extension services to help with beekeeper education and conduct scientific research relating to bees.

Provinces are also responsible for regulating the sale, storage, transportation, and disposal of pesticides.[3] Provinces may also issue permits for pesticides, monitor their usage and set additional conditions on their use or allow municipalities to do so.[4] As mentioned by Gillian Leitch, Location Committee Member from the Toronto Beekeepers Co-operative, the City of Toronto banned the use of cosmetic pesticides in 2003 and Ontario banned cosmetic pesticides province-wide five years later. Ontario has also sought public input on a pollinator health proposal that would involve three main aspects, namely (1) reducing the planted acreage of neonicotinoid-treated corn and soybean seeds by 80% by 2017; (2) reducing the overwinter honey bee mortality rate to 15% by 2020; and (3) establishing a comprehensive Pollinator Health Action Plan.[5]

## B. Current State of Honey Bees

### 1. Number of Beekeepers and Colonies

Canada had over 8,700 commercial and hobbyist beekeepers in 2014, managing over 694,000 colonies[6] (Figure 1). Over the last 20 years, the number of colonies has been increasing, while the number of beekeepers has been decreasing. The restructuring of the beekeeping industry was highlighted by Dr. Peter Kevan, Professor Emeritus from the School of Environmental Sciences at the University of Guelph. He stated that beekeeping itself is becoming a more intensive agricultural endeavour and that beekeeping activities are in the hands of fewer and fewer people.

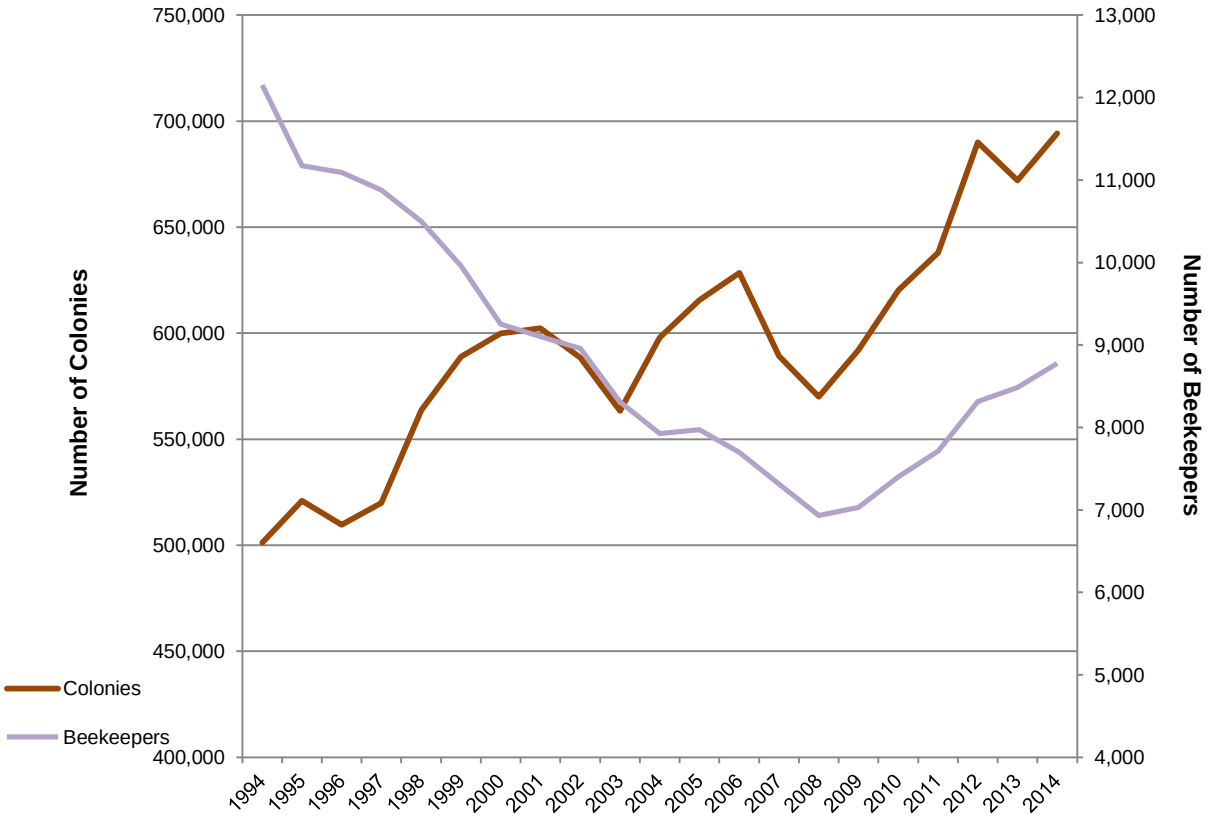
> [T]he number of colonies, interestingly enough, is remaining fairly stable and is even increasing. This means that beekeeping itself is becoming a more intensive agricultural endeavour and it's in the hands of rather fewer and fewer people when it comes to the practical issues. (Peter Kevan, PhD, FRSC, Professor Emeritus, School of Environmental Sciences, University of Guelph, 28 January 2014)

Figure 1 also shows that, although the number of beekeepers is down from its high of just over 12,000 in 1994 to about 7,000 in 2008; the number of beekeepers has since slightly increased, reaching about 8,700 in 2014. Rod Scarlett, Executive Director of the Canadian Honey Council, explained that the

3 Ibid.
4 Ibid.
5 Ontario Ministry of the Environment and Climate Change, "Reducing Pesticide Use and Protecting Pollinator Health," *News Release,* 25 November 2014.
6 There are more than 50,000 bees in a hive.

number of commercial beekeepers (i.e. those that make the majority of their income from apiculture) is relatively stable and typically represents about 20% of beekeepers in Canada. The Statistics Canada data used in Figures 1 to 3 does not differentiate between hobbyist and commercial beekeepers. However, Eliese Watson, the founder of Apiairies and Bees for Communities, noted that increasing public awareness of commercial honey bee losses and growing interest in urban agriculture have generated a relatively significant increase in the number of hobbyist beekeepers.

**Figure 1 – Number of Beekeepers and Bee Colonies in Canada, 1994 to 2014[a]**




Notes:

a. Data is not available for Newfoundland and Labrador.

Source: Statistics Canada, *Table 001-0007 - Production and value of honey, annual (number unless otherwise noted)*, CANSIM (database).

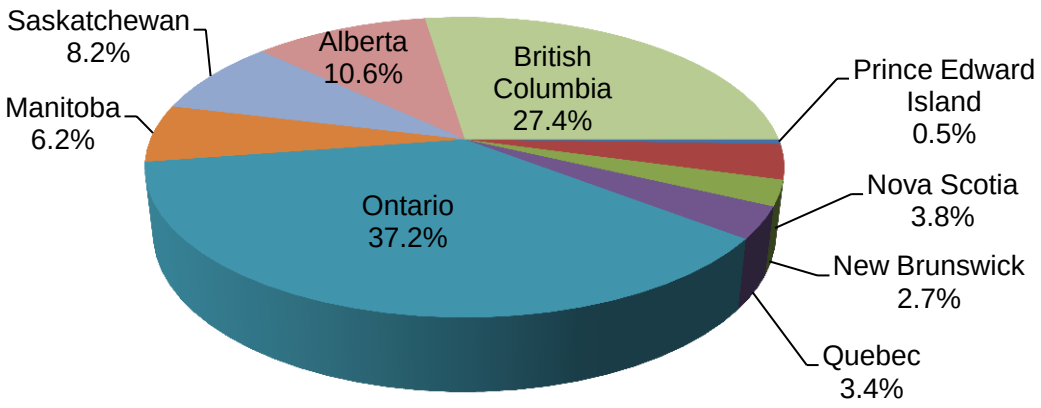
There are major regional differences in beekeeping (figures 2 and 3). Most colonies (66% in 2014) are in Alberta, Saskatchewan, and Manitoba, despite these provinces having a small share of beekeepers (25% in 2014). In contrast, most beekeepers (65% in 2014) are in British Columbia (BC) and Ontario which have a smaller share of bee colonies (23% in 2014).

Due to the relatively small size of its beekeeping industry, the province of Newfoundland and Labrador is not included in the Statistics Canada data used for Figures 2 and 3. However, Mr. Deering, Assistant

Deputy Minister of Agrifoods Development, Government of Newfoundland and Labrador, indicated to the Committee that there are 35 beekeepers and 500 colonies in the province.

Regional differences in crop production mean that honey bees are used to pollinate different crops depending on the province. For example, honey bees are a major pollinator for canola crops in Alberta, corn and soybeans in Ontario, and blueberries in eastern Quebec and the Maritime Provinces.

**Figure 2 – Share of Beekeepers by Province (2014)[a]**

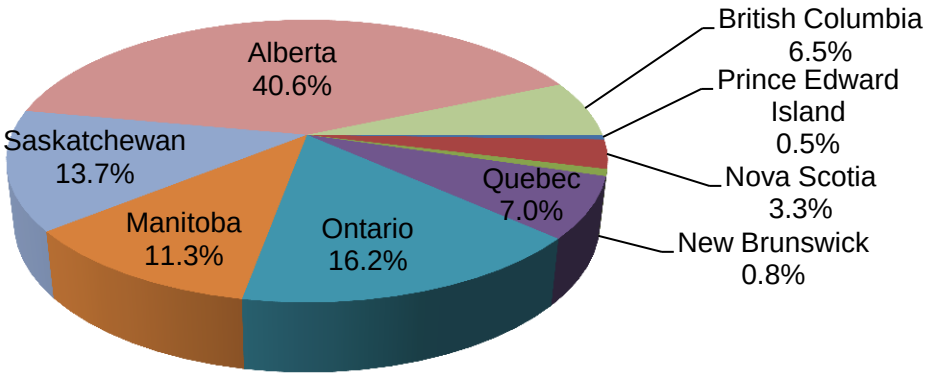



Notes:

a. Data is not available for Newfoundland and Labrador.

Source: Statistics Canada, *Table 001-0007 - Production and value of honey, annual (number unless otherwise noted)*, CANSIM (database).

**Figure 3 – Share of Bee Colonies by Province (2014)[a]**




Notes:

a. Data is not available for Newfoundland and Labrador.

Source: Statistics Canada, *Table 001-0007 - Production and value of honey, annual (number unless otherwise noted)*, CANSIM (database).

With respect to other jurisdictions, witnesses reported a declining number of commercial beekeepers in the U.S. and EU. Witnesses identified a number of reasons for this trend, including the retirement of beekeepers due to age, the difficulty of starting a beekeeping business due to the large initial investment, and the increasingly knowledge-intensive nature of modern beekeeping. Tim Tucker, President of the American Beekeeping Federation, characterized the American situation as a "crisis," with beekeepers coming close to not having enough colonies to pollinate the almond crop in recent years. However, Marie-Pierre Chauzat, Deputy Head of the European Reference Laboratory for Honey Bee Health at the World Organization for Animal Health (known by its French acronym, OIE), noted that she has not seen any study, in Europe or elsewhere, to suggest that there are currently fewer honey bees available for pollination.

### 2. Overwinter Colony Losses in Canada and Other Jurisdictions

In Canada, beekeepers have seen higher than normal rates of colony loss over the winter. Figure 4 presents data on wintering losses at the national level from the annual colony loss reports published by the Canadian Association of Professional Apiculturists (CAPA). Since 2006/2007, the losses have been above the norm of 10% to 15% of colonies (the upper limit of this norm is represented by the horizontal line in Figure 4). These higher-than-normal rates of colony loss have been attributed to Colony Collapse Disorder (CCD).

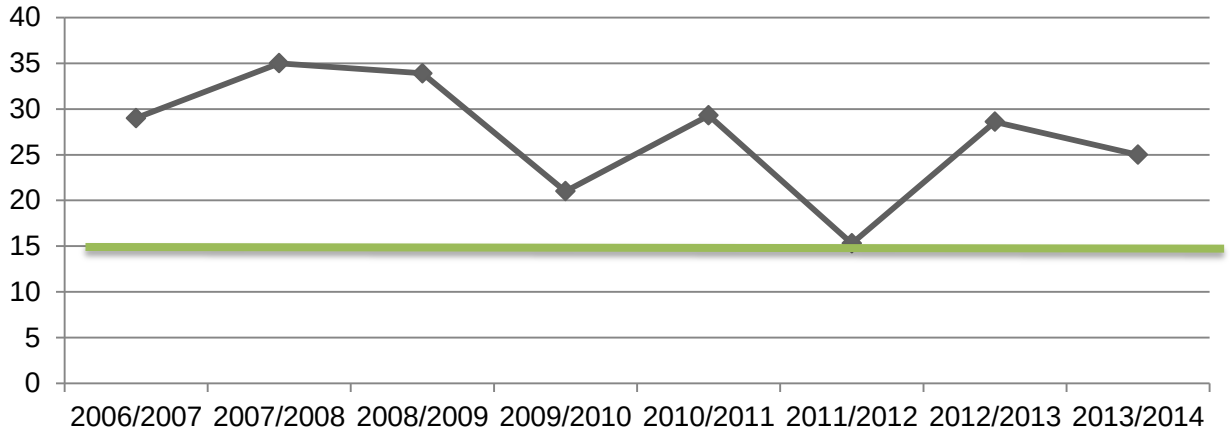
According to the OIE, CCD is defined as:

> A syndrome involving a rapid decline in a colony's adult bee population without any dead bees being found in or around the colony. In the terminal phase, the queen is reported to be no longer surrounded by more than a few newly emerged bees despite the fact that the hive still contains reserves of food and capped brood cells.[7]

Although several factors have been cited in the literature in order to explain CCD, the PMRA received, in 2012 and 2013, reports of pollinator mortalities resulting from exposure to neonicotinoid insecticides in Ontario, Quebec, and Manitoba.

[7] Reza Shahrouzi, "Causes of bee colony mortality," *OIE news*, April 2009.

**Figure 4 – Wintering Losses in Canada (Percent), 2006/2007 to 2013/2014[a]**




Notes:

a. Data is not available for Newfoundland and Labrador.

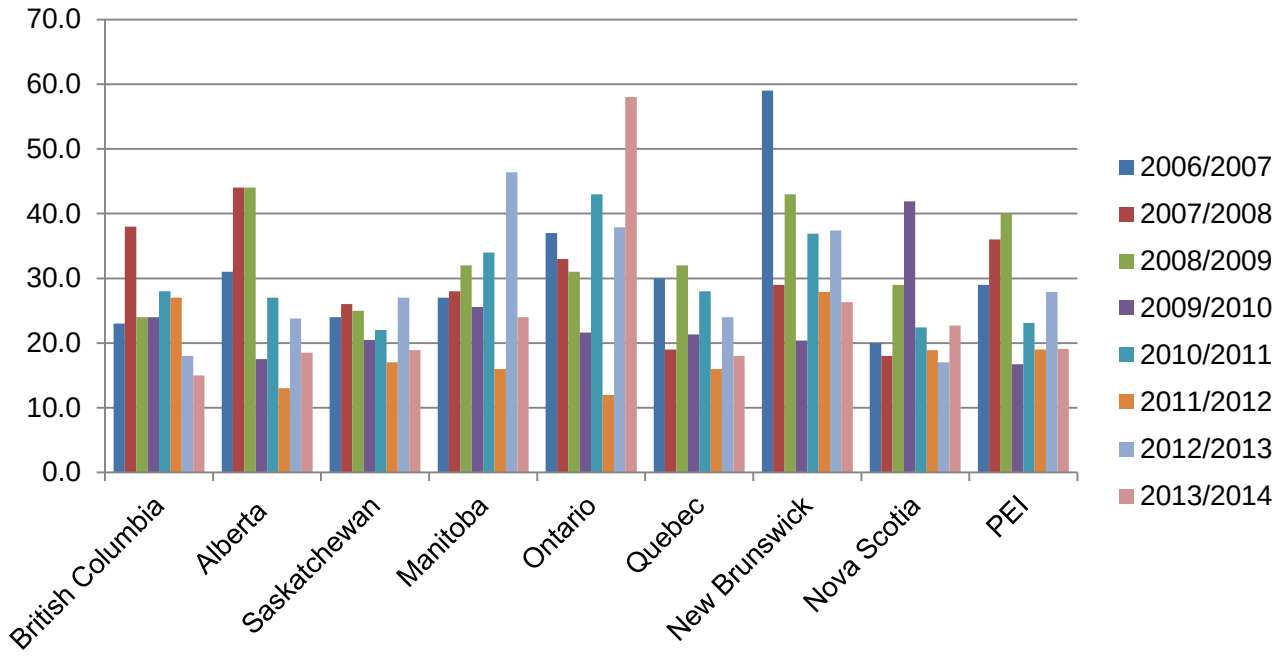
Source: Canadian Association of Professional Apiculturists, *Annual Colony Loss Reports*.

According to CAPA data, the state of honey bee health, as measured by colony losses, can vary significantly from one province to another (Figure 5). For example, in 2013/2014, losses ranged from a low of 15% in BC to a high of 58% in Ontario. Losses can also vary widely from one year to another.

Dave Jennings, Director of Product and Market Development from the Government of Newfoundland and Labrador, told the Committee that on average, overwinter losses are less than 20%. However, for the winter of 2013/2014, beekeepers in the province lost 30% to 40% of their colonies.

**The bee mortality rate should be analysed with caution**. Shelley Hoover, an Apiculture Research Scientist in Agriculture and Rural Development with the Government of Alberta, explained that colony loss reports from beekeepers are not standardized, meaning that the definition of a loss may vary from one beekeeper to another. Ms. Chauzat also noted that comparison between countries is difficult, since data collection methods vary by country.

**Figure 5 – Wintering Losses (Percent) by Province, 2006/2007 to 2013/2014[a]**




Notes:

a. Data is not available for Newfoundland and Labrador.

Source: Canadian Association of Professional Apiculturists, *Annual Colony Loss Reports*.

However, despite these higher-than-normal losses over the winter, the overall number of bee colonies in Canada has increased in recent years (Figure 1). As explained by some witnesses, the practice of colony splitting – making up for losses by splitting a single colony into two or more – and the use of imported bees may explain the increase in colony numbers despite higher than normal overwinter losses. John Bennett, National Campaign Director from the Sierra Club Canada, cautioned that it may eventually become difficult for beekeepers to continue investing in replacement bees if they see declines in honey profits due to the high mortality rates. According to the Ontario Beekeepers Association, apiculturists in the province have seen a 32.6% decline in their honey crop this year.

Although the lack of comparable data makes it difficult to speak of a global decline in bee health, other countries have also experienced higher than normal overwinter losses. In the U.S., the average annual loss since 2006 has been about 30%. Agnes Rortais, a Scientific Officer from the European Food Safety Authority (EFSA), explained that losses vary considerably between EU member states, ranging from 5% to 30%. Higher losses were typically in the Northern parts of the EU, with southern member states having the lower mortalities. Geoffrey Williams, the Secretary of COLOSS (Prevention of honey bee COlony LOSSes), noted that the mortality rate is 15% to 20% in Switzerland. In Australia, Kareena Arthy, the Chief Executive Officer of the Australian Pesticides and Veterinary Medicines Authority (APVMA), explained that beekeepers have not seen higher than normal losses due in part to the absence of varroa mites.

High honey bee mortality rates are not unique to modern beekeeping. For example, Jerry J. Bromenshenk noted that in the mid-1970s, many American states were affected by symptoms similar to CCD. At the time, the condition was referred to as “disappearing disease.”

### 3. Stressors Affecting Bee Health

Witnesses identified several stressors that may contribute to the high mortality rates. As noted by several witnesses, these stressors may affect managed honey bees and wild pollinators to varying degrees. For example, Dr. Chris Cutler, Associate Professor in the Department of Environmental Sciences at Dalhousie University, noted that scientists have known about declines in bumblebee populations for decades, but Mr. Williams explained that bumblebees and other wild bees are not affected by varroa mites. In contrast, some viruses and microorganisms may be transferred between honey bees and wild bees. Human activity, such as the use of pesticides and destruction of pollinator habitat and forage, can also have an impact on both honey bees and wild bees.

**Photo 1: Visit to B. Hogan Apiaries in Ontario**

Ms. Leitch also noted that urban beekeepers face many of these same hazards. Urban beekeepers may also face unique challenges, such as the difficulty for bees to forage in industrial zones, street traffic, and the heat island effect.[8]

Ms. Rortais stated that prioritizing between these stressors can be a challenge since geographic differences make it difficult to generalize about the priority of each stressor. Indeed, factors like habitat structure, type of crops, heterogeneous or homogeneous crop systems, microclimate, pathogen loads, or exposure to chemicals could vary greatly between regions.

#### a. Weather and Climate Change

Long and harsh winters or cool and long springs may result in higher mortality. As indicated by some witnesses, cold weather makes it difficult for bees to leave the hive for cleansing flights, making the

[8] According to Health Canada, the term "heat island" describes built-up areas that are hotter than nearby rural areas. The average air temperature of a city with 1 million people or more can be 1 to 3°C warmer than its surroundings. In the evening, the air temperature difference can be as high as 12°C.

colony more susceptible to disease. Unusual fall temperatures can also delay the use of disease treatments and prevent adequate feeding, which may affect the health of bees going into the winter.

Weather-related challenges can vary greatly between regions. In regions that are further south, such as Ontario, beekeepers may not be as prepared for severe winters as their counterparts in northern regions, where severe winters are the norm. David Hoffman, Co-Chief Executive Officer from Oxford Frozen Foods, suggested that the Maritimes lack the right climate for growing and managing bees, putting beekeepers in the region at a disadvantage to competitors in other provinces.

**Photo 2: Winter Hives**
Photo Credit: Canadian Honey Council

Rhéal Lafrenière, Provincial Apiarist from the Government of Manitoba, noted that weather was identified by the province's beekeepers as the number-one factor for high losses. Regional differences in weather have also been important in other jurisdictions. As noted above, colony losses in the EU have been lower in the southern member states where weather tends to be warmer.

In Australia, as explained by Dr. Les Davies, Chief Regulatory Scientist of Pesticides from the APVMA, droughts and bushfires have been key stressors on bee health. Droughts and bushfires both affect the availability of flora, which in turn can affect the diet and habitat of bees.

As explained by Dr. Stephen F. Pernal from AAFC, it is difficult to connect the decline in bee health with climate change:

> In response to your question regarding whether global climate change has affected winter survival, I would submit that's very difficult to answer. We have experienced higher rates of mortality over the last seven winters, and that's a fairly short time span to evaluate the effects of climate change and perhaps their effects on bees. […] People who predict climate change would suggest our weather will become more variable over time, with increasing intensity of extremes. If these predictions of climate change hold true and we do have more extreme weather, I would suggest these will potentially have a bigger impact on the survival of bees, but I can't specifically comment on whether over the last seven years climate change has had an effect on the survival of bees we've seen, at least recently. (Stephen F. Pernal, Ph.D., Research Scientist (Apiculture), Agriculture and Agri-Food Canada, 12 December 2013)

### b. Transportation of Bees

Many witnesses identified the transportation of bees for pollination as a stressor on bee health. Dr. Dave Shutler, Professor in the Department of Biology at Acadia University, mentioned that:

> One stress of transportation might be being locked inside a hive for days while in transit, unable to get rid of waste, dead bees, et cetera. (Dr. Dave Shutler, Professor, Department of Biology at Acadia University, 3 April 2014)

However, the relevance of the transportation stressor can vary widely between provinces. In Ontario, some beekeepers send their colonies to the East Coast for blueberry pollination, while Alberta beekeepers will move their hives around the province to pollinate hybrid canola. In contrast, beekeepers in Manitoba and Saskatchewan tend to keep their colonies stationary, meaning that transportation is likely less of a stressor in these two provinces.

### c. Diseases and Pathogens

Bees are also affected by various parasites and diseases, such as *Varroa destructor*, *Nosema ceranae*, and American foulbrood. Although it is difficult to prioritize between stressors, most provincial beekeeping associations that appeared before the Committee, with the exception of Newfoundland and Labrador, identified the *Varroa destructor* as an important factor affecting bee health.

The *Varroa destructor* is a parasitic mite from Asia that feeds on honey bees. Varroa mites are very large in comparison to the bee; witnesses compared it to a human with a parasite the size of a fist or a dinner plate. When feeding on bees, these mites spread viruses and pathogens, leave open wounds, and cause immune suppression, making bees more susceptible to other health problems.

Varroa mites are not unique to Canada. In their annual national honey bee pests and diseases survey, American beekeepers have consistently identified the varroa mite as one of the top two causes of bee deaths in each of the last five years. A witness from EFSA also identified varroa mites as a problem in the EU, though the rate of varroa infection varies widely between member states. As explained by Dr. Shutler, Australia and Hawaii are among the few places in the world where varroa mites do not occur, possibly because of their warmer winter seasons.

### d. Disease Treatments

Chemicals used for treatment of bee diseases can also be toxic to bees. For instance, the chemicals used to control varroa mites can be toxic to both the targeted mites and the bees. As Dr. Pernal explained to the Committee, these mite control treatments are only separated by a small margin in terms of the dose at which they can kill bees. As suggested by Mr. Williams, the treatments can also affect the health of bees through accumulation in the hive.

Timing the application of the varroosis[9] treatment can also be a challenge for beekeepers. As explained by Dr. Rob Currie:

> In some cases, misapplication of hive-applied pesticides can contribute to the problem, and in some cases things happen that we don't understand. A beekeeper could be applying a hive-applied insecticide and there could be an interaction with a fungicide that is coming into the hives from the crops. Sometimes interactions occur between hive-applied pesticides and stresses with varroa mites. (Rob Currie, PhD, Professor and Head, Department of Entomology, University of Manitoba, 4 February 2014)

### e. Lack of Floral Diversity

A lack of floral diversity can affect bees' nutrition and habitat. Bees normally obtain most of their diet from pollen and require diverse sources of pollen to remain healthy. When bees are used to pollinate a monoculture crop for a long period of time, there is minimal floral diversity in their diet, meaning that they lack the necessary variety of foods.

However, during its fact-finding mission in Ontario, the Committee noted that it is less a question of monoculture practices that affect bee nutrition than the type of cultivated crops. As mentioned by Les Eccles from the Ontario Beekeepers' Association Technology Transfer Program, in the U.S. for instance, almond orchards are favoured by bees compared to corn crops because of the quality of the almond flower pollen. In addition, representatives from the canola industry noted that the almond tree, which is typically planted on large acreages, does provide nutritionally complete diets for honey bees. The effects of monoculture on honey bee health therefore vary from one province to another, depending on the crop. Nevertheless, witnesses suggested that bee access to a variety of flowers could provide them with a nutritional diet made up of good quality proteins.

There can also be a lack of food (i.e. pollen) for the bees in periods between the flowering of different crops. In these cases, even with the artificial foods that beekeepers use as supplements, these bees may not always have a nutritionally complete diet.

> There are not enough natural flowers to provide complete nutrition to these colonies. So we tried to supplement honeybees' diet with artificial foods, but there are no nutritionally complete diets available for honeybees. It seems kind of strange; we know how to feed every animal in the zoo, but we don't know how to feed honeybees. As a result, this is an added stressor. (Gerald Hayes, Commercial Lead, Beeologics/Monsanto, 1 May 2014)

[9] Varroosis is the disease resulting from a parasitic infestation of the adult and brood honey bee by varroa mites.

For wild bees, a lack of floral diversity can also affect habitat. Changing natural landscapes to agricultural or urban environments can destroy habitat for many animals, including wild bees. Thus, witnesses stated that in an agricultural environment, particularly with monoculture farms, there are not enough habitats for wild bees. The elimination of weeds can also affect wild bees as weeds sometimes provide habitat to wild pollinators.

### f. Neonicotinoids

#### (i) What are Neonicotinoids?

Neonicotinoids are a class of insecticides[10] with a chemical structure related to nicotine. These insecticides work by attacking the central nervous system of insects, resulting in paralysis and death.[11] Originally introduced in the 1990s, these chemicals are among the world's most widely-used insecticides.

Neonics can be applied using sprays, though they are often used as seed-applied insecticides. According to Scott Kirby, Director of Product Assessment in the PMRA at Health Canada, the neonics in these systemic seed treatments are meant to be taken up by the plant as it grows, providing protection from soil-borne pests and early season pests during the early stages of a plant's development.

#### (ii) The Challenge of Neonicotinoids

As explained by Frédéric Seppey, the Chief Agriculture Negotiator and Director General in the Trade Agreements and Negotiations Directorate of the Market and Industry Services Branch at AAFC, the challenge with neonics is to address their impacts on bee health without significantly restricting the possibilities for crop production.

According to some witnesses like CropLife and the Grain Farmers of Ontario, farmers use neonics as a tool to manage pests, particularly early in the season, which in turn contributes to yield increases, and ensures that they can compete on world markets. Neonicotinoid seed treatment is also thought to be less harmful to the environment. In contrast to foliar applications, using a seed treatment allows a small amount of the chemical to be applied directly to where it will provide the most protection while minimizing exposure to beneficial insects and other wildlife.

Dust generated from the planting of neonicotinoid-treated corn and soy seeds can be acutely (i.e. immediately) toxic to bees. Until recently, talcum powder was used as a seed lubricant; this powder would rub off of some of the chemical coating on the seed and become airborne as dust during the planting process.

Although honey bees in Ontario, Quebec, and Manitoba have died from acute exposure to dust from the planting of neonicotinoid-treated corn and soy seeds, this situation has not occurred in other parts of

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10 The term "neonicotinoid" is used for a large variety of pesticides. Imidacloprid, thiamethoxam, clothianidin, acetamiprid, and thiacloprid are chemicals from the neonicotinoid group that are registered for use in Canada. For more information, see: Ontario Ministry of Agriculture, Food and Rural Affairs, *Ontario Bee Health Working Group Report*, March 2014.

11 Beyond Pesticides, *Chemicals Implicated*.

Canada. Provincial government witnesses from Atlantic Canada also reported no incidents with neonics in their regions.

Witnesses noted, for example, that no bee deaths have been reported within Canada's 21.3 million acres (in 2013) of neonicotinoid-treated canola. Witnesses further explained that canola creates less dust than corn or soy because canola seeds are small and round, and different equipment is used to plant the crop.

> Corn and soy specifically generate dust because they require a lubricant to prevent the seeds from coming up the machinery. Other seed treatments, such as canola, with a much smaller seed and very round, doesn't require this type of lubricant. (Scott Kirby, Director, Product Assessment, Pest Management regulatory Agency, Health Canada, 12 December 2013)

In a laboratory setting, small doses of neonics have also been shown to have sub-lethal effects (i.e. effects that are harmful but not immediately deadly) on foraging, feeding, immune function, and navigation in individual honey bees.

Some witnesses also questioned the environmental benefits of neonics.[12] Witnesses also noted that neonicotinoid residue may also be persistent in water and soil. However, in their study of soil samples, undertaken in 2010 and 2011 in Alberta and in the U.S., Jerry J. Bromenshenk and Colin B. Henderson found very low levels of neonicotinoid residues.

The value of neonics with respect to crop yield increase was also questioned. Witnesses cited a report from the Center for Food Safety which conducted a literature review of 19 North American studies (including three from Canada – two in Ontario, and one in Manitoba and Saskatchewan). The report states that, "neonicotinoid seed treatments do not provide significant yield benefits in many contexts."[13] For example, the study on canola in Manitoba and Saskatchewan showed that by reducing the use of treated seeds by one third had a noticeable effect on yield in the context of heavy flea beetle pressure.[14] Mr. Sproule also cited information from the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) which states that only 10% to 30% of corn and soybeans benefit from neonicotinoid seed treatments.

Similarly, witnesses during the Committee's fact-finding mission in Ontario shared a study by the U.S. Environmental Protection Agency (EPA) which found that neonicotinoid seed treatments "provide

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12 Dan Davidson, President of the Ontario Beekeepers Association, stated that "neonicotinoids are thousands of times more lethal to bees than are older insecticides like DDT" (dichlorodiphenyltrichloroethane, which is a colorless, crystalline, tasteless, and almost odorless organochloride known for its insecticidal properties).

13 Center for Food Safety, *Heavy Costs: Weighing the Value of Neonicotinoid Insecticides in Agriculture*, March 2014.

14 Ibid.

negligible overall benefits to soybean production in most situations."[15] Compared to the next best alternative,[16] the EPA study suggests that neonicotinoid seed treatments provide $0 to $6 per acre in benefits (representing a 0% to 1.7% difference in net operating revenue). The study did note, however, that usage of these chemicals could provide an insurance benefit against sporadic and unpredictable pests, particularly in southern states.[17]

**According to the U.S. EPA neonic seed treatments provide negligible overall benefits to soybean production in most situations.**

A report of the Conference Board of Canada notes that there are conflicting studies on the potential losses to crop yields. According to the report, "[T]he effectiveness of neonicotinoids depends on a variety of factors that likely include the size and type of local insect populations, weather, and climate."[18] The efficacy of the pesticide, according to the report, may vary considerably between farms within a region depending on local conditions.

#### g. Synergies Between Stressors

Witnesses generally agreed that the factors outlined above interact and combine to cause the high levels of bee mortality recently seen in many countries around the world, though scientists still do not have a significant understanding of the interactions between stressors. For example, overexposure to chemicals or inadequate nutrition may have an effect on the spread of bee disease.

### C. Importance of Pollinators and Consequences of Bee Mortality

#### 1. Environment

Witnesses explained to the Committee how bees (and other pollinators) provide important ecosystem services. For example, some migratory and resident birds depend on seeds and fruits in the forest that are produced through the pollination of wild plants. Most flowering plants also need pollination in order to reproduce, and bees are responsible for about 70% of that pollination. A decline in bee health could therefore affect the survival of other animal and plant species.

#### 2. Food and Seed Production

Approximately one third of the human diet comes directly or indirectly from insect-pollinated plants. As noted in the introduction to the report, honey bee pollination is worth billions of dollars domestically and globally. In Western Canada, about 300,000 honey bee colonies are used to pollinate hybrid canola seed each year. Alfalfa seed production, a $40 million industry, also depends on the use of alfalfa leafcutter bees. Furthermore, the bumblebees used in greenhouses are a $3.7 million per year industry.

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15 United States Environmental Protection Agency, *Memorandum: Benefits of Neonicotinoid Seed Treatments to Soybean Production*, 15 October 2014.

16 According to the study, multiple foliar insecticides are available in instances where pest pressure necessitates a pest management tactic and such foliar insecticides have been found to be as efficacious as neonicotinoid seed treatments for target pests.

17 Ibid.

18 Conference Board of Canada, *Seeds for Success: The Value of Seed Treatments for Ontario Growers,* July 2014.

Witnesses also noted the importance of pollinators to food and seed production at the provincial level. For example, pollination services of honey bees are valued at $44 million in New Brunswick, $80 million in Manitoba, $400 million in Saskatchewan, and $10 million in British Columbia. Pollination from leaf cutter bees is worth an additional $15 million in Manitoba. As a result of the regional, national, and global importance of pollinators to food and seed production, bee colony losses could be detrimental to the production of food and seed crops.

### 3. Honey Production

According to Statistics Canada, in 2014, 42% of the Canadian honey was produced in Alberta, 20% in Saskatchewan, 17% in Manitoba, 10% in Ontario, 5% in Quebec and 5% in British Columbia. The Atlantic Provinces produced 1% of the total honey in Canada.[19]

Most Canadian beekeepers make their income from honey production. According to Dr. Pernal, honey and other hive products are valued at almost $200 million annually. According to Statistics Canada, in 2014, honey production totalled about $79 million in Alberta, $35 million in Saskatchewan, $30 million in Manitoba, $30 million in Ontario, $13 million in British Columbia, $13 million in Quebec, and $3 million in the Atlantic Provinces. Canadian beekeepers produced over 81 million pounds of honey in 2014, up from 69 million pounds in 2007.[20] Since beekeepers make most of their income from honey and other hive products, declining bee health will certainly have a detrimental impact on the profitability of this sector.

[19] Statistics Canada, *Table 001-0007 – Production and value of honey, annual (number unless otherwise noted)*, CANSIM (database)

[20] Ibid.

# Part 2
# Strategies to Ensure Pollinator Health

## PART 2 – STRATEGIES TO ENSURE POLLINATOR HEALTH

### A. Government Actions

#### 1. Disease Control and Surveillance

##### a. Import Restrictions

The health of bees in Canada has been a concern for the federal government since 1987, when restrictions on importations from the U.S. were imposed.

Dr. Primal Silva, Executive Director at the Animal Health Science Directorate of the CFIA, identified three main factors to justify the import restrictions: (1) the higher health status of Canadian honey bees; (2) resistance to chemicals used in disease treatments; and (3) better disease control measures in Canada.

In terms of the higher health status of Canadian bees, federal officials want to prevent the introduction into Canada of diseases such as the small hive beetle and the oxytetracycline-resistant American Foulbrood pathogen. Federal officials are also seeking to protect Canadian honey bees against Africanized genetics, which are an aggressive trait found in some American bees. The stings of these bees could be a threat to human health.

There is also a concern related to the development of resistance against efficient pesticides, such as Amitraz, which is considered to be one of the last lines of defence in the fight against the varroa mite.

Regarding disease control measures, animal owners, veterinarians, and laboratories are required to immediately report federally reportable diseases specified in the *Health of Animals Act* and *Reportable Diseases Regulations* to the CFIA and the provincial authorities. When the CFIA receives such a report, control or eradication measures can be implemented. Movement controls are also applied between provinces, unlike in the U.S. Canadian beekeepers also have the option to adopt the National Bee Farm-Level Biosecurity Standard. The objective of this biosecurity standard, which has been developed in partnership with the CFIA and the Canadian Honey Council (CHC), is to implement biosecurity practices for both small and large-scale operations. The implementation of such biosecurity practices should minimize the introduction and spread of diseases caused by pests.[21]

For countries other than the U.S., the CFIA imposes certification standards in order to certify the disease status of imported packaged bees.[22] This disease status is based on the history of bee health in the exporting country. Although the CFIA inspects imported packaged bees, the exporting country is also required to undertake bee inspection. Similarly, these certifications and visual inspections are also required for imports of individual honey bee queens. As noted by Dr. Silva, the CFIA authorizes the import of honey bee queens from the States of Hawaii and California in the U.S.

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21 Canadian Food Inspection Agency, *Honey Bee Producer Guide to the National Bee Farm-level Biosecurity Standard*.

22 A package of bees includes a queen accompanied by worker bees.

However, the Committee notes that these import restrictions of honey bee packages from the U.S. are not unanimously supported within the Canadian beekeeping industry. Although most provincial beekeepers' organizations defend the imposition of such import restrictions, the Manitoba Beekeepers' Association (MBA) along with beekeepers in Alberta and blueberry growers in the Maritimes, would like the federal government to remove import restrictions on package bees from the U.S. Indeed, the MBA argued that because of critical winter conditions, the production of a sufficient number of bees is not possible:

> In Canada, we simply do not have the climate to produce enough new bees early enough in the year. Replacement hives are needed in April to give them time to grow strong for our nectar flow. (Allan Campbell, President, Manitoba Beekeepers' Association, 11 February 2014).

The MBA also stated that geographical or physical barriers do not prevent the circulation of bees and therefore the spread of diseases. Thus, Canadian beekeepers are still vulnerable to diseases caused by the varroa mite or the small hive beetle. In addition, treatment-resistant American Foulbrood is now present in Canada.

In the Atlantic Provinces, blueberry growers need to have access to an increased number of honey bee hives when the crop is flowering to reach the full potential of blueberry production. This pollination demand cannot be met by the relatively small beekeeping industry in Atlantic Canada. Moreover, access to other species such as bumblebees or leafcutter bees is limited, either because they are not as effective as honey bees or because of cooler temperatures in Atlantic Canada during the time of year when blueberry crops are flowering.

The Committee acknowledges the importance of preserving human and animal health through import measures that could prevent the dissemination of diseases, pathogens, or undesirable genetic traits in the Canadian bee population. The Committee also notes that beekeepers need to be able to stock up on honey bees to compensate for their winter loss. This supply needs to be acquired from countries with a high status of honey bee health so that bee imports do not increase the risk of disseminating additional diseases or pathogens within Canadian bee colonies. Some witnesses, however, mentioned that countries like New Zealand were facing a limited supply of honey bees which restricts their ability to meet the Canadian demand.

Canada authorizes the importation of honey bee packages from countries such as Australia and New Zealand, and honey bee queens from Chile and the states of Hawaii and California. The U.S. authorizes the importation of package bees from Canada and New Zealand but has prohibited the importation of package bees from Australia. The prohibition of bee importation from Australia is due to concerns

related to the 2007 discovery, in Queensland, of exotic honey bee pathogens or parasites associated with exotic bee species, namely *Apis cerana*.[23]

The U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service has also conducted a Honey Bee Pests and Diseases Survey Project annually since 2009 with the aim of monitoring the absence of *Apis cerena*, slow paralysis virus, and the parasitic mite *Tropilaelaps* spp.[24] However, the USDA is aware of the limit of such a survey, and is now seeking to extend its scope by considering additional diseases or pathogens in order to develop a long-term overall baseline picture of bee colony health.

A similar survey is going to be carried out in Canada. Indeed, the federal government announced a four-year, nation-wide surveillance project to better record the nature, extent, and prevalence of diseases, pest organisms, and chemical residues in Canadian honey bee colonies. Moreover, provinces such as Manitoba and Alberta already undertake annual bee health surveillance projects. The Committee notes that these governmental actions illustrate the efforts to improve the health status of bee colonies given the importance of bees in agriculture and for human food consumption. Therefore,

**Recommendation 1**

**The committee recommends that:**

- **Health Canada and the Canadian Food Inspection Agency amend the *Honeybee Importation Prohibition Regulations, 2004* in order to allow the importation of bee packages from the United States while developing additional methods and tools to improve the inspection of imported honey bee packages.**

- **Agriculture and Agri-Food Canada implement the bee health surveillance project on a continuous basis rather than a four-year period in order to set, in the long term, an overall picture of the health of Canadian bee colonies and in order to take appropriate long term actions to maintain the health of Canadian bee colonies.**

### b. National Bee Farm-Level Biosecurity Standard

The Committee has been informed of the CFIA's implementation of the voluntary National Bee Farm-Level Biosecurity Standard. According to the CFIA, the objective of the biosecurity standard is to ensure that sanitary procedures and management practices adopted by beekeepers minimize the introduction of diseases or control the spread of certain diseases within the hives. The biosecurity standard also aims to harmonize, at the country-wide level, biosecurity practices for both small and large scale operations.

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23 The Animal and Plant Health Inspection Service (APHIS), *Federal Import Order-Prohibit Importation of Adult Honey Bees (Apis mellifera) from Australia*, 21 December 2010.

24 Animal and Plant Health Inspection Service, *National Honey Bee Pests and Diseases Survey-Questions and Answers*, United States Department of Agriculture.

The Committee heard about the importance of implementing this biosecurity standard. According to Medhat Nasr, President of CAPA, a national strategy for bee health in general is necessary. Mr. Scarlett also stressed the importance of adopting such a national biosecurity standard across the country, which explains why the biosecurity plan has been distributed to beekeepers in the various provinces. However, Mr. Scarlett highlighted the need to overcome some challenges in order to efficiently adopt the biosecurity standard:

> There's a whole myriad of problems we haven't addressed yet within the operational side of that biosecurity plan that need to be addressed. Part of that is money, part of it is federal-provincial relationships, and part of it is who is going to do it and how. (Rod Scarlett, Executive Director of the Canadian Honey Council, 5 December 2013)

The Committee notes that the CFIA has developed biosecurity plans and implementation guides for several types of production such as mink, goat, beef, and dairy. Biosecurity advisory and biosecurity technical advisory committees were also created with the collaboration of industry stakeholders. The purpose is to help coordinate the implementation and the management of biosecurity plans.

For the beekeeping industry, the Bee Biosecurity Advisory Committee (BeeBAC) has been formed, and a honey bee producer guide was developed to provide practical guidance to beekeepers on how a series of target outcomes could be achieved. However, as mentioned by Mr. Scarlett, challenges remain with respect to the management and the funding of the National Bee Farm-Level Biosecurity Standard.

Therefore,

**Recommendation 2**

**The Committee recommends that Agriculture and Agri-Food Canada, in conjunction with the provinces and territories, and in collaboration with industry stakeholders, accelerate the implementation of the National Bee Farm-Level Biosecurity Standard through adequate funding and management activities.**

## 2. Registration of Neonicotinoid Insecticides

### a. Length of the Registration Process of Pesticides

In their testimony, some witnesses criticized the long duration of conditional registrations of certain pesticides:

> These studies date back 10 years, and they're still on the market and are still being renewed on a conditional basis. We fail to understand how it is possible that companies can have pesticides licensed without providing all of the toxicity information that's required and then have them renewed, despite the fact that they have not provided those studies yet. (John Bennett, National Campaign Director, Sierra Club Canada, 1 April 2014)

Julie Gelfand, Commissioner of the Environment and Sustainable Development, confirmed that in an audit undertaken in 2008, there were nine pesticides conditionally registered for a duration of 10 to 20 years. According to the Commissioner, such a duration cannot be considered temporary.

Margherita Conti, Director General, Value Assessment and Re-Evaluation Management Directorate at the PMRA, stated that all registration decisions rely on rigorous scientific evaluation of health and environmental risks posed by a pesticide. According to Ms. Conti, granting conditional registration is part of a regular pesticide registration process, and is also used in such jurisdictions as the U.S. and Europe. These conditional registrations allow for the consideration of additional data to confirm certain conclusions during the risk assessment process.

Currently, conditional registrations exist for agricultural uses of three neonicotinoid active ingredients, namely clothianidin, imidacloprid, and thiamethoxam, which are present in 36 pesticide products. Studies provided to date have not indicated any unacceptable risk, but newer studies have been requested due to inconclusive results. The PMRA awaits data related to a hive study and a field residue study for each of these three active ingredients. Data submitted by manufacturers follow modern protocols and the new Pollinator Risk Assessment Framework.

Officials from the PMRA noted that some improvements have been made to reduce the duration of new conditional registrations over the past five years. These improvements can be explained by numerous factors such as a more robust screening framework, better guidance to manufacturers to help them provide complete data, and better data tracking with respect to ownership and submissions.

The Committee appreciates the efforts conducted by the PMRA to improve the quality of scientific data submitted during the pesticide registration process, and to reduce the duration of the process. Thus, the PMRA has reduced the period of time between the conditional registration and the full registration which is now between two to five years. However, the Committee notes that some witnesses questioned the duration of the conditional registration granted to the three neonicotinoid active ingredients. Out of the nine pesticides which have been conditionally registered for more than 10 years, only one pesticide was

granted full registration status in 2009. The Committee recognizes the importance of considering scientific progress in the assessment of pesticides, hence the need to apply new protocols for existing data requirements. Nevertheless, the Committee believes that it is important to create an adequate balance between scientific needs and stakeholders' needs in order to preserve bee health. In its 2014 report on Innovation in Agriculture, the Committee pinpointed the importance that Health Canada reduces the current number of conditional registrations of pest control products.

In light of additional information provided by the witnesses,

**Recommendation 3**

**The Committee recommends that the Pest Management Regulatory Agency accelerate its conditional registration process in order to reduce the current number of conditional registrations granted to neonicotinoid active ingredients.**

In the view of the Committee, the role of the Commissioner of the Environment and Sustainable Development (CESD) in improving the pesticide registration process, in particular the conditional registration process, is paramount. The 2008 audit report was undertaken with the aim of determining whether the PMRA was making satisfactory progress with regard to the evaluation and re-evaluation of its policies and procedures, and was meeting its targets for re-evaluating older pesticides. This report was a follow-up to an audit from 2003. The CESD has not conducted any more recent audits to verify whether the PMRA has implemented its 2008 recommendations.

Therefore,

**Recommendation 4**

**The Committee recommends that the Commissioner of the Environment and Sustainable Development conduct a follow-up audit to verify whether the Pest Management Regulatory Agency has implemented the recommendations described in its 2008 audit report.**

As indicated by some witnesses, the PMRA re-evaluates chemical products on a regular basis. The Re-evaluation Program focuses on reviewing pesticide active ingredients and their associated uses by considering updated data and information to determine whether the continued registration of the active ingredients is acceptable. The process of re-evaluation in Canada can be relatively long compared to countries like the U.S. In its 2008 report, the CESD indicated that the re-evaluation of old pesticides was a fairly long process, as new data had to be analysed. That process takes two years in the U.S. but four years in Canada. The Committee sought to understand the reasons justifying this difference between

Canada and the U.S. but has yet to obtain a response. However, some witnesses pinpointed the need to accelerate access to new products for hive treatment:

> Also with regard to the PMRA, we need to expedite the registration process once a new product for hive treatment becomes available so the producers can access it in a timely manner. (Kevin Nixon, Alberta Delegate to Canadian Honey Council, Alberta Beekeepers Commission, 11 February 2014)

The Committee also heard that, although the miticide Apivar was already registered in France, it took six years for the PMRA to approve the miticide.

Witnesses also justified the need to accelerate access to new chemicals by highlighting the fact that out of the three chemical products available to fight against the *Varroa destructor*, the mite has developed a resistance to two of these chemicals. The third chemical, Apivar, could be ineffective in the near future. There is a need to have new products, already available in foreign jurisdictions, approved in Canada to better control the varroa mite.

Therefore,

**Recommendation 5**

**The Committee recommends that the Pest Management Regulatory Agency take the necessary actions to accelerate its pesticide registration process, especially in relation to new products intended to control mites and diseases affecting honey bees. Any changes in the registration process should also take into consideration the safety of humans, plants, and the environment.**

### b. Re-Evaluation of Neonicotinoid Pesticides

Under Section 16 of the *Pest Control Products Act*, the PMRA is undertaking a re-evaluation of neonicotinoid pesticides in cooperation with the U.S. EPA and the California Department of Pesticide Regulation. This re-evaluation was initiated following bee mortality reports in Ontario, Quebec, and Manitoba. Indeed, evidence suggested a possible link between neonicotinoid-treated seeds of corn and soy, and bee mortality in these regions through exposure to contaminated dust generated during the planting of treated seeds. The re-evaluation targets all agricultural uses of neonicotinoid insecticides including soil and foliar applications, seed treatments, greenhouse, and tree injection uses. The main objectives are to assess acute as well as sub-lethal exposures of bees and pollinators at the hive level while looking at whether or not the neonicotinoid insecticides have value in preventing pests from damaging crops.

Officials from EFSA indicated to the Committee that this type of re-evaluation was also conducted in the EU. Under Article 21 (2) of Regulation (EC) No 1107/2009, and in light of new scientific information on the sub-lethal effects of neonics on bees, the European Commission mandated EFSA to assess this new scientific information and to review the risk assessment of neonics on bees. Further to this assessment, EFSA identified, for certain crops, high acute risks to bees due to the application of protection products containing the three active ingredients clothianidin, thiamethoxam, or imidacloprid. In particular, EFSA identified high acute risks for bees from exposure to dust but also from consumption of residues in contaminated pollen and nectar, and from exposure via guttation fluid[25]. Several crops including corn were identified. EFSA also concluded that unacceptable risks due to chronic effects on colony survival and development could not be excluded for several crops. However, EFSA recognized the presence of data gaps in information that was assessed.

Following the conclusions of EFSA, the European Commission decided to prohibit several uses of the three active ingredients. Thus, under Regulation (EU) No. 485/2013, the use of the three neonicotinoid active ingredients for seed treatment, soil application, and foliar treatment on bee-attractive plants and cereals is restricted; the remaining authorized uses are available only to professionals. Exceptions to this Regulation apply only to the treatment of bee-attractive crops in greenhouses and in open-air fields only after flowering.[26] The new regulation has been effective since 1 December 2013 for a two-year period.

Officials from EFSA stressed that in order to better assess sub-lethal and chronic effects, EFSA is working on developing new study protocols. These protocols will factor in sub-lethal and chronic effects based on field data while also considering other pollinators such as bumblebees and solitary bees.

Following the adoption of the moratorium in the EU, some witnesses indicated that they would like the imposition of such a moratorium in Canada:

> It is our understanding that PMRA has the capacity to suspend immediately the use of pesticides when the strength of research supports such a decision. We believe that the balance of scientific evidence of the effect on pollinators and our ecosystem is compelling enough to warrant such action. (Dan Davidson, President, *Ontario Beekeepers Association,* 25 February 2014)

However, a number of witnesses cautioned that a moratorium could cause farmers to return to older, foliar-applied pesticides that are worse for the environment. According to Dr. Paul Hoekstra, Regulatory and Science Stewardship Manager from Syngenta Canada, these seed treatments use a smaller amount of active ingredient compared to other pesticides, and are less likely to affect non-target organisms since they are applied directly to the seed.

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25 Guttation is the exudation of drops of transport tissues on the tips or edges of leaves of some vascular plants.

26 European Commission, *Bees & Pesticides: Commission goes ahead with plan to better protect bees*, 30 May 2013 (date of modification).

Other witnesses also warned that an outright ban on the pesticides would have a detrimental impact on farmers' crop yields. For example, the flea beetle could cause losses of about $300 million to canola farmers in the absence of pesticides. Mr. Seppey cited a report from the Conference Board of Canada, which found that losses in revenue for the Ontario corn and soy industries would be an estimated $630 million annually.[27]

In the Committee's view, any decision regarding the use of neonicotinoid active ingredients should be based upon **scientific results**. Jurisdictions like Canada, the U.S., and the EU have decided to re-evaluate the impact of neonics on bees in light of new scientific information or data corroborating a possible link between neonicotinoid insecticides and bee mortality. Further to its reassessment, the EU imposed a two year moratorium on some uses of the neonicotinoid insecticides. Ms. Chauzat further explained that:

> This moratorium was imposed only a few months ago, and we certainly need to keep in mind that bee health also depends on the climate. The moratorium has still not been in place for a full year, and bee mortality is generally observed during two important periods of the year—at the end of winter and during the summer. So to answer your question on what the moratorium's impact has been, it is difficult to say for Europe as a whole, since there is no program in place to collect information on this issue in a standardized manner across Europe. (Marie-Pierre Chauzat, Deputy Head, European Reference Laboratory for Honey Bee Health of the World Organization for Animal Health, 30 October 2014)

Prior to the EU moratorium, some countries, such as Italy and France, imposed a similar moratorium for a relatively lengthy period of time. Italian authorities observed a decrease in mortality related to the dust released during the seedling phase. In France whereby the use of the active ingredient imidacloprid was prohibited, no difference in bee colony mortality was observed.

The Committee notes that, in addition to the re-evaluation of neonicotinoid pesticides, the PMRA has taken protective measures for corn and soybean production to limit bee exposure to dust during seed planting season. The measures include the use of safer, dust-reducing seed flow lubricants, the adherence to safer seed planting practices, and the labelling, with enhanced warnings, of new pesticides and seed packages.

The PMRA is also considering a new study protocol, namely the new Pollinator Risk Assessment Framework, which was developed in conjunction with the U.S. EPA and the California Department of Pesticide Regulation. This framework enables the PMRA's re-evaluation of neonicotinoid insecticides to consider such criteria as acute and chronic effects affecting hives. The EU is also looking at including chronic effects in its study protocols. New scientific evidence could entail a review of the EU regulation with respect to a moratorium of certain agricultural uses of neonicotinoid insecticides.

[27] Conference Board of Canada (2014).

Knowing that bee mortality can vary according to such factors as the type of soil, weather conditions, regions, or type of crop, the Committee thinks that it is too early to decide whether or not the various agricultural uses of neonicotinoid active ingredients should be prohibited. However,

**Recommendation 6**

**The Committee recommends that:**

- **The Pest Management Regulatory Agency keep monitoring pollinator mortality during the spring of 2015 to assess whether the protective measures adopted for the 2014 planting season were efficient.**

- **The Pest Management Regulatory Agency conclude, without delay, its re-evaluation of neonicotinoid insecticides based on evidence and sound scientific principles with an objective of protecting the health of bees.**

## B. Private-Public Partnership

Agricultural stakeholders are highly involved in actions to preserve bee health. These actions are undertaken through collaboration, better communication, research projects, knowledge transfer, and better management practices. These actions are sometimes undertaken in consultation with the federal government and the provinces.

### 1. Coexistence Between Stakeholders

Witnesses indicated that coexistence between growers and beekeepers is paramount. Among other activities, this relationship results from networking. In 2012, at the request of the Ontario Beekeepers' Association, the CHC formed the Bee Incident Committee, which made several recommendations to the PMRA, CropLife Canada, growers, and beekeepers. These recommendations were related to pesticides, management practices, incident reporting, and investigations. According to the CHC, the PMRA adopted almost all the recommendations for the 2013 planting season.

In March 2014, Agriculture and Agri-Food Canada (AAFC) organized the Bee Health Forum, which gathered representatives from the beekeeping industry, growers, processors, equipment manufacturers, seed companies, and officials from the provincial and federal governments. The participants agreed on several actions:

> At the latest meeting, held on Friday, October 3 [2014], the bee health forum participants agreed on and launched a coordinated industry-government national action plan with the following themes to address the diversity of bee health issues: bee care and nutrition, for example, pests and pathogens, pesticides in-hive and outside of the hive environment and surroundings and agricultural needs. The group committed to work on a number of projects, including a national controlled pollinator strategy, a national bee health monitoring strategy, an action plan for control of pesticide exposure inside and outside beehives affecting bees, pest predictor tools to better inform growers of the need for seed treatment based on pest pressures, improved best management practices for agricultural producers across Canada, including beekeepers, development of a bee health research strategy, as well as the creation of a communication strategy for the forum. Reducing the risk posed by agricultural pesticide use while addressing agricultural needs for crop protection is also one of the bee health forum pillars. (Frédéric Seppey, Chief Agriculture Negotiator and Director General, Trade Agreements and Negotiations Directorate, Market and Industry Services Branch, Agriculture and Agri-Food Canada, 9 October 2014)

In addition to these actions, the participants have committed to share information and disseminate key messages to accelerate better understanding by all stakeholders of the issues and solutions being developed.

According to several witnesses, communication strengthens the relationship between beekeepers and growers as it enables the adoption of practical measures by growers or beekeepers to mitigate bee exposure to pesticides. For instance, witnesses noted that when informed about the location of bee hives, growers can communicate with beekeepers about insecticide applications and the type of insecticide being used. Beekeepers can then decide whether additional measures are

**Photo 3: A commercial honey bee apiary situated adjacent to a canola field**
Photo Credit: Agriculture and Agri-Food Canada

required such as covering or temporarily moving hives. Growers can also apply the pesticides early in the morning or late in the evening, knowing that honey bees forage during warmer parts of the day. Growers could also factor in wind speeds and directions when applying pesticides.

In order to better support communication between beekeepers and growers, tools such as DriftWatch are offered to enable the mapping of cultivated fields and apiaries using global positioning system (GPS) coordinates. The province of Saskatchewan is undertaking a pilot project using this tool.

The Committee also learned that Monsanto organized a honey bee health summit at the company's Chesterfield research centre in Missouri. U.S. representatives from the beekeeping industry, academia, the agricultural sector, and the government sector attended the three-day summit. Participants agreed to develop focused areas for research as well as setting up collaborations for future work on improving honey bee health.

### 2. Research Activities

Agricultural stakeholders, including seed companies and equipment manufacturers, are involved in research activities aiming to enhance bee health. Monsanto is working on developing biological treatment against the parasitic varroa mite. According to the company, BioDirect, based on RNA (ribonucleic acid) interference,[28] is in discovery phase, and has shown promising results. The company is also funding, through its Project Apis Mellifera, research studies, equipment for bee laboratories at universities, as well as scholarships to young bee scientists to encourage their pursuit of science-based solutions to honey bee challenges. Bayer Crop Science has invested more than $13 million in research activities, infrastructure, and personnel through its Bee Care Program. Bayer Crop Science is also involved in the pilot project to develop DriftWatch in the province of Saskatchewan.

The Association of Equipment Manufacturers (AEM) indicated that manufacturers have started the design and development of new planters which meet the new ISO Standard aiming to minimize the effects of seed coating when mixed in the exhaust fan airflow. The AEM is also a member of the Corn Dust Research Consortium coordinated by Pollinator Partnership, a non-profit organization. The Consortium is a multi-stakeholder initiative whose funds are invested in mitigating honey bee exposure to dust emitted during the planting of treated corn seeds.

Governments are also collaborating with agricultural stakeholders. Indeed, beekeepers, seed companies, and the government of Alberta are investing in bee research, in particular bee health, bee habitat, colony pollination efficiency, and the effect of beehive moving on canola pollination. In Saskatchewan, $1.1 million over three years was committed to bee research by Saskatchewan's Agricultural Development Fund. Research projects focus on honey bee breeding, honey bee disease management, leaf-cutting bee disease management, and the specification and cataloguing of wild populations in orchards.

AAFC is evaluating alternative chemical treatments to fight against the *Varroa destructor,* and is developing techniques to detect residue of the chemical used to treat *Nosema ceranae*. AAFC is

[28] RNA interference is a natural process that regulates gene expression.

surveying agricultural and apicultural pesticide residues in hives in Alberta. In addition, the department, in collaboration with stakeholders from the beekeeping industry, funded several research projects, between 2009 and 2014, aiming to improve bee health and queen breeding:

> These projects include mite, virus and fungus treatments in Saskatchewan, Manitoba, Ontario, Quebec and Nova Scotia; breeding hardier queens in British Columbia, Saskatchewan, Ontario and Quebec; documenting in-hive pesticide residues in Nova Scotia; performing pollination studies in New Brunswick and Quebec; reducing neonicotinoid dusting during corn seeding in Ontario; developing best management practices for beekeepers in Ontario; and improving bee nutrition in Quebec and Nova Scotia. The funding provided for these projects amounts to almost $6 million plus an additional $600,000 for four other projects on native bee pollinators in Saskatchewan and New Brunswick. (Dr. Stephen Pernal, Research Scientist (Apiculture), 12 December 2013)

The Committee notes that several projects are ongoing in order to find innovative solutions to preserve bee health. However, some witnesses indicated the importance of allocating long-term funding to research projects to study bees' chronic exposure to pesticides and the impact of chronic exposure on queen bees' fertility. Research projects should also be undertaken to increase queen life expectancy. Research activities are also important to understand pollinators' complex diseases and how this can affect the health of commercially managed bees, to find alternative solutions that could be adopted by beekeepers in their integrated pest management programs, and to study and understand the impact of synergies between various stressors affecting bee health. Research activities should also address floral diversity and the effects on bee nutrition. Some witnesses also questioned the fact that key agricultural crops are heavily reliant on honey bee pollination. They stressed the importance of considering wild bees to support agricultural production.

**Photo 4: Visit to the Bee Resarch Laboratory of the Agricultural Research Service of the USDA**

Witnesses highlighted the importance of funding independent research projects such as the ones undertaken by the Canadian Pollination Initiative. In addition, AAFC carries out bee research projects at the Beaverlodge Research Farm in Alberta; these projects are mainly related to the detection of diseases, the control of parasites, the improvement of bee nutrition, and queen breeding.

However, the bee research capacity of the Beaverlodge Research Farm is rather limited compared to other jurisdictions like the U.S. Indeed,

during its fact-finding mission to Washington, D.C., the Committee learned that the Agricultural Research Service of the USDA grants more than $10 million, annually, to the Bee Research Laboratory. The mission of the Laboratory is to conduct research on the biology and control of honey bee parasites, diseases, and pests to ensure adequate supply of bees for pollination and honey production. This federal funding enables several scientists to work on long-term research projects aiming to preserve bee health, and to collaborate with Canadian scientists from the Beaverlodge Research Farm.

The Committee understands that private research is important as it enables organizations to improve their productivity and profitability. However, as highlighted by some witnesses, private-sector funding actually presents certain challenges as it focuses mainly on production or activities which offer a return on investment.[29] In contrast, as noted by the Committee in its report on Innovation in Agriculture, the advantage of public-sector funding, in the long term, is that it targets areas in which the economic benefits are unclear. The knowledge acquired from basic research may be the foundation for future solutions and discoveries.

Therefore,

**Recommendation 7**

**The Committee recommends that Agriculture and Agri-Food Canada, Health Canada, and the Department of Finance Canada through the Bee Health Forum, and in collaboration with the provinces and territories, increase the amount and the duration of research funding in order to undertake long-term research projects which contribute to the preservation of pollinator health.**

### 3. Knowledge Transfer, Education, and Management Practices

In addition to undertaking research activities, witnesses highlighted the importance of knowledge transfer activities to beekeepers and growers through training and extension activities. These activities enable them to improve their agricultural practices. Mr. Scarlett told the Committee about the pest management booklet for beekeepers' use that the CHC produced and distributed across Canada. The committee also heard that the AEM has been working with the OMAFRA in order to develop a bulletin for growers regarding planting practices. In Manitoba, the provincial government has emphasized education and the adoption of best management practices to improve bee biosecurity:

[29] Peter Kevan stated that "[w]hen it comes to the private sector, the beekeepers themselves have few resources, and I'm sure you'll hear about that in the future. The growers themselves have few resources. The agrichemical industry has large resources, but they have corporate agendas and policies that have not lent themselves well to the support of the Canadian Pollination Initiative." (Peter Kevan, PhD, FRSC, Professor Emeritus, School of Environmental Sciences, University of Guelph, 28 January 2014)

> We promote workshops and training sessions on bee biosecurity and incentive programs to adopt some best practices by incorporating items into their operation that will assist with their biosecurity. (Rhéal Lafrenière, Provincial Apiarist, Government of Manitoba, 23 September 2014)

In New Brunswick, the focus has also been put on educational activities:

> We also financially provide assistance to our beekeeper association to help with their educational activities because education is so important. We provide funding for new entrants through a mentoring program so they can learn how to properly manage beehives. (Kevin McCully, Director, Sector Specialist Services, Agriculture, Aquaculture and Fisheries, Government of New Brunswick, 7 October 2014)

In Ontario, Quebec, and Saskatchewan, beekeepers benefit from the expertise of extension teams. These teams have been valuable in conducting research projects and disseminating science to the field.

According to some witnesses, these educational and extension activities are important to the adoption of good agricultural practices that reduce the use of chemical products either in the beehives or in the field. Indeed, Mr. van Westendorp stated that beekeepers have taken courses with the desire to lower the usage of chemicals and drugs in the beehives. He recognized that reducing the use of chemical products needs to be compensated by a close monitoring of diseases with the collaboration of inspectors. This idea was also highlighted by Mr. Nasr, who declared that such inspections are a proactive measure to preserve bee health.

Given the importance of undertaking inspection programs to maintain bee health, some witnesses regretted the cut of such inspection services in some provinces:

> The extension branch of the Manitoba government, for example, has removed the inspection staff that used to go out and provide advice and sampling for beekeepers (Rob Currie, PhD, Professor and Head, Department of Entomology, University of Manitoba)

Beekeepers are also adopting such practices as colony splitting to increase the number of bees in spring.

> Good practice of beekeeping recommends merging the colony before winter to make it very big to increase its chance to overwinter in good condition. The colony would be split the following spring to recover the number. (Marie-Pierre Chauzat, Deputy Head, European Reference Laboratory for Honey Bee Health of the World Organization for Animal Health, 30 October 2014)

With regards to growers, many witnesses also supported the adoption of best management practices in order to preserve bee health. That is the reason why the PMRA, for the 2014 planting season, implemented additional protective measures requiring the use of safer dust-reducing seed flow lubricants, the adherence to safer seed planting practices, the adoption of new pesticide and seed package labels with enhanced warnings, and the update of value information to support the continued need for neonicotinoid treatment.

**Photo 5: Visit to Cedar Lodge Farms, Morrisburg, Ontario**

Some industry stakeholders have supported the implementation of such measures:

> The steps that we identified and on which we are focused are as follows: promotion of best management practices for planting treated seed; identifying on seed labels when corn and soybean seed has been treated with neonicotinoids; introduction of improved technology that will reduce the dust generated during the planting operation in the springtime, involving life-cycle stewardship of the handling, collection and safe disposal of empty seed bags — our seeds are often sold in seed bags — and giving farmers choice from a range of product options including seed that is not treated with a seed treatment. (Peter Entz, President, Canadian Seed Trade Association, 6 March 2014)

Community-developed and farmer-delivered programs, such as Alternative Land Use Services (ALUS), enable the reconstruction of natural areas such as wetlands, grassland, riparian areas, and trees. The ALUS voluntary program ensures conservation habitat and biodiversity which is beneficial to vertebrates and invertebrates including pollinators.

Witnesses also identified a need to improve floral diversity, especially when monoculture farming is prevalent. Hedgerows or cover crops of pollinator-friendly plants can be planted on farms. Similarly, roadway shoulders, abandoned farmland, and utility corridors can be planted with bee-friendly plants. In the case of hedgerows or cover crops, timing and plant selection can be a challenge. As explained by Victoria Wojcik, Research Director from the Pollinator Partnership, in order to avoid competition between the two crops for the services of pollinators, farmers would need to choose plants that do not bloom at the same time as the crop which is to be pollinated. However, for crops that are particularly attractive to bees, such as almonds, competition may be less of a problem.

Industry stakeholders are also promoting integrated pest management (IPM) practices to reduce the prophylactic use of pesticides; seed treatment should therefore be used only when required. The Food and Agriculture Organization of the United Nations defines IPM as follows:

> Integrated Pest Management (IPM) means the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment. IPM emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms.[30]

Nevertheless, it can also be challenging for farmers to determine whether or not they have a pest problem requiring the use of treated seeds. Mr. Kirby from the PMRA explained that the pests are often in the soil, making it difficult to determine if a pest problem is present. However, Mr. Kirby noted that the Government of Ontario and the Bee Health Forum both have projects in place with the aim of developing tools in order to identify pest problems. The Committee thinks that such tools, if adequately transferred into the field, could facilitate the adoption of better IPM practices.

The adoption of IPM practices could also be fostered through the supply of untreated seeds. Although seed companies told the Committee that they offer untreated seeds and that the supply is higher than the demand, the Committee heard that some growers have difficulties accessing untreated seeds either because of the lack of availability or because of higher costs compared to neonicotinoid treated seeds. The access of growers to untreated seeds will give growers the option to use these seeds when their field or plants are not threatened by pests. Moreover, access to untreated seeds could reduce the

[30] Food and Agriculture Organization of the United Nations, AGP – Integrated Pest Management.

development of resistance to the pesticides. The Committee thinks that the Bee Health Forum would be the appropriate platform to ensure that communication between growers and seed companies is established in order for these companies to supply untreated seeds in a timely manner and at the right price.

Based on the received testimony, the Committee understands that industry stakeholders and the various levels of government are aware of the importance of bees for the environment in general and agricultural production in particular. There should be a tight collaboration between the various stakeholders to find solutions to preserve bee health. The Committee also notes that additional actions are needed to better take into consideration hobbyist beekeepers who represent a significant proportion of Canadian beekeepers, and whose hive management can also affect bee health:

> [M]any in the commercial beekeeping industry have genuine concern that the growing population of hobbyists will parallel the increase of uneducated and unethical hive management, therefore causing a spread of honey bee pathogens and pests from hobbyist colonies to commercial outfits. The dichotomy of interest between industry and hobbyist participants has sterilized communication to the detriment of the entire industry. (Eliese Watson, Founder, Apiaries and Bees for Communities, 4 March 2014)

Therefore,

**Recommendation 8**

**The Committee recommends that Agriculture and Agri-Food Canada, through the Bee Health Forum, and in collaboration with the provinces and territories, adopt initiatives aiming to improve management practices of hobbyist beekeepers and growers while minimizing the use of chemical products and ensuring the availability of untreated seeds.**

The Committee also understands the importance of floral diversity in bee nutrition. Indeed, planting bee-attractive plants could increase bee access to a nutritional diet. In other jurisdictions like the U.S., the importance of floral diversity is also recognized. During its fact-finding mission to Washington, D.C., the Committee learned that a 2014 Presidential Memorandum that creates a federal strategy to promote the health of honey bees and other pollinators, includes federal actions to increase and improve pollinator habitat. In the Committee's view, improving biodiversity is important to ensure pollinators' access to a healthy diet.

**Photo 6: Meeting with the officials from the U.S. Environmental Protection Agency**

Therefore,

**Recommendation 9**

**The Committee recommends that Agriculture and Agri-Food Canada, through the Bee Health Forum, and in collaboration with the provinces and territories, adopt initiatives to improve pollinator habitat such as the planting of selected wild flowering plants on median strips and highway shoulders, and on marginal land around all developments including airports and shopping centres.**

## CONCLUSION

In undertaking this study, the Standing Senate Committee on Agriculture and Forestry hoped to better understand the current state of bees and other pollinators in Canada, as well as the factors that influence their health. Such a study is also important to identify strategies for Canadian governments and industry stakeholders to improve bee health.

Pollinators, particularly honey bees, play a key role in the environment, food and seed production, and honey production in Canada. In addition to the neonicotinoid pesticides that have received much public attention, witnesses identified a number of other stressors that interact and combine to impact pollinator health: weather and climate change; the transportation of bees; diseases and pathogens; disease treatments; and a lack of floral diversity.

Given the importance of pollinators and the multiple stressors affecting the well-being of bees, witnesses suggested a number of strategies to improve bee health. Witnesses highlighted a need for better collaboration between stakeholders. They also identified a need to increase the amount and duration of research funding to improve knowledge about pollinators. Where knowledge does exist, witnesses explained that there is a need to share it with beekeepers and incorporate it into management practices.

The Government of Canada has already introduced a number of measures in response to these stakeholder concerns. For example, Agriculture and Agri-Food Canada has created the Bee Health Forum, the Canadian Food Inspection Agency has partnered with the Canadian Honey Council to implement the National Bee Farm-Level Biosecurity Standard, and Health Canada's Pest Management Regulatory Agency is re-evaluating three neonicotinoid pesticides.

To support these ongoing efforts, the Committee has made a series of recommendations to the Government of Canada, including Agriculture and Agri-Food Canada and Health Canada. The Committee hopes that these recommendations will be seen as an opportunity to be acted upon to ensure bee health, whose role in pollination is of paramount importance to the production of food and seed, and to enhance ongoing bee health initiatives.

## APPENDIX A: WITNESSES

| ORGANIZATION | NAME, TITLE | DATE OF APPEARANCE |
|---|---|---|
| Acadia University | Dr. Dave Shutler, Professor, Department of Biology | April 3, 2014 |
| Agriculture and Agri-Food Canada | Dr. Stephen F. Pernal, Ph.D., Research Scientist (Apiculture)<br>Frédéric Seppey, Chief Agriculture Negotiator and Director General, Trade Agreements and Negotiations Directorate, Market and Industry Services Branch | December 12, 2013<br>October 9, 2014 |
| Alberta Beekeepers Commission | Kevin Nixon, Alberta Delegate to Canadian Honey Council | February 11, 2014 |
| Almond Board of California | Gabriele Ludwig, Associate Director, Environmental Affairs | September 30, 2014 |
| American Beekeeping Federation | Tim Tucker, President | October 2, 2014 |
| Apiaries and Bees for Communities | Eliese Watson, Founder | March 4, 2013 |
| As an Individual | Colin B. Henderson<br>Jerry J. Bromenshenk<br>Michael Lynch-Staunton | October 21, 2014<br>October 21, 2014<br>May 1, 2014 |
| Ash Apiaries | Brent Ash, Owner/Operator | April 3, 2014 |
| Association of Equipment Manufacturers | T. Howard Mains, Canadian Public Policy Advisor | March 6, 2014 |
| Australian Pesticides and Veterinary Medicines Authority | Kareena Arthy, Chief Executive Officer | May 6, 2014 |
| Australian Pesticides and Veterinary Medicines Authority | Dr. Les Davies, Chief Regulatory Scientist, Pesticides | May 6, 2014 |
| Bayer CropScience | Paul Thiel, Vice-President, Innovation and Public Affairs | March 6, 2014 |
| BC Bee Breeders Association | Barry Denluck, President | February 4, 2014 |
| Beef Farmers of Ontario | Arden Schneckenburger, Director | January 30, 2014 |
| Beeologics/Monsanto | Gerald (Jerry) Hayes, Commercial Lead | May 1, 2014 |

| ORGANIZATION | NAME, TITLE | DATE OF APPEARANCE |
|---|---|---|
| Canadian Association of Professional Apiculturists | Medhat Nasr, PhD, President | February 4, 2014 |
| Canadian Canola Growers Association | Todd Hames, President | February 13, 2014 |
| Canadian Federation of Agriculture | Mark Wales, Member of Board of Directors | February 13, 2014 |
| Canadian Food Inspection Agency | Dr. Ian D. Alexander, DVM, Executive Director/Chief Veterinary Officer for Canada<br>Dr. Primal Silva, Executive Director, Animal Health Science Directorate<br>Dr. Ian Alexander, Executive Director, Animal Health Science Directorate | December 12, 2013<br><br><br>October 9, 2014 |
| Canadian Honey Council | Rod Scarlett, Executive Director | December 5, 2013 |
| Canadian Horticultural Council | Anne Fowlie, Executive Vice-President | March 25, 2014 |
| Canadian Ornemental Horticulture Alliance | Michel-Antoine Renaud, Managing Director | March 25, 2014 |
| Canadian Seed Trade Association | Stephen Denys, Past President<br>Peter Entz, President | March 6, 2014<br>March 6, 2014 |
| Canola Council of Canada | Curtis Rempel, Vice-President of Crop Production and Innovation | February 13, 2014 |
| COLOSS (Prevention of honey bee COlony LOSSes) | Geoffrey Williams, Secretary | September 18,2014 |
| CropLife Canada | Dr. Maria Trainer, Director of Regulatory Affairs | March 6,2014 |
| Dalhousie University | Chris Cutler, PhD, Associate Professor, Department of Environmental Sciences<br>Dr. Derek Lynch, Associate Professor and Canada Research Chair in Organic Agriculture | January 28,2014<br>March 25, 2014 |
| European Food Safety Authority | Agnes Rortais, Scientific Officer<br>José V. Tarazona, Head of the Pesticides Unit | April 10, 2014 |
| Fédération des apiculteurs du Québec | Jean-Pierre Chapleau, Beekeeper, Co-Director of the Health Folder Bees/Pesticides | February 25, 2014 |

| ORGANIZATION | NAME, TITLE | DATE OF APPEARANCE |
|---|---|---|
| Fédération des producteurs de cultures commerciales du Québec | William Van Tassel, First Vice-President<br>Salah Zoghlami, Agronomic Advisor | January 30, 2014 |
| Flowers Canada Growers | Cary Gates, Pest Management Director | March 25, 2014 |
| Government of Alberta | Shelley Hoover, Apiculture Research Scientist, Agriculture and Rural Development | May 6, 2014 |
| Government of British Columbia | Paul van Westendorp, Provincial Apiary Specialist | September 23,2014 |
| Government of Manitoba | Rhéal Lafrenière, Provincial Apiarist | September 23,2014 |
| Government of New Brunswick | Kevin McCully, Director, Sector Specialist Services, Agriculture, Aquaculture and Fisheries | October 7, 2014 |
| Government of Newfoundland and Labrador | Keith Deering, Assistant Deputy Minister of Agrifoods Development<br>Dave Jennings, Director, Product and Market Development | October 7, 2014 |
| Government of Nova Scotia | Jason Sproule, Bee Health and Miner Use Pesticide Coordinator<br>Karen Wong-Petrie, Acting Manager, Animal Crop Services | October 7, 2014 |
| Government of Saskatchewan | Janice Tranberg, Assistant Deputy Minister | September 23,2014 |
| Grain Farmers of Ontario | John Cowan, Vice President, Strategic Development | January 30,2014 |
| Grain Growers of Canada | D'Arcy Hilgartner, Director | February 13, 2014 |
| Health Canada | Scott Kirby, Director, Product Assessment, Pest Management Regulatory Agency<br>Lars Juergensen, Head, Policy and Strategic Advice, Pest Management Regulatory Agency<br>Margherita Conti, Director General, Value Assessment and Re-evaluation Management Directorate, Pest Management Regulatory Agency<br>Scott Kirby, Director, Environmental Assessment Directorate, Pest Management Regulatory Agency | December 12, 2013<br>October 9,2014 |
| Honeyview Farm | Peter Awram, Owner/Operator | April 3, 2014 |

| ORGANIZATION | NAME, TITLE | DATE OF APPEARANCE |
|---|---|---|
| Hytech Production Ltd | Scott Horner, General Manager | March 27, 2014 |
| Manitoba Beekeepers Association | Allan Campbell, President | February 11, 2014 |
| Manitoba Corn Growers Association | Myron Krahn, President<br>Dennis Thiessen, Farmer/Director | January 30, 2014 |
| Monsanto Canada | Brian K. Treacy, Vice-President, Regulatory Affairs | March 27, 2014 |
| National Farmers Union | Coral Sproule, 2nd Vice President | May 1, 2014 |
| New Brunswick Beekeepers Association | Paul Vautour, Maritime Delegate to Canadian Honey Council | February 27, 2014 |
| Nova Scotia Beekeepers Association | Paul Kittilsen, Member | February 27, 2014 |
| Office of the Auditor General of Canada | Julie Gelfand, Commissioner of the Environment and Sustainable Development<br>Andrew Ferguson, Principal | September 16, 2014 |
| Ontario Beekeepers Association | Dan Davidson, President | February 25, 2014 |
| Oxford Frozen Foods Limited | David Hoffman, Co-Chief Executive Officer<br>John Hamilton, Manager of Bee Operations | January 28, 2014 |
| Paradis Honey Ltd | Michael Paradis, President, Owner/Operator | February 27, 2014 |
| Pioneer Hi-Bred | Dave Harwood, Technical Services Manager Coordinator | March 27, 2014 |
| Pollination Canada | Kimberley Fellows, Pollination Outreach Coordinator | April 1, 2014 |
| Pollinator Partnership | Victoria Wojcik, Research Director | September 30, 2014 |
| Royal Saskatchewan Museum | Cory S. Sheffield, PhD, Research Scientist - Curator of Invertebrate Zoology | January 28, 2014 |
| Saskatchewan Beekeepers Association | Jake Berg, President | February 11, 2014 |
| Sierra Club Canada | John Bennett, National Campaign Director | April 1, 2014 |
| Syngenta Canada | Paul Hoekstra, PhD., Regulatory and Science Stewardship Manager | March 27, 2014 |

| ORGANIZATION | NAME, TITLE | DATE OF APPEARANCE |
|---|---|---|
| Toronto Beekeepers Co-operative | Gillian Leitch, Location Committee Member | March 4, 2014 |
| University of Guelph | Peter Kevan, PhD, FRSC, University Professor Emeritus, School of Environmental Sciences<br>Ernesto Guzman, PhD, Professor and Head of the Honey Bee Research Centre | January 28, 2014<br>February 4, 2014 |
| University of Manitoba | Rob Currie, PhD, Professor and Head, Department of Entomology | February 4, 2014 |
| University of Maryland | Dennis vanEngelsdorp, Assistant Professor of Entomology | May 8, 2014 |
| University of Montreal | Dr. Pascal Dubreuil, Assistant Dean, Clinical and Professional Affairs | February 4, 2014 |
| Urban Bee Supplies and Education | Lindsay Dault, Owner/Operator | March 4, 2014 |
| Wilderness Committee | Gwen Barlee, Policy Director | April 1, 2014 |
| World Organization for Animal Health | Marie-Pierre Chauzat, Deputy Head, European Reference Laboratory for Honeybee Health | October 30, 2014 |

## APPENDIX B: FACT-FINDING MISSION

## WASHINGTON, D.C. - JANUARY 25-28, 2015

| ORGANIZATION | NAME, TITLE |
|---|---|
| American Farm Bureau | Paul Schlegel, Director, Energy and Environment Team |
| Crop Life | Kellie Bray, Senior Director, Government Affairs,<br>Iain Kelly, Director, Regulatory Policy & Issue Management |
| Congressional Research Service | Renée Johnson, Agricultural Policy Specialist<br>Jeanette Patell, First Secretary, Agriculture & Fisheries<br>James Monk, Agriculture Policy Resources<br>Pauline Walsh, Customs and Immigration |
| Embassy of Canada | Ambassador Gary Doer<br>Denis Stevens, Deputy Head of Mission<br>Gilles Gauthier, Minister (Economic)<br>Colin Bird, Minister-Counsellor<br>Dan Abele, Head, Intergovernmental Affairs<br>Brad Wood, First Secretary (Agriculture and Fisheries)<br>Mike Hawkins, Counsellor (Agriculture)<br>Weston Bachman, Intergovernmental Relations Officer |
| George Washington University | Dr. Hartmut Doebel, Director of Honey Bee Research and Beekeeping Program<br>Hannah Cox, Researcher, Honey Bee Research and Beekeeping Program |
| National Association of State Departments of Agriculture | Dr. Barb Glenn, CEO<br>Nathan Bowen, Policy Director<br>Dudley W. Hoskins, Public Policy Counsel |
| United States Department of Agriculture | Dr. Kevin Hackett, National Program Leader, Agricultural Research Service |

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|---|---|
| | Dr. Sheryl H. Kunickis, Director, Office of Pest Management Policy<br>Dr. Jay Evans, Research Entomologist, Bee Research Lab, Agricultural Research Service<br>Dr. Judy Chen, Virologist, Bee Research Lab, Agricultural Research Service<br>Dr. Jeffery Pettis, Colony Health and Mite Control, Bee Research Lab, Agricultural Research Service<br>Dr. Miguel Corona, Honey Bee Nutrition, Agricultural Research Service<br>Dr. David L. Epstein, Entomologist, USDA Office of Pest Management Policy<br>Mr. Bart Smith, National Bee Disease Diagnostic Service<br>Kristy Goodfellow, North America Team Leader for the USDA Foreign Agricultural Service |
| United States Environmental Protection Agency | Jack Housenger, Director, Office of Pesticide Programs<br>Bill Jordan, Deputy Director for Programs, Office of Pesticide Programs<br>Richard Keigwin, Director, Pesticide Re-Evaluation Division<br>Don Brady, Director, Environmental Fate and Effects Division<br>Jackie Mosby, Director, Field and External Affairs<br>Meredith Laws, Chief, Invertebrate-Vertebrate Branch 3, Registration Division<br>Scott Drewes, Field and External Affairs, Policy and Regulatory Services Branch<br>Tom Steeger, Senior Advisor, Environmental Risk Branch IV, Environmental Fate and Effects Division,<br>Pam Teel, Office of International and Tribal Affairs<br>Bob McNally, Director, Biopesticide and Pollution Prevention Division<br>Anita Pease, Associate Director, Environmental Fate an Effects Division<br>Nicole Zinn, Biologist, Government an International Services Branch an External Affairs Division |

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|---|---|
| United States House of Representatives | Representative Earl Blumenauer (D-OR)<br>Representative Chellie Pingree (D-ME), Member of the House Appropriations Subcommittee on Agriculture, Rural Development, Food and Drug Administration, and Related Agencies<br>John Goldberg, Senior Professional Staff Member, House Agriculture Committee<br>Mary Nowak, Legislative Assistant, House Agriculture Committee.<br>Allison Crittenden, Intern, House Agriculture Committee<br>Kimber Colton, Staff, Office of Representative Chellie Pingree (D-ME) |

## APPENDIX B: FACT-FINDING MISSION

## BATH AND MORRISSBURG, ONTARIO – NOVEMBER 7, 2014

| ORGANIZATION | NAME, TITLE |
|---|---|
| B Hogan Apiaries | Ben Hogan, Owner/Operator<br>Tim Hogan, Owner/Operator |
| Cedar Lodge Farms | Arden Schneckenburger, Owner/Operator<br>Rhonda Schneckenburger, Owner/Operator<br>Wayne Schneckenburger, Owner/Operator |
| Coneybeare Honey | Jim Coneybeare, Owner/Operator |
| Ontario Beekeeper's Association | Albert Devries, Board Member<br>Les Eccles, Technology Transfer Program Lead Specialist |