CANADIAN ASSOCIATION OF PROFESSIONAL APICULTURISTS

L'ASSOCIATION CANADIENNE DES PROFESSIONELS DE L'APICULTURE

Proceedings 2019/20

Hilton Garden Inn, Ottawa, Ontario
January 21st, 2020

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Canadian Association of Professional Apiculturists
2019/20 Business Meeting

Hilton Garden Inn, Ottawa, ON
Leomont Room, January 21st, 2020

$165 Registration Fee for CAPA Members includes breakfast & lunch (January 21st)

Tuesday January 21st (7:00 A.M. – 5:15 P.M.) – *Breakfast, coffee break and lunch provided*

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Committee Selection	- New President

Canadian Association of Professional Apiculturists
2019/20 Business Meeting
Hilton Garden Inn, Ottawa, ON
January 21st, 2020

MINUTES

Members Present
Stephen Pernal, Nuria Morfin, Paul van Westendorp, Mark Winston, Rob Currie, Valérie Fournier, Pierre Giovenazzo, Karen Kennedy, Julia Common, Heather Higo, Gabrielle Claing, Nicolas Tremblay, Cameron Menzies, Ernesto Guzman, Leslie Eccles, Chris Maund, Paul Kozak, Medhat Nasr, Shelley Hoover, Stephen Page, Renata Borba

Guests
Connie Rajzman, Mathew Boucher

Present Via Video Conference
Connie Hart, Judy Wu-Smart (guest), Kim Skyrm (guest), Martine Bernier, Samantha Muirhead, Mylee Nordin, Lora Morandin

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Welcome and Introductions
Shelley Hoover

President Shelley Hoover called the meeting to order at 8:09 am. President Hoover welcomed the membership to the 62nd annual meeting and thanked the organisers. A round table of introductions was made for those in attendance.

Past president Medhat Nasr explained how the elections was going to proceed and welcomed members to enter nominations.

Approval of Agenda
Shelley Hoover

MOTION:	**Motion to approve the agenda as circulated.**
MOVED BY:	**Medhat Nasr**
SECONDED BY:	**Les Eccles**
CARRIED	

President's Report 2018
Shelley Hoover

Dr. Shelley Hoover, President, Canadian Association of Professional Apiculturists
Apiculture Unit Lead, Alberta Agriculture and Forestry
Lethbridge, Alberta

I would like to welcome you to the 62nd annual general meeting of the Canadian Association of Professional Apiculturists. I want to extend a special thank you to the Canadian Honey Council, and to those CAPA members that helped organise our meeting, especially CAPA secretary Renata Borba. As always, the meeting is a lot of work for the secretary, so I want to give her special recognition for her effort. I want to extend a special welcome to our guests, whether they are here in the room with us, or joining us remotely. I also want to thank all the members who are able to join us in person or remotely today. It is an unusual meeting in that there is no research symposium, as this AGM follows closely after the Apimondia meeting in Montreal in September 2019.

This has been a busy and demanding year, and I have had the pleasure of serving with a capable, supportive, and professional executive. I want to thank Past-President Medhat Nasr, Vice-President Les Eccles, Secretary Renata Borba, and Treasurer Martin Bernier for their assistance and guidance.

On behalf of the executive, I would also like to thank the Provincial Apiculturists, the committee members and chairs, and all the CAPA members who contributed their valuable time to CAPA endeavours this year. 2019 was a busy year for CAPA members, particularly leading up to Apimondia last September (2019). We appreciate the valuable time and knowledge that CAPA members contribute without a second thought.

Detailed activities are covered in the annual reports by committee chairs and provincial apiculturists. To briefly highlight a few:

1. Apimondia dominated 2019 for many members, and was definitely a high point for many members and beekeepers across Canada. We owe Georges Martin a debt of gratitude for managing the CAPA booth at Apimondia, to Rob Currie and the awards committee for their effort to facilitate travel awards so as many members and students as possible could attend, to all the volunteers and 'voluntolds' who staffed the CAPA booth and worked at the events in many capacities. A special thanks to Julie Ferland who coordinated the Apimondia volunteers. We also owe Rod Scarlett and the CHC a special thank you for bringing the amazing event to Canada, and for facilitating our booth and publication sales. Pierre Giovenazzo and Steve Pernal, a special thank you to both of you for your work on the Apimondia executive, it was a massive amount of work for both of you.

2. Julie Ferland with help from Geoff Wilson and the members of the winterloss committee once again did an excellent job writing a report for the annual survey of honey bee mortality in Canada. This report is highly anticipated by the industry and media, so I thank all those involved in getting it produced in a timely manner. Winter colony mortality across Canada ranged from 20-54%, and continues to be a struggle for beekeepers.

3. As always the research report outlines the huge amount of research in apiculture being conducted by our members in bee breeding, queen production and care, pollination, small hive beetles, nutrition and habitat, and disease and parasite control.

4. The IPM committee chaired by Jason Sproule outlines the activities of that committee, with the registration of HopGuard II, availability of Fumigillin-B and VITA EFB and AFB kits across Canada.

5. The Importation and Bee Movement Committee chaired by Samantha Muirhead and Paul Kozak was kept very busy by concerns about queen supply from California and the closure of the US border to Canadian queens in particular.

6. Publication sales remained strong, and I am especially pleased that CAPA is now able to offer the disease manual in Spanish, so a special thank you to Ernesto Guzman for translating it, and to Carlos Castillo and Nuria Morfin for editing the document.

One final thank you is due to the Asian Giant Hornet, for appearing in BC, and preventing Paul van Westendorp from retiring, and thank you to all the members for your effort on behalf of Canadian beekeepers.

We have a full agenda ahead of us at this meeting and tomorrow's joint meeting with the Canadian Honey Council. I hope you have a good and productive meeting, and take the time to connect with your colleagues from across the country.

Shelley Hoover
CAPA President

MOTION: **Motion to accept the President's Report as presented.**
MOVED BY: **Heather Higo**
SECONDED BY: **Ernesto Guzman**
CARRIED

CHC Report
Stan Reist, CHC Chair

We have had a significant increase in colony numbers and honey production from 2004 to 2018. Overwinter bee losses have dropped in 2019 compared to 2018, but we are still getting the usual colony starvation and poor queen in the fall. CHC has partnered with Vita Bee Health to re-introduce Fumagilin-B on the market. There has been some glitches but we are working on it. The Bee Health Roundtable produced reference guides for beekeepers, such as the Canadian Best Management Practices for Honey Bee Health. We are working towards a development of a national surveillance program, that may take place this year 2020. CFIA is working with CHC and they are keen to keep testing honey for adulteration. Stock replacement: there has been a recent border closure of Canadian queens to the US. Queens can now be imported from Malta, Italy and possibly Ukraine. There are threats to the California queens. Queen breeders in California are keeping an eye on Africanization, and they have strategies in place to keep Africanised genes out. This year, CHC will be attending several meetings to promote Canadian honey and expand our export market. We had our first shipment to India this month. Apimondia: lot of hard work. We had over 5,500 participants. Financial results will take a couple of months to finalize.

Discussion ensued on the importation of queens from California and other countries (Malta, Ukraine), as well as new miticides and Fumagilin-B.

President Hoover thanked Stan Reist for his presentation.

Power Point presentation located in Appendix 1

Minutes of 2018 Meeting
Renata Borba

Secretary Renata Borba indicated that the Minutes of the 2018/19 AGM (London-ON) were previously circulated on CAPA-L. Final Proceedings have been posted on the CAPA website.

MOTION: **Motion to accept the Minutes of the 2018/19 AGM as circulated.**
MOVED BY: **Paul Kozak**
SECONDED BY: **Rob Currie**
CARRIED

Financial Report for 2019
Martine Bernier via videoconference

The Membership list is currently up to date, or as up to date as possible with our changing membership. Membership is:

	Active (in good standing – as of Dec. 2019)
Full Members	62
Associate Members	19
Honorary Members	14
Total	95

Total Cash on hand as of December 31st, 2019:

Community Plan Plus (day to day banking)	$ 20 664,20
GIC Term Deposit (yearly auto renewal)	$ 10 538,63
Term Deposit (Monthly auto renewal)	$ 10 243.16
PAYPAL Account (electronic payment option)	$ 3 880,79
Total Cash	**$ 45 326,78**

Publication Sales in 2019

5000 English copies printed in 2019 ($12,189.00 + tx)
969 Spanish copies printed in 2019 ($6,935.00 + tx for printing and $1,520.00 for typesetting)

	Sales	
English	14 401,91$	+ tx & S/H
French	730,00 $	+ tx & S/H
Spanish	680,00 $	+ tx & S/H
Outstanding publications invoices:	(3 330,81$)*	tx and S/H included

* Might be less than that. Half of them were November or later invoices and the checks are just not arrived yet. For some of them I have to double check and send reminders.

2018 London was paid in 2019 (3,127.65$)

Apimondia 2019: we budgeted 25 000$

CHC booth	(5 000,00 $)
Travel Awards	(12 353,14 $)
Bee poster S/H	(647,70 $)
Bee poster sales	450,00 $
Remaining	7 449,16 $

2020 Ottawa is estimated to 3,519.90$

There were no Donations to the IBRA and CBRF fund (up to now). At the last meeting, we budgeted $500 for IBRA and $0 for CBRF.

GST/HST were filled in early 2020 for 2018 and 2019. I will follow up on the 133,26$ credit that we must have.
2018: We owe CRA 698,41 $
2019: Rebate of 2 085.38$

The accountant consultation (estimated 40hrs @ $100/hr) remains incomplete. This was to help determine CAPA's official status for tax purposes. i.e. Not for profit, charitable organization, business etc.

Paypal: in mid 2019, we had a warning about the authentication of the holder of the account. It was still to the name of Chris Jordan. After several attempts, the transfer was made to Martine Bernier in late December. The process of authentication is completed, but I'm still waiting for the final approval of Paypal.

Cash balance is lower than last year because we used some for Apimondia. CAPA disease book: we reprinted the English version and printed the Spanish version, and these were large expenses for this year. The sales have remained as last year. In the 2019 budget we still have the balance for our AGM and Apimondia expenses. We did not use all the budget we had proposed for the Apimondia travel award. We also sold bee prints at the Apimondia, so we have revenue for those sales. Both 2018 and 2019 taxes are now filed. I am working with Paypal to transfer the account ownership to myself. We now have a square account as well, which we acquired for Apimondia.

2019 CAPA Financial Statement					
GIC Term Deposit Balance		1-Jan-19			$ 20,732.47
Account Balance		1-Jan-19			$ 46,935.33
Paypal Balance		1-Jan-19			$ 5,123.68
		Account opening balance			$ 72,791.48
REVENUE				**Planned for 2019**	**As of December 31st, 2019**
Membership		cost	members		
12	2020 Full	40	53		$ 480.00
3	2020 Associate	20	13		$ 60.00
19	2019 Full			$ 1,760.00	$ 760.00
11	2019 Associate			$ 300.00	$ 220.00
2	2018 Full				$ 80.00
0	2018 Associate				$ -
1	2017 Full	* We collected some of the 2017/2018 that did not pay their membership			$ 40.00
0	2017 Associate				$ -
Meetings					
1	2018 London Registrations				$ 90.00
5	2020 Ottawa registrations			$ -	$ 800.00
			number of sales		
2019 ENG Publication Sales			1274	$ 12,000.00	$ 14,401.91
2019 FR Publication Sales			123	$ 1,600.00	$ 730.00
2019 SP Publication Sales			142	$ 2,000.00	$ 680.00
Shipping/handling on publications				$ 2,230.80	$ 1,619.36
Bee art scene Apimondia					$ 450.00
GST/HST collected	* on publications and meeting registration			$ 668.55	$ 671.74
GIC Term interests				$ 5.00	$ 47.32
2015 HST Rebate				$ 163.29	
2016 HST Rebate				$ 499.55	
				$ 21,227.19	**$ 21,130.33**

EXPENDITURES					
Publications					
	S/H charges (all editions)	* for S/H of the reprint	$	(2,230.80)	$ (308.46)
	Reprinting English (5000 copies)		$	-	$ (12,189.00)
	Printing and typesetting of Spanish edition		$	(10,000.00)	$ (8,455.00)
	Shipping honorarium (Janet Tam)		$	(150.00)	$ (105.95)
	Queen Document		$	(1,200.00)	$ (1,200.00)
	storage		$	(800.00)	$ (707.88)
Meetings	2018 AGM London				$ (3,127.65)
	2019 Apimondia	* S/H bee print scene			$ (647.70)
	Travel of Executive to meetings (CAPA,AIA, AAPA)		$	(2,000.00)	$ -
IBRA Donation			$	(500.00)	$ -
CBRF Donation			$	-	$ -
Student Merit Award		* 600$ + travel expenses	$	-	$ (798.75)
Student Presentation Award (given in some years at research symposium)			$	-	$ -
CAPA MERIT AWARD new queen model or other			$	(2,000.00)	$ -
AAPA student travel Award (too late to submit to ABRC?)			$	(2,100.00)	$ -
CAPA Website Hosting			$	(600.00)	$ (519.85)
GST/HST Paid					$ (2,757.12)
2018 GST/HST Payment		* 698,41 $, made in early Jan 2020	$	(668.55)	$ -
Misc. (cards, shipping, postage, gift card etc)			$	(5.00)	$ (98.95)
Banking Fees (includes PayPal)			$	(200.00)	$ (183.58)
Consult with Accountant, advice, consult, no formal audit (~40hrs X $100/hr?)			$	(4,000.00)	$ -
CAPA Workshop for professional development of members			$	-	$ -
Holding for Apimondia or give CHC			$	(25,000.00)	$ (17,353.14)
		Expenditures	**$**	**(51,454.35)**	**$ (48,453.03)**
		Revenue-expenditures	**$**	**(30,227.16)**	$ (27,322.70)
GIC Term Deposit (1 year cashable at 0.40%; Matures 26 May 2020)			**$**	**10,510.00**	**$ 10,538.63**
GIC Term Deposit (30 days renewable at 0.05%; Matures 26 Janyary 2020)			**$**	**10,242.00**	**$ 10,243.16**
PayPal (December 31st, 2019)			**$**	**-**	**$ 3,880.79**
Cash in account as of December 31st, 2019			**$**	**27,630.00**	**$ 20,664.20**
		Total Cash / Investments	**$**	**48,382.00**	$ 45,326.78
Should maintain at least $15,000 RESERVE		Predicted Surplus/deficit	$	18,154.84	Dec 31 2019 actuals

Action item:	**Budget Committee to consist of Rob Curie, Stephen Pernal and Paul van Westendorp.**
MOTION:	**Motion to accept the financial report as presented.**
MOVED BY:	**Rob Curie**
SECONDED BY:	**Heather Higo**
CARRIED	

AAFC National Statistical Trends in Honey, Beekeeping and Pollination
Stephen Page

This year I had the opportunity to attend the US meeting in Sacramento, visit almond growers and meet some American beekeepers (pollinators).

Although we have increased our queen importation from Chile, the US continues to be by far the country that we import the most queens from. California and Hawaii are the only source of queens in the US (that come to Canada). In 2019 the total quantity of imported queens took a dip but likely because of importation issues and price. Package bees did not significantly increase. Honey production: we had a dip in the 2019 total production, and most of this drop was because of the low honey production in Alberta. The number of honey bee colonies did not drop as much as the honey production. Annual yield has dropped below the trend line, at the expense of the drop in AB. Ontario is the province with the largest number of hobby beekeepers. Honey prices have stayed solid in 2019 but we saw that provinces that consume more local honey have a higher honey price per lb.

Honey: New Zealand honey price is still higher due to the manuka honey. Brazil has the organic market but the price is not that much different than Canadian honey prices.

President Hoover thanked Stephen Page for his presentation.

Power Point presentation located in Appendix 2

CFIA Update
Connie Rajzman

We are working on the importation approval of queens from Italy and Malta, but it is not approved yet. We are also still doing the paperwork for queen importation from Ukraine. Cuba has contacted CFIA regarding queen importation and we are working on their request and we will be drafting the risk assessment shortly. I am in close communication with the CAPA import committee and CHC about what is going on in California. For exports, the US is still conduction their risk assessments on Canada. As we know, they have closed the border for queens coming from Canada into the US. After preliminary discussions that I had we them, they have suggested some changes to the export certificate. They are concerned that we import bees from Australia and Chile, because they do not import bees from these countries. Because we have very close relationship with the US for many other commodities, we tend to respect each other import procedures, but in this case they are not. They are doing their assessments and they are hoping to be completed before the import season.

President Hoover thanked Connie Rajzman for her presentation.

Discussion:

Who initiates the request for queen importation? – It depends, in some cases the request comes directly from the exporters and in others it comes from the government of these countries. We also consult the industry to request if there is any interest from the industry.
What is the US concern about Chile and Australia? - They haven't evaluated Chile yet so they just are concerned because it is not a country that they have evaluated the risks. In regards to the US is the tropilaelaps mite.

Any plans for package importation from the US? No, any pressure or plans yet.

Africanized testing – we need to start thinking about implementing this test to secure our supply in the US because exclusion zones will be difficult to maintain in the future.

PMRA Update
Connie Hart

New hive pesticide products for varroa mite:

- HopGuard II (active ingredients hop beta acids (present as potassium salts)):
    - Registered 2019-10-21
- Api Life VAR (active ingredients thymol, eucalyptis oil, menthol, camphor):
    - Currently under evaluation.
    - Expected completion in approximately one month.
    - Following completion of evaluation and determination of the PMRA proposed decision, the proposed decision will be published for consultation. Following consultation and consideration of comments, a final registration decision will be published.

Neonicotinoid Pollinator Re-evaluations Completed in 2019

- Final Re-evaluation Decisions for Pollinators published April 2019
    - RVD2019-04 Thiamethoxam and its associated End-Use Products: Pollinator Re-Evaluation
    - RVD2019-05 Clothianidin and its associated End-Use Products: Pollinator Re-Evaluation
    - RVD2019-06 Imidacloprid and its associated End-Use Products: Pollinator Re-Evaluation
- Proposed Re-evaluation Decisions for Pollinators included the detailed risk assessments
    - PRVD2017-23 Clothianidin and its associated End-Use Products: Pollinator Re-Evaluation
    - PRVD2017-24 Thiamethoxam and its associated End-Use Products: Pollinator Re-Evaluation
    - PRVD2018-12 Imidacloprid and its associated End-Use Products: Pollinator Re-Evaluation
- The provided summary table indicates the changes to registrations for the three neonicotinoids by crop/crop group.

Special Review on Squash bees

- Awaiting final submission of research from the University of Guelph research team, including field studies over two years, before completion of the Special Review
- Health Canada considered squash bees in its neonicotinoid pollinator re-evaluation decisions published in April 2019
- PMRA used the pollinator risk assessment framework, and took into account the information on toxicity effects for all bees, as well as considered the different biology and exposure possibilities for squash bees.
- Health Canada's cancellations and further restrictions for clothianidin, imidacloprid and thiamethoxam, included those on cucurbit uses, and were protective of squash bees.
- Based on the research results that the University of Guelph team have already presented to PMRA, we expect their research results to be consistent with the decisions that have already been made for neonicotinoid pesticide use on cucurbits.

Pollinator Protection Measures

- Pollinator protection measures are based on the pollinator risk assessment results for each specific pesticide.
- Along with the risk characterization of each pesticide, the appropriate protection measures consider the potential for pollinator exposure on a crop specific basis
    - Crop attractiveness to both *Apis* and non-*Apis* bees
    - Agronomic considerations (e.g., is crop harvested prior to bloom?)
- PMRA is continuing to update information on crop specific pollinator exposure
- Development of crop specific Pollinator Protection Plans- concept document

Discussion:
Are you working on any provinces on the pollinator protection measures (crop exposure document)? We are working with the pollinator protection (contractor). We will look for inputs from PAs, Tech Transfer Programs and other end-users.

HopGuard3 has been approved in the US. Any news for it to get approved here? We have not been contacted by the company.

President Hoover thanked Connie Hart for her presentation.

Supplemental documents located in Appendix 3

Committee Reports

New Disease Publication Report
Steve Pernal

Publications Editorial Committee Report 2019

Third Edition of CAPA Disease Publication (English, French and Spanish)

Following the CAPA AGM in November 2018, 5,000 new copies of the CAPA "Honey Bee Diseases and Pests" (3rd edn.) were reprinted and delivered to Janet Tam for storage and distribution in Guelph, ON. Reprinting was done by Ampersand Printers in Guelph, ON, at a total cost of $13,773.57 (including HST). The last reprinting was done in December 2015.

Note that CAPA also does pay storage for these items, at $799.80 per year, to the Royal City Brewing Warehouse in Guelph, which is also home to the Ontario Tech Transfer Team Offices.

In 2019, sales of the English edition remained strong with 1179 copies being sold from January to the end of December 2019, through regular orders. During the same period 85 copies of the French edition were also sold through regular orders. Approximately 500 copies of the French edition remain.

A major accomplishment in 2019 was Dr. Ernesto Guzman completing the translation of the Disease Publication into Spanish, which was proofread by Nuria Morfin and Carlos Castillo. Ampersand Printing produced 1,000 copies of the Spanish edition which were received by Janet Tam on June 17. The printing cost for this batch was $7,836.55 (including HST). A total of 99 copies of the Spanish edition were sold through CAPA's normal orders.

CAPA also sold a number of the Disease Publications at Apimondia 2019 in Montreal at the CAPA/CHC booth. Totals for these orders were: 105 English, 26 French and 43 Spanish.

The Spanish version of the Disease Publication was also entered into the World Beekeeping Awards at Apimondia 2019, in the category for books, however it did not win an award.

CAPA currently sells the English, French and Spanish versions for $10, not including shipping. There are no plans for any reprinting in 2020.

Janet Tam has agreed to continue distributing the English and Spanish versions. Martine Bernier took over the French orders in 2018, and will remain doing so.

S. Pernal, Co-Editor.

Editorial Committee: Rob Currie, Ernesto Guzman, Nicolas Tremblay

Discussion ensued on plans to publish a 4th version and increasing the cost of the CAPA disease book. At this moment there is no plan to do a 4th edition for the next couple of years or increase the price of the book.

MOTION: Motion to accept the New Disease Publication Report as submitted.
MOVED BY: Rob Currie
SECONDED BY: Cameron Menzies
CARRIED

National Survey Report
Gabrielle Claing

Statement on Honey Bee Wintering Losses in Canada (2019)

Prepared by CAPA National Survey Committee and Provincial Apiculturists: Julie Ferland (chair), Melanie Kempers, Karen Kennedy, Paul Kozak, Rhéal Lafrenière, Chris Maund, Cameron Menzies, Samantha Muirhead, Medhat Nasr, Steve Pernal, Jason Sproule, Paul van Westendorp and Geoff Wilson

The Canadian Association of Professional Apiculturists (CAPA) coordinated the annual honey bee wintering loss report for 2018-2019. As in previous years, the survey consisted of harmonized questions based on the national beekeeping industry and the Provincial Apiculturists collected the survey data. All provinces were included in the national survey. The respondents operated 398,728 honey bee colonies across Canada. This represents 50% of all colonies operated and wintered in the country in 2018-2019. The national winter loss, including non-viable bee colonies was 25.7% with provincial losses ranging from 19.8% to 54.1%. The overall national colony loss reported in 2019 is in the middle range of reported losses since 2007. Through the hard work of beekeepers replacing loses and making increases, Statistics Canada reports show that the total colony count has increased by 35.2% during the period between 2007 and 2018.

Respondents reported some variation in identifying and ranking the top four possible causes of colony losses across the country. The most frequently cited causes in order from high to low were: weather, starvation, poor queens, and weak colonies in the fall.

Beekeepers also responded to questions on the management of three serious parasites and pathogens to beekeeping: Varroa mites, *Nosema spp*. and *Paenibacillus larvae* (the causal bacteria of American foulbrood disease). The majority of beekeepers in most provinces reported that they monitored for Varroa

mites. The most commonly reported Varroa treatments were Apivar® and formic acid (Mite Away Quick Strip® (MAQS), repeated 40 ml of 65% formic acid treatments or flash treatments) in spring, Apivar® or formic acid (MAQS or flash treatments) in the summer or fall and oxalic acid in late fall. Many beekeepers reported using spring and fall applications of Apivar® or Apivar® plus formic or oxalic acid to keep mites under control in 2018. Nosemosis and American foulbrood were treated by many Canadian beekeepers. Across the country registered antibiotics were the commonly used treatments; but methods and timing of application varied from province to province.

Provincial Apiculturists, Tech-transfer agents and researchers have been working with beekeepers across Canada to encourage them to monitor honey bee pests, especially Varroa mites and *Nosema*, and adopt recommended integrated pest management practices to keep these pests under control. Through various working groups, that include various stakeholders, CAPA members continue to work on development and improving management options for beekeepers to keep healthy bees. CAPA members are also actively involved in the Federal Bee Health Roundtable to develop strategies that work toward addressing risks and opportunities for developing a sustainable, healthy beekeeping industry.

Disclaimer: Survey data were supplied by the provincial apiarist of each province. The data were then compiled and further analyzed by the CAPA National Survey Committee.

Introduction

For over a decade, many countries, including Canada, have surveyed beekeepers and reported overwintering mortality of honey bee colonies and management practices used for Varroa mites, Nosema and American foulbrood. The Canadian Association of Professional Apiculturists (CAPA) has worked with the Provincial Apiculturists to report on wintering losses of honey bee colonies and possible causes of bee mortality in Canada since 2007. The objective of this national report is to consolidate provincial honey bee losses across the country based on data collected through harmonized survey questions. The possible causes of winter loss, as reported by beekeepers and information on pest surveillance and control are surveyed and included in this report. The survey results aid in identifying gaps in current management systems, developing strategies to mitigate colony losses and improving bee health, biosecurity practices, and industry sustainability.

Methodology

In 2019, the Provincial Apiculturists and the CAPA National Survey Committee members reviewed the questions used in the 2018 survey and made necessary revisions. Examples of these revisions include new treatments or new strategies for beekeepers to manage pests and diseases as they are developed over the years. The result was an updated harmonized set of questions that was used in the 2019 survey (Appendix A). These questions took into account the large diversity of beekeeping industry profiles, management practices and seasonal activities within each province. Some provinces also included supplementary regional questions in their provincial questionnaire. Results of these regional questions are not included in this report but it can be accessed by contacting the Provincial Apiculturist of the province in question (Appendix B).

Commercial beekeepers and sideliners that owned and operated a specified minimum number of colonies (Table 1) were included in the survey. The survey reported data from full-sized producing honey bee colonies that were wintered in Canada, but not nucleus colonies. Thus, the information gathered provides a valid assessment of honey bee losses and management practices.

The common definitions of a honey bee colony and a commercially viable honey bee colony in spring were standardized as follows:

- Honey Bee Colony: A full-sized honey bee colony either in a single or double brood chamber, not including nucleus colonies (splits).
- Viable Honey Bee Colony in Spring: A honey bee colony that survived winter, with a minimum of 4 frames with 75% of the comb area covered with bees on both sides on May 1st (British Columbia), May 15th (New Brunswick, Nova Scotia, Ontario, Prince- Edward-Island and Quebec) or May 21st (Alberta, Manitoba, and Saskatchewan).

The colony loss and management questionnaire was provided to producers using various methods of delivery including mail, email, an online and a telephone survey; the method of delivery varied by jurisdiction (Table 1). In each province, data were collected and analyzed by the Provincial Apiculturist. All reported provincial results were then analyzed and summarized at the national level. The national percent of winter loss was calculated as follows:

$$\text{Percentage Winter Loss} = \left(\frac{\text{Sum of the estimated total colony losses per province in spring 2019}}{\text{Sum of total colonies in operation in each province for 2018}} \right) \times 100$$

Results

Throughout Canada, a total of 536 sideline and commercial beekeepers responded to the 2019 survey. These respondents represented 44% of the all surveyed targeted beekeepers. They operated nearly 50% of all registered colonies that were put into winter in 2018. Although the number of reported colonies is down from 46.6% of beekeepers responding representing 63.9% of bees in Canada in the 2018 survey, the participation rate and representation of the industry can still be considered to be good.

The survey delivery methods, operation size of surveyed beekeepers, and response rate of beekeepers in each province are presented in Table 1. It is important to note that the total number of colonies operated in a province reported in this survey may vary from the Statistics Canada official numbers. In some provinces the data collection periods for the provincial database and the Statistics Canada numbers are at different times of the year. This can result in minor discrepancies between the official Statistics Canada total number of colonies and this surveys total reported colonies per province.

Survey results showed that the national level of wintering loss including nonviable colonies was 25.7% with individual provincial percentage ranging from 19.8% to 54.1%. The overall winter loss percentage for 2018-2019 was lower than 2017-2018 which had a loss rate of 32.6%. The level of winter loss varied from province to province, and among beekeeping operations within each province. In general, most provinces reported lower mortality in 2018-2019 than the previous year, the exception being Nova Scotia reporting similar mortality to last year and Prince Edward Island and Newfoundland/Labrador reporting higher mortality than last year. Prince Edward Island reported the highest winter losses of 54.1% in 2019 with weather cited as being the most frequent cause contributing to colony mortality. The lowest winter loss (19.8%) was reported by Nova Scotia again this year.

Overall 72% of the colonies owned by respondents were wintered outdoors in fall 2018. The rest of the colonies (28%) were wintered indoors (Table 2). The highest percentage of bee colonies wintered indoors was in Nova Scotia (75%), followed by Quebec (66%) and New- Brunswick (60%). The mortality rate for colonies wintered outdoors and indoors for each province is presented in Table 3. The mortality rate is calculated only for provinces where enough colonies are wintered indoors to have a fair representation of this wintering technique.

For detailed information about the winter losses in each province, please contact each province directly for a copy of its provincial report where available.

Table 1: Survey parameters and honey bee colony mortality by province

Province	Total number of colonies operated in 2018	Estimated number of colony lost based on the estimated provincial winter loss	Type of data collection	Number of beekeepers targeted by survey	Number of respondents (% of participation)	Size of beekeeping operations targeted by survey	Number of respondents' colonies that were wintered in fall 2018	Number of respondents' colonies that were alive and viable in spring 2019	Percentage of surveyed colonies to the total number of colonies in the province	Provincial Winter Loss including Non-viable Colonies
Newfoundland and Labrador	425	127	Email, Telephone, Text message	9	9 (100%)	20 col. and more	426	299	100%	**29.8%**
Prince Edward Island	6 000	3 246	Email, Telephone	50	17 (34%)	All sizes	5 330	2 448	89%	**54.1%**
Nova Scotia	25 210	4 992	Email	41	20 (49%)	50 col. and more	16 058	12 877	64%	**19.8%**
New Brunswick	11 998	3 155	Email, Telephone, Postal	30	16 (53%)	50 col. and more	8 628	6 360	72%	**26.3%**
Quebec	65 128	16 282	Email, Telephone, Postal	137	108 (79%)	50 col. and more	50 198	37 669	77%	**25.0%**
Ontario	100 413	22 693	Email, Telephone, Postal, Online	218	87 (40%)	50 col. and more	48 418	37 469	48%	**22.6%**
Manitoba	114 098	24 417	Email	112	34 (30%)	100 col. and more	46 091	36 249	40%	**21.4%**
Saskatchewan	114 000	24 396	Online	120	47 (39%)	100 col. and more	47 087	36 999	41%	**21.4%**
Alberta	311 374	89 676	Online	111	43 (39%)	400 col. and more	121 786	86 680	39%	**28.8%**
British Columbia	54 706	17 451	Online	403	155 (39%)	10 col. and more	54 706	37 242	100%	**31.9%**
Canada	**803 352**	**206 435**		**1231**	**536 (44%)**		**398 728**	**294 292**	**50%**	**25.7%**

Table 2: Overwintering method by province

Province	Bee colonies owned by responding beekeepers wintered outdoors in fall 2018		Bee colonies owned by responding beekeepers wintered indoors in fall 2018	
	Number of colonies	Percent (%)	Number of colonies	Percent (%)
NFL	423	99	3	1
PEI	5 328	100	2	0
NS	3 958	25	12 100	75
NB	3 468	40	5 160	60
QC	16 916	34	32 982	66
ON	38 485	79	9 933	21
MB	28 139	61	17 952	39
SK	30 209	64	16 878	36
AB	105 771	87	16 015	13
BC	54 387	99	410	1
Canada	**287 084**	72	111 435	28

Table 3: Indoor and outdoor wintering mortality as reported by responding beekeepers

Province	Total number of colonies wintered **outdoors** in fall 2018	Total number of viable colonies wintered **outdoors** in spring 2019	Percent of losses of colonies wintered **outdoors (%)**	Total number of colonies wintered **indoors** in fall 2018	Total number of viable colonies wintered **indoors** in spring 2019	Percent losses of colonies wintered **indoors (%)**
NFL	423	295	30.3	3	3	N/A
PEI	5 328	2 447	54.1	2	1	N/A
NS	3 958	3 310	16.4	12 100	9 567	20.9
NB	3 468	2 590	25.3	5 160	3 770	26.9
QC	16 916	11 670	31,0	32 982	25 762	21.9
ON	38 485	29 598	23.1	9 933	7 871	20.8
MB	28 139	22 115	21.4	17 952	14 134	21.3
SK	30 209	24 200	19.9	16 878	12 799	24.2
AB	105 771	76 969	27.2	16 015	9 711	39.4
BC	54 387	36 928	32.1	410	314	N/A
Canada	287 084	210 122	26.8	111 435	83 932	24.7

Contributing factors as cited by beekeepers

Beekeepers were asked to rank possible contributing factors to colony losses. These responses are summarized in Table 4. Weather was considered an important factor for winter loss across the country, likely reflecting the very long and cold winter in addition to the cold periods of weather well into April and May through many beekeeping areas. In six provinces, weather was considered the number one (five provinces) or number two (one province) factor contributing to reported winter losses. Similar to the previous year, beekeepers reported that a lot of bee colonies died in April and into early May.

Starvation was the second most reported cause of winterkill by beekeepers in several regions across Canada. Starvation can be the result from the inability of bees in weak colonies to store enough stored food during the fall, the inability of bees to move to new resources within the hive during winter, the rapid consumption of stored food because of early brood production, or insufficient feed provided by the beekeeper in the fall or spring. During the winter of 2018- 2019, starvation may be associated with increased consumption of stored food during the long cold winter and extended cold through the spring.

Poor or failing queens were also another commonly cited as a cause of winter loss across Canada. Poor queens can result in weakened colonies entering the winter; this causes an insufficient number of bees in the colony to survive. If a queen fails or dies over the winter, the colony will die as well because there is no opportunity for the beekeeper to replace the queen and the bees cannot rear a new queen during the winter season. The poor and failing queens can be caused by many factors, including, inadequate rearing conditions, poor mating weather, age of the queen or exposure to pesticides in hive and in the environment. The recent increase of queens as a reported cause for winter mortality is a concern that should be investigated further.

Another contributing factor identified across Canada was weak colonies in the fall. This can be caused by a variety reasons including: making late splits (nuclei), underlying pest and disease issues, exposure to pesticides, or poor foraging and nutrition.

Ineffective Varroa control was reported as the third or fourth possible contributing factor to winter colony loss in only three provinces. While the Varroa mites and their impacts on the honey bee health are still a serious issue for Canadian beekeepers, reported survey results may indicate that most beekeepers are treating in a timely manner to keep mite populations under control. Many beekeepers across the country are relying on multiple Varroa treatments in a year as it better enables beekeepers to protect their bees in the winter. Unfortunately, some individual producers treated Varroa too late, which results in wintering bees being less healthy from the impacts of Varroa and associated viruses. These beekeepers often report winter mortality greater than 30% and frequently reported mites as a primary concern.

Several beekeepers in different provinces reported that they did not know why their colonies perished. Inability to identify a possible cause for colony mortality may be associated with lack of applying best management practices including monitoring for pests, diseases and other general colony health parameters during the season, or a multitude of underlying problems that cannot be identified without specialists.

Operations that reported higher than 25% winter loss were asked to rank the top four possible causes of bee colony mortality in the 2018-2019 survey. These data are summarized in Table 5. Weather, starvation and poor queens are still the 3 most cited causes of winter loss for these operations. Overall, there were no striking

differences between reported causes of winter losses across the provinces and operations that reported 25% or more winter losses.

Table 4: Top four ranked possible causes of honey bee colony mortality by province, as cited by beekeepers who responded to the 2018-2019 winter loss survey

Province	1st.	2nd.	3rd.	4th.
NL	Other (rodents)	Weak colonies in the fall	Weather	Starvation
PEI	Weather	Starvation	Ineffective Varroa control	Poor queens and Other (shrew predation)
NS	Weak colonies in the fall	Weather	Poor queens	Starvation
NB	Weather	Don't know	Poor queens	Starvation
QC	Weather	Starvation and Poor queens	Weak colonies in the fall	Ineffective Varroa control
ON	Starvation	Poor queens	Weather	Weak colonies in the fall
MB	Poor queens	Starvation	Weather	Weak colonies in the fall
SK	Starvation	Poor queens	Weather	Weak colonies in the fall
AB	Weather	Poor queens and Starvation	Ineffective Varroa control	N/A
BC	Weather	Weak colonies in the fall	Starvation	Poor queens

Table 5: Top four ranked possible causes of bee colony mortality by province, as cited by beekeepers who reported higher than 25% losses in the 2018-2019 winter loss survey

Province	1st.	2nd.	3rd.	4th.
NL	Other (rodents)	Other (trial experiment)	Weather	N/A
PEI	Weather	Starvation	Ineffective Varroa control	Other (shrew predation)
NS	Other (pygmy shrews) and Starvation	Weak colonies in the fall	Weather	Poor queens
NB	Poor queens	Don't know	Weather	Ineffective Varroa control

QC	Weather	Starvation	Ineffective Varroa control	Poor queens
ON	Weather	Starvation and Poor queens	Ineffective Varroa control and Nosema and Weak colonies in the fall	N/A
MB	Starvation	Weather	Poor queens	Don't know
SK	Starvation	Poor queens	Weather	Weak colonies in the fall
AB	Weather	Poor queens	Starvation and Ineffective Varroa control and Weak colonies in the fall	N/A
BC	Weather	Weak colonies in the fall	Starvation	Poor queens

Bee Pest Management Practices

In recent years, Integrated Pest Management (IPM) has become the most important practice to maintain healthy honey bees. To successfully manage bee health, beekeepers must identify and monitor pests and diseases to take timely action in accordance with approved methods. This survey focused on asking beekeepers questions about their management of three serious threats that may impact bee health, survivorship and productivity (Appendix A).

A. **Varroa monitoring and control[1]**

The Varroa mite continues to be considered by beekeepers and apiculture specialists as one of the main causes of honey bee colony mortality.

During the 2018 production season, a large majority of surveyed beekeepers monitored for Varroa mite infestations (Table 6). The alcohol wash of a sample of 300 bees per colony was the most preferred technique in all provinces, except Quebec where beekeepers favoured the use of sticky boards and British Columbia where beekeepers preferred the technique using icing sugar. The frequency of use for the alcohol wash technique in various provinces ranged from 22% to 81%. The frequency of use of the sticky board method ranged from 0% to 37%. Some beekeepers used both sticky boards and alcohol wash methods to evaluate the levels of mites. These results demonstrate that most Canadian beekeepers recognize the value of monitoring Varroa mites. The education and extension programs delivered to beekeepers in Canada have helped in adoption of recommended management practices for Varroa mites. The goal is to have all beekeepers actively monitoring Varroa mite populations to improve timing and selection of the best treatment options for Varroa mite control.

In Canada there are a variety of registered miticides available to beekeepers for mite control. Beekeepers are encouraged to use the most effective miticide that fits their region, season and operation. Beekeepers are

encouraged to rotate miticides to prevent the development of resistance to these products. In the current survey of bee winter losses, beekeepers were asked “what chemical treatment was used for Varroa control during the 2018 season”. The beekeepers’ response is summarized in Table 6. In the spring of 2018, the percentage of beekeepers that treated with chemical methods ranged from 38% in New Brunswick to 100% in Saskatchewan. The main miticide used for spring Varroa control was Apivar® (a synthetic miticide with the active ingredient amitraz). The second most common treatment is formic acid in late spring, followed by oxalic acid. In fall of 2018, most Canadian beekeepers ranging from 67% in Alberta to 98% in Quebec treated their colonies for Varroa. The main miticides used at this time of the year were oxalic acid, Apivar® and formic acid. It was noted that some beekeepers used Apivar® twice in the same year in 2018, once in spring and again in fall. More and more beekeepers have started to combine Apivar® with formic or oxalic acid in the fall for keeping control of the mite population.

Few beekeepers used Apistan® (a synthetic miticide with the active ingredient fluvalinate) and Checkmite+® (a synthetic miticide with the active ingredient coumaphos). Beekeepers may be leery of these products because of previously reported resistance to these active ingredients in Canada.

Once again, these surveys show that Apivar® (amitraz) is one of the most commonly used miticides for treating Varroa in Canada. Through the repeated use of Apivar®, it is only a matter of time before we see the development of resistance to this miticide. Initial findings of decreased efficacy have been observed in some provinces. It is becoming increasingly important that beekeepers become aware of the principles behind resistance development and the importance of monitoring the efficacy of all treatments, in particular Apivar®. This will help to mitigate unforeseen failures of treatments. Beekeepers are encouraged to incorporate resistance management practices such as using appropriate thresholds for treatment, and alternating miticides with different modes of action in their *Varroa* treatment programs. Good biosecurity and food safety practices will also go a long way to ensure healthy bees and a safe, quality product while reducing the disease pressure.

Table 6: Varroa monitoring and chemical control methods as cited by the respondents of the 2018-2019 winter loss survey. Chemical treatment is in order from most to least commonly used.

Province	Beekeepers screening for varroa mites		Varroa control: treatment and methods			
			Spring 2018		Summer/Fall 2018	
	Sticky boards (%)	Alcohol wash (%)	% of beekeepers	Methods of treatment	% of beekeepers	Methods of treatment
NL	0	22	N/A	N/A	N/A	N/A
PEI	6	29	47	Mite Away Quick Strips®, 65% Formic acid – 40 mL multiple application, Apivar®	88	Oxalic acid, Mite Away Quick Strips®, 65% Formic acid - 40 mL multiple application
NS	30	40	70	Apivar®, Oxalic acid, Apistan®	90	Apivar®, Mite Away Quick Strips®, Oxalic acid
NB	19	50	38	Apivar®	88	Oxalic acid, Apivar®
QC	37	24	53	65% Formic acid - 40 mL multiple application, Apivar®, Apistan® and Oxalic acid and 65% Formic acid - 250 ml single application	98	65% Formic acid - 40 mL multiple application, Oxalic acid, Thymovar®
ON	20	59	75	Apivar®, 65% Formic acid – 40 ml multiple application, Mite Away Quick Strips®	95	Apivar®, Oxalic acid, Mite Away Quick Strips®
MB	9	71	82	Apivar®, Oxalic acid, Bayvarol®	94	Oxalic acid, Apivar®, Mite Away Quick Strips®
SK	12	81	100	Apivar®, Oxalic acid, Apistan®	87	Oxalic acid, Apivar®
AB	21	74	65	Apivar®, Oxalic acid, 65% Formic acid – 40 ml multiple application	67	Apivar®, Oxalic acid, 65% Formic acid – 40 ml multiple application
BC	N/A	28	61	Formic acid, Apivar®, Oxalic acid	85	Formic acid, Oxalic acid, Apivar®

B. Nosemosis management practices

Nosema is a fungal pathogen that infects honey bees. *Nosema ceranae* gradually replaced *Nosema apis* to become the most frequently found nosema species in Canada. The real role of *N. ceranae* in honey bee colony survival during winter and spring build-up is still unclear. It could, in certain regions or under some circumstances have an impact and play a role in spring build up (Guzman *et al*., 2010). It was not cited by all surveyed beekeepers as a possible cause of colony mortality during the 2018-2019 winter loss survey, except in Ontario within operations with more than 25% losses.

In the survey, beekeepers reported the use of fumagillin for the treatment of nosemosis in spring and/or in fall of 2018 (Table 7). The percent of beekeepers that reported using this drug varied widely from province to province. This year, beekeepers were also asked to report all alternative treatments that they use during the spring or the fall for helping in the control of nosemosis. It's important to know that Fumagilin–B is the only product registered by Health Canada for nosema treatment. Any other products mentioned by beekeepers are not currently registered for the treatment of this disease. These products are marketed and used as a general promotor of honey bee health.

Table 7: Antibiotic (fumagillin) and alternative treatments for nosemosis as cited by the respondents of the 2018-2019 winter loss survey

Province	Use of antibiotic and alternative treatments for nosemosis (% of respondents)					
	Spring treatment			Fall treatment		
	Fumagillin	Other product	main alternative products	Fumagillin	Other product	main alternative products
NL	0	0	N/A	0	0	N/A
PEI	12	0	N/A	12	0	N/A
NS	20	0	N/A	30	0	N/A
NB	19	0	N/A	25	0	N/A
QC	2	8	CompleteBee®, Apple cider vinegar	4	15	Apple cider vinegar, CompleteBee®
ON	9	0	N/A	9	2	Hive Alive®, Thymol in syrup in fall when feeding
MB	9	3	Honey B Healthy®	3	9	Honey B Healthy®, Nozevit®, Thymol
SK	30	19	Thymol based feed supplement	30	30	Thymol based feed supplement
AB	42	0	N/A	41	7	Honey B Healthy®, Bee vital®
BC	16	N/A	N/A	13	N/A	N/A

C. American foulbrood management practices

American foulbrood (AFB) is a bacterial disease of brood caused by *Paenibacillus larvae*. AFB is considered endemic in Canada, and it has been of great concern to beekeepers. Oxytetracycline and more recently tylosin and lincomycin are antibiotics registered for treating AFB in Canada. The pattern of use for these antibiotics, as reported by beekeepers is presented in Table 8. Oxytetracycline was more frequently used by beekeepers in spring and fall than the others.

Table 8: Antibiotic treatments for American foulbrood (oxytetracycline, tylosin and lincomycin) as cited by the respondents of the 2018-2019 winter loss survey

Province	Use of American Foulbrood treatments (% of respondents)					
	Spring treatment			Summer/Fall treatment		
	Oxytetracycline	Tylosin	Lyncomycin	Oxytetracycline	Tylosin	Lyncomycin
NL	0	0	0	0	0	0
PEI	6	0	0	12	0	0
NS	65	0	0	50	0	0
NB	63	0	0	25	0	0
QC	8	0	0	2	0	0
ON	70	1	1	66	0	1
MB	62	0	0	44	6	0
SK	60	0	0	62	5	0
AB	23	0	0	28	0	0
BC	11	<1	0	6	4	0

Honey Bee Winter Loss and Population in Canada Since 2007

Reported winter loss has been variable from year to year in Canada since 2007. This year, the reported Canadian winter mortality averaged 25.7%. This is better than last year but it's still higher than the long term suggested baseline/ threshold for winter losses of 15%. In fact, since the beginning of this survey in 2007, this suggested acceptable threshold has never been reached. The national winter losses were highest in 2008, 2009 and 2018 which ranged from 32.6% to 35.0%. From 2010 to 2019, the national winter losses ranged from 15.3% to 32.6%, averaging 23.6%. During the period between 2007 and 2018 Statistics Canada reports showed that the total colony count increased by 35.2%.

Each lost colony costs beekeepers time and money to replace. Individual beekeepers experiencing high winter mortalities face large expenses replacing those lost bees. These increased expenses greatly affect profitability for individual beekeepers and can put some beekeeping operations at risk; however, on the Canadian industry scale, the overall increase in bee colonies over the years demonstrates that despite

difficulties keeping healthy, viable bee colonies through winter the Canadian beekeeping industry is resilient and able to grow.

Since the inception of this harmonized survey in 2007, beekeepers have faced challenges keeping healthy bees. Causes for bee health concerns include pest management, climatic condition, bee nutrition, and bee exposure to pesticides in hives and the environment. Another added challenge facing beekeepers is the economics of beekeeping this includes variable honey prices versus the cost of production. Even though responses from this annual survey have provided evidence that beekeepers from various regions are using recommended practices for monitoring and managing honey bee pests and diseases; there are always the opportunities to make further improvements.

It appears that stresses caused by parasites and a combination of other stressors warrants further studies to provide alternative management practices to maintain honey bee health. At this time, beekeepers have few products to control Varroa. New options are important to mitigate the risk of developing resistances. Additionally, the only product registered to treatment of nosema (fumagillin) is currently unavailable. If there is resistance developed to the primary treatment for Varroa (Apivar®) and no available treatment for *Nosema spp*., beekeepers could suffer even greater difficulties keeping their bees alive. Ultimately, beekeepers will need more effective and additional options (miticides, antibiotics and non- chemicals) in their "tool box" if they are to continue effective integrated pest management to maintain healthy bees.

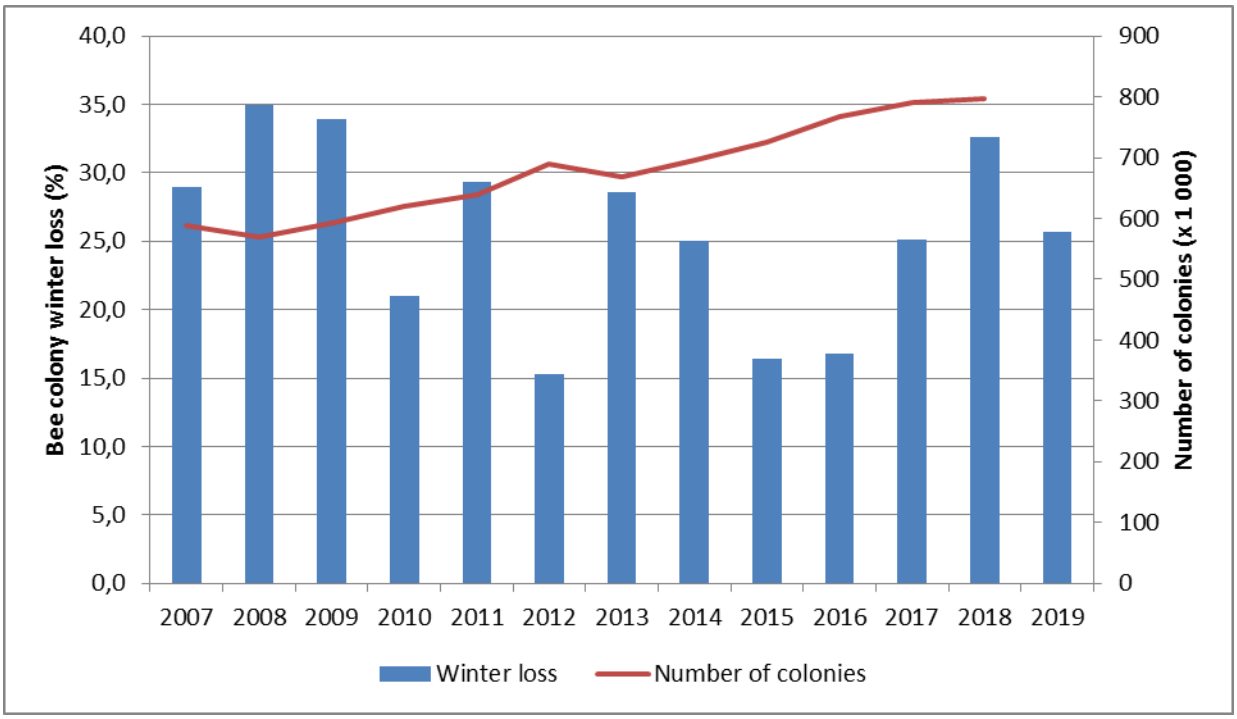

Figure 1. Summary of bee colony numbers and bee losses in Canada from 2007-2019

Further Work

CAPA members continue to work closely with industry stakeholders, the Bee Health Roundtable and provincial working groups to address bee health and industry economics. Members of CAPA and Provincial Apiculturists have also been actively involved in conducting surveillance programs at the provincial levels and across the country to monitor the status of bee health including emerging pest, and the small hive beetle. CAPA and the Provincial Apiculturists are also involved in conducting outreach and extension programs to promote IPM and biosecurity practices to beekeepers. Researchers within CAPA are active in evaluating alternative control options for Varroa mites and *Nosema* and developing genetic stocks more tolerant to pests which will hopefully enhance the integrated pest management (IPM) practices and address honey bee health sustainability.

For more information about this report, please contact:

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Dr. Julie Ferland, Chair of CAPA National Survey Committee julie.ferland2@mapaq.gouv.qc.caTel: 418 380-2100 Ext. 2067

MOTION: **Motion to accept the National Survey Report as presented.**
MOVED BY: **Paul Kozak**
SECONDED BY: **Valérie Fournier**
CARRIED

CAPA - Core Winter loss survey questions (2019) is available in Appendix 4

Importation and Bee Movement Report
Paul Kozak and Samantha Muirhead

We had a significant change to the Importation and Bee Movement committee. We now have a co-chair position within the committee, which has been helpful to the committee. In regards to the exclusion zone in California - we had a lot of questions but still many unanswered questions. We documented as much as we could. There is interest from the committee and CHC to follow up on this further. It sounds like the Africanization has expanded beyond the 100 mile radius. CFIA has spoken with CHC and the 100 mile radius from queen producers has been reduced to 50 miles.

Border closure US-CANADA: we have compiled information from the provinces (except Saskatchewan) and the national health survey and shared these with the CFIA to assist with the US risk assessment on Canada. This is a relationship between the CFIA and USDA. CAPA is a resource to CFIA, providing information. We were caught off guard and we are trying to assist the CFIA with all information we have. The provincial apiculturist from Saskatchewan is in communication directly with CFIA. We still don't know what is driving the USDA risk assessment to close the border, besides their concern on the couple countries that we import bees from. We are trying to improve the communication process, so information is coming from one or fewer sources.

Movement across Canada: CHC would like to see the movement across Canada more harmonized but this item is a bit delicate because each province has their own rules and regulation. Going forward we plan to compile the information from each province and provide that to CHC so they are better informed.

Asian hornet: USDA has a lot of interest on this pest in Canada.
Queen importation from Italy and Ukraine has not been approved yet. CAPA role again on this is just assisting CFIA with any information that might be helpful to them. We also work with the CAPA executives to communicate major issue to CHC.

CAPA Bee Importation and Movement Committee 2019 Report:

Paul Kozak (Ontario Provincial Apiarist) and Samantha Muirhead (Alberta Provincial Apiarist)

Membership:

Geoff Wilson (Saskatchewan Provincial Apiarist) was reappointed as Chair of committee at the London, Ontario 2018/2019 Canadian Association of Professional Apiculturists meeting. Paul Kozak (Ontario Provincial Apiarist) was nominated and elected as a Co-Chair. Geoff Wilson subsequently resigned from the committee and Samantha Muirhead (Alberta Provincial Apiarist) was nominated as Co-Chair. Sam and Paul would both like to thank Geoff for his years of work chairing and participating on this committee.

The membership of the committee includes:

- Paul Kozak (Ontario Provincial Apiarist) Co-Chair
- Samantha Muirhead (Alberta Provincial Apiarist) Co-Chair
- Robert Currie (University of Manitoba)
- Ernesto Guzman (University of Guelph)
- Graham Parsons (Government of Saskatchewan, Ministry of Agriculture)
- Les Eccles (Technology Transfer Program, Ontario Beekeepers' Association) All other Provincial

Apiarists officio – with the exception of Saskatchewan:

- Paul van Westendorp (BC)
- Rhéal Lafrenière (MB)
- Julie Ferland / Gabrielle Claing (QC)
- Chris Maund (NB)
- Jason Sproule (NS)
- Cameron Menzies (PE)
- Karen Kennedy (NL)

Sam and Paul have aimed to focus on facilitating the ideas, concerns and goals brought forward by the committee members, partners in the Canadian Food Inspection Agency, Canadian Honey Council, other industry members and the CAPA Executive Committee. The membership of the committee includes a great deal of scientific, regulatory and policy expertise and has collectively formed the options, and recommendations provided by the committee. In particular, there were several technical summaries that were organized by

individual committee members. The committee has also networked with the CAPA Africanized Honey Bee Committee for further scientific and technical expertise.

Communication Structure:

The Co-chairs communicate directly with Connie Rajzman (Senior Veterinary Officer with the CFIA) on requests for technical information from the committee. These are relayed back to the committee for comment. Major, and general developments are regularly reported to the committee, the CAPA Executive Committee, the Canadian Honey Council (Rod Scarlett - Executive Director; Scott Plante – President and Allan Campbell – Communications Chair) and with Provincial Apiarists outside of the committee. The CAPA Executive may also be consulted on high priority or contentious items as the need arises.

California Queens and Africanized Honey Bees (AHB):

In early 2019 the committee met on numerous occasions to discuss the 100 mile exclusion zone in California which was created to prevent the introduction of AHB into Canada. A major development was the increase in distribution and spread of AHB in California, reported in a recent research paper (Lin *et al*., 2018). Key issues were AHB being detected within this zone, the implications of shrinking the exclusion zone, the distribution of queen producers and AHB in California in relation to the zone, methods used to test AHB, other options for exclusions zones, and California's inspection, sampling process, and surveillance AHB program.

There were many and still are unanswered questions regarding the current inspection program in California, such as how the distribution of AHB in California is determined, and where, how and how often do inspectors sample for AHB. CFIA was asked for clarification on this process but they were unable to get a clear overview. Both the CFIA and the committee concluded there are gaps in the available information related to AHB and the USA (particularly the distribution, process of surveillance and testing protocol) and that further information is required.

With the recognized information gaps the committee gathered scientific and technical information on subjects such as *methodology for determining Africanization (with considerations on availability, cost, feasibility and recognition by regulatory authorities); mapped the locations where AHB were reported from the literature (Lin *et al*., 2018) and mapped the locations (base of operations) of known California breeders who have shipped honey bee queens to Canada in the past. This technical information was used to develop options which were framed with pros and cons and discussed by the committee. Further issues related to AHB (detection methodology and aspects of risk) are also covered in the CAPA AHB Committee report.

*This information was provided through the CAPA Africanized Bee Committee.

Three options and other measures were discussed and voted on by the committee.

- Option 1) Reduce the 100 mile limit for the exclusion zone
- Option 2) Reduce the 100 mile limit plus other measures
- Option 3) Stop the importation of queens from mainland USA
  - Other measures A): Additional and / or more regular inspections of the CA operations

- Other measures B): The use of different / updated molecular testing
- Other Measures C): Trace-outs required by Provincial Apiary Programs from importers and producers

The committee voted for Option 1, to shrink the 100 mile limit but could not reach a consensus on what distance it should be.

Consensus was reached on the following measures:

- The frequency for testing AHB (mitochondrial DNA) should be done every 90 days.
- A new method for AHB detection such as single nucleotide polymorphism (SNP) test should be used when it becomes available.
- The distance requirements should be measured from the mating yard not the county.

The committee brought our recommendations to the CFIA. The CFIA shrunk the exclusion zone from 100 to 50 miles. The 50 miles zone will be measured from breeding/ production yards.

The issue of AHB provided further context on past, current and future working process that could be of broader value to CAPA. At various points in the discussion on options developed by the committee and examining how previous protocol was decided upon many gaps were encountered. In particular, current committee members were not able to cite past decisions and or protocol. This underlies the need for better communication and coordination within committees, specifically ensuring that important decisions from CFIA are made aware to all. Given that CAPA members change over time, there may be an overreliance on verbal memory. Better records of rationale and supporting documents will allow future CAPA and committee members to continue to work on issues, and understand why and how decisions or recommendations were made.

In addition, there was a lot of technical information gathered and summarized for the options on AHB. This information was particularly important for providing a background rationale on each of the options. While it may be out of the scope of this report, it may be of value for some of the technical information to be further summarized for future reference, perhaps in an appendix or further report to CAPA.

Canada / USA Border:

In August 2019, an Ontario beekeeper had his shipment of honey bee queens to the U.S. rejected at the border. On September 4, 2019, the CFIA received confirmation from the United States Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) that the U.S. border was officially closed to honey bees being exported from Canada. Prior to the border closure, Canadian beekeepers could export honey bee queens to the USA.

There are a few beekeepers in Canada who have business with and/or export queens to the U.S. On September 6, 2019, the U.S. Department of Agriculture (USDA) advised that the decision to temporarily close the border to Canadian bees is due to a perceived risk from Canada allowing the import of bees from Denmark, Chile and Australia. The USDA has concerns regarding the pest and disease status of bees coming to Canada from those exporting countries.

The Canadian Food Inspection Agency (CFIA) is responsible for providing and coordinating pest and disease information on Canada's honey bee population to the USDA / APHIS. The CAPA Bee Importation and Movement Committee coordinated the collection of inspection, regulation, apiary statistics and pest and disease data from the provinces (including the summaries of the 2 most recent years of Provincial Apiarist Reports, the 2 most recent years National Honey Bee Surveys and a questionnaire for the provinces) and provide this to CFIA.

As per the USDA's request, the CFIA sent a revised risk assessment of honey bees in Canada in late summer. APHIS are expected to conduct a risk assessment on the health of bees in Canada and will review the information submitted by the provinces to make a determination on the boarder and are likely to request information from Canadian provinces. At this time, the most recent communication on this issue from the CFIA is that the USDA intends to make a decision officially by March 2020 and possibly sooner.

Movement Across Canada:

Honey bee movement harmonization across Canada was brought to the committee by the Canadian Honey Council. At this point we have asked every province for a summary of their interprovincial movement guidelines including primary contacts, government websites for more information, inspection requirements, special conditions and requirements etc. The intent is to give this information to the Canadian Honey Council so that they will have on hand all the requirements of each province to make it easier for beekeepers to find the information required to move bees/equipment/queens interprovincially.

Canadian Food Inspection Agency Risk Assessments of Italy and Malta, and Ukraine:

In 2019, the CFIA undertook two risk assessments (RA) of three countries to determine if they could potentially import honey bee stock (queens) to Canada from Italy and Malta (joint RA – May 2019) and Ukraine (Oct 2019).

This CFIA's risk assessment process is based on the approach recommended by the World Organisation for Animal Health (OIE). A literature review was conducted to determine if disease agents or pests could be considered hazards based on a set of inclusion criteria. This was followed by a qualitative assessment of the risk associated with potential hazards. Identified uncertainties were taken into account in this risk assessment. The CFIA requested further technical review from the CAPA BIM Committee to identify additional risks, and potential mitigation measures through protocol. The committee reviewed both RA's and provided these directly to the CFIA. Some suggested protocols that were developed through committee discussion, such as sampling for varroa, may be beneficial protocol for within and between provinces.

Italy / Malta:

Two potential hazards were identified with the importation of honey bee queens from Italy and Malta: small hive beetle (SHB) and amitraz-resistant Varroa mites.

Although historically free of SHB, SHB was detected in the Calabria region of Italy in 2014 and detections continue to occur. Italy has implemented surveillance and controls, including sentinel apiaries throughout the country. Movement restrictions are in force for commodities including honeybees, bumblebees and their products and related equipment.

Ukraine:

Two potential hazards were identified with the importation of queen honey bees (plus attendants) from Ukraine: American foulbrood (AFB) and amitraz resistant Varroa mites (rVAR).

Both RA were quite extensive and took into account the demographics, geography, regulations and government resources. The final conclusions of the RA's are outside of the scope of this report at the time of writing.

Asian Giant Hornet (ASG):

The information below is a summary of CAPA emails from Paul van Westendorp.

Vespa soror - May 2019 - Vancouver harbor. Originally identified as *Vespa ducalis* but later assessment revised and concluded to be *Vespa soro*. Specimen was submitted and preserved at the Beaty Biodiversity Research Centre at UBC, and it was concluded to be a queen. No other reports of hornets were received since May and is assumed to be a single introduction.

Vespa basalis - July 2019 - Richmond. Report was a photo, not verified with actual specimen.

Vespa mandarinia - August 2019 - Nanaimo. Two independent sightings. A single nest was found and destroyed. Believe that the nest was eradicated prior to the emergence of queens, but recognize the possibility that some may have dispersed. Hence, plans are made to monitor next spring/summer.

Vespa *mandarinia* - November 2019 - White Rock. Hornets are currently in winter mode and only mated queens are wintering on their own (same as your standard Yellow jacket and Bald-Faced Hornet). Their presence will not be apparent until emergence sometime in the spring.

How, why and by whom these hornets are brought to Coastal BC remains unknown. BC is currently developing a comprehensive monitoring program for 2020 with various agencies and organizations including local government and beekeeper associations.

BC Monitoring program currently being developed, includes:

- Feeding station(s) with bait set up at locations where hornets have been sighted.
- Feeding stations must be staffed to catch any visiting ASG.
- Locating nests will be done through two methods;

1. ASG will be cooled and a 'streamer' ribbon will be applied. ASG will be released and will be followed for indication of nest direction. New feeding station will be set up and process repeated.

2. Captured ASG will be cooled and equipped with a radio tag. After release, receiver will be employed to locate the tagged hornet and search for the nest location.

- Nest eradication will take place through application of CO2 followed by placing specimen into container with iso-propyl alcohol.
- Implementation of this monitoring program involves the public submitting images of hornets or actual specimens, with detailed description of location(s).

- Local beekeepers are also requested to monitoring their colonies closely for hornet visits.

Connie Rajzman from the CFIA informed us that the Plant Health group are putting together a Border Lookout for Canadian Border Services Agency to carefully inspect clay/ceramic pots and other rounded or cylindrical containers for the presence of all life stages of hornets mostly from the East – Asia and Russia. They wanted to know if the committee wanted to add anything. The committee received one response concerning the focus being only on clay/ceramic pots and not other bulk materials etc. where the hornets could be present.

References:

Lin W, McBroome J, Rehman M, Johnson BR (2018) Africanized beesextend their distribution in California. PLoS ONE 13(1): e0190604. https://doi.org/10.1371/journal.pone.0190604 kimberley.leclerc@ontario.ca

MOTION: **Motion to accept the Importation Report as presented.**
MOVED BY: **Medhat Nasr**
SECONDED BY: **Les Eccles**
CARRIED

IPM Report
Paul Kozak (on behalf of Jason Sproule)

2019 CAPA Integrated Pest Management Report

Prepared by: Jason Sproule

Committee members have not had opportunity to contribute or provide edits to the report. The following report contains updates to the status of 2 treatments, a monitoring tool, a summary table of all pesticides registered for use in apiculture as well as an addendum of relevant updates from Ontario.

HopGuard II

Hopguard II is biopesticide miticide formulated as a strip impregnated with Potassium salts of Hop Beta acids for control of Varroa mites. A registration package was submitted by Agriculture and Agri-Food Canada's Pest Management Centre to Health Canada's Pest Management and Regulatory Agency (PMRA) in July 2017. PMRA released their Proposed Registration Decision (PRD) to approve the registration for commercial use of HopGuard II and the proposed pesticide label. The PRD was then subject to a 60-day public consultation period. Receiving no comments, PMRA published a final Registration Decision on October 31, 2019, consistent with the PRD.

Fumagillin-B

Fumagilin-B is an antimicrobial used in the treatment and prevention of Nosemosis, a disease caused by microsporidian pathogens: *Nosema apis*, and *Nosema cerenae*. In April of 2018, Medivet Pharmaceuticals announced plans to shut down operations. Canadian Honey Council (CHC) has been working with Medivet and Health Canada to transfer the DIN # and procure a new supplier for the active ingredient: fumagillin

dicyclohexylamine. With the goal of ensuring timely access to the product for fall treatments, CHC submitted an Emergency Drug Release request to Health Canada in August. The IPM committee and CAPA Executive provided a letter in support of this, outlining need and some technical considerations. Fumagillin-B was then made available through major bee suppliers in time for fall treatments.

VITA honey bee diagnostic kits

VITA Bee Health produces test kits for diagnosis of American foulbrood and European foulbrood. The kits involve macerating infected material in test solutions and then applying the solution to a test strip for real-time verification of either diseases. These kits were not available in Canada. Beginning in late 2018, the Committee discussed the utility of these test kits as tools for field diagnosis in Canada. At the behest of the Committee, VITA agreed to send a limited supply which would be distributed via Bee-Maid. Kits are now regularly available through many Canadian bee supply stores.

Registered Pest Control Products for use in Apiculture

Product	Active Ingredient	Formulation	Registrant	Registration Expires
Mites				
Hopguard II	Hop Beta acids	Strip	Betatec Hop Products Inc.	2024-12-31
Oxalic acid	Oxalic acid dihyrdate; Ethanedioic acid	solid	Canadian Honey Council	2020-12-31
Formic acid	Formic acid (65%)	Liquid (for tracheal mite)	NOD Apiary Products Ltd.	2019-12-31
Formic acid	Formic acid (65%)	liquid	Medivet Pharmaceuticals Ltd.	2021-12-31
Mite Away Quick Strips	Formic acid (46.7%)	Gel strip	NOD Apiary Products Ltd.	2023-12-31
Formic Acid	Formic acid (65%)	Liquid for Mitegone ready to fill kits	MiteGone Enterprises int. (Vaclav)	2024-12-31
Bayvarol	Flumethrin	Strip	Bayer Inc.	2021-12-31
Apistan	Fluvalinate-tau	Strip	Wellmark International	2020-12-31
Apivar	Amitraz	Strip	Veto-Pharma	2022-12-31
Thymovar	Thymol	Impregnated Wafer	Sylvar Technologies Inc.	2020-12-31
Checkmite	Coumaphos	Strip	Bayer Inc.	2020-12-31
Small Hive Beetle				

Perm-Up	Permethrin	EC	United Phosphorous Inc	2024-12-31
Checkmite	Coumaphos	Strip	Bayer Inc.	2020-12-31

Addendum

Prepared by Paul Kozak

Thymol - Thymite™ Pre-Submission Consultation to the PMRA (Health Canada) for the registration of the U of G (Honey Bee Research Centre) thymol formulation

- High efficacy formulation using thyme oil (developed by the University of Guelph – Honey Bee Research Centre), low impact on bees, very economical for beekeepers; an active ingredient that is not being used by most beekeepers in Ontario / Canada
- October, 2019: Pre-submission consultation package sent to Health Canada (PMRA) from OBA
- November 2019: Health Canada (PMRA) responds to OBA; discussion on further requirements for a testing

Mid-Season Treatments

- ON Tech Transfer is wrapping up a project on efficacy of treatments that may be used during a honey flow in order to suppress the development of varroa levels (Les Eccles has more information on this and the project would be covered in research reports). 2 oxalic and 1 formic acid application.
- Residue samples are collected and may be analyzed (proposed project under review)
- This is an initiative that several provinces are interested in (AB, MB, etc.).
- This may be a future goal for expanding the label use of formic acid and / or oxalic acid.

Screening for *Varroa* Resistance:

- There are multiple provinces tracking this issue, and it has been listed in several provinces as a concern from beekeepers (including Ontario).
- Some provinces are tracking this through follow-up by Apiary Inspection programs as beekeepers report concerns, while others are run through surveillance program (Alberta – Shelley Hoover and her team; Ontario – project conducted in 2018).
- I am not sure what to write further on this item (there is much more information that could be summarized) but it is one that a lot of provinces and their beekeepers are interested in.

Discussion:

Formic pro is a new product, it has not been included in the report, but is has been in wide use this year. There has also been brought up in conversations the possible use of BT for wax moth control, and that Canada might want to consider.

Formic acid from Medvet will move to Vita Europe, and they will assume the production and distribution of formic acid.

Is there some evidence that miticide (Apivar) resistance exist in Canada, as well as antibiotic resistance to AFB? We are not tracking resistance in the IPM committee. That will be covered in each PA report and it has also been tested at the National Health Survey.

Hopguard 2 will be on the market through Mannlake. Canadian distributors will buy from Mannlake and distribute here in Canada. Hopguard 3 is not available in the Canadian market yet.

MOTION: **Motion to accept the Chemical Report as presented.**
MOVED BY: **Heather Higo**
SECONDED BY: **Rob Currie**
CARRIED

Awards Report
Rob Currie

It was a busy year for the awards committee. As noted below, we have plans to order more of the statuettes and if we go forward with this plan we will likely order a large number.

CAPA AWARDS COMMITTEE REPORT 2019

Rob Currie (Chair)

Members: Martine Bernier, Samantha Muirhead, Nicolas Tremblay, Rhéal Lafrenière, Paul van Westendorp, Mylee Nordin, Ernesto Guzman, Shelley Hoover (Ex Officio)

Student award of merit:

The selection committee was chaired by Samantha Muirhead. There were five excellent applicants from the competition for the CAPA Student Merit Award. Following deliberation the selection committee chose, Ms. Sarah El Khoury, a Ph.D. Student from the University of Laval.

CAPA Outstanding Service Award:

There were no nominations for the CAPA Outstanding Service award this year. The outstanding service award has traditionally consisted of a bronze statuette and a letter of recognition from the President. Since we are running low, or out of statuettes we were asking to investigate the possibility of getting more and potential costs or propose alternatives. Working in close association with the Chair of the Archives committee, we were able to locate the original artist (George Foster- for details see Archive report) and have requested estimates for getting additional copies of the award made up. The existing molds were retained by the artist and he is investigating what needs to be done to produce additional copies. At the time of writing this report those estimates are not available.

Previous winners are not recognized on the Society's website. The committee recommends that a sub-page be set up as is done with the student award of Merit and the names, years and positions of individuals receiving the award should be recorded along with photographs of them receiving the award (where available). The

names of awardees and a notation of photographs we are missing are listed in the archives report. Anyone with photographs of the award presentations should contact Rob Currie

CAPA Travel Award

The awards committee developed criteria and procedures to provide awards to assist travel of students and members to encourage attendance at Apimondia in Montreal. Awards were developed with the philosophy of trying to allow as many to attend as possible with the available funds and to facilitate travel of not only students but other members of CAPA that might have difficulty obtaining sufficient funds to allow them to attend. The award criteria and procedures are appended to this report. In all we were able to approve funding of up to a maximum of $800 to subsidize the travel of 17 individuals to attend the meeting. Only one application was rejected due to not meeting the eligibility criteria, two were approved but withdrew their applications.

We had broad coverage across the country with representation from BC(6), AB (4), SK(4), MB(2), ON(1). Of these, 5 M.Sc., 3 Ph.D., 5 Post Doc, 2 Tech Transfer and 2 Researchers were represented.

CAPA Apimondia Travel Awards

The Canadian Association of Professional Apiculturists is offering travel awards to assist Students, Post Doctoral Fellows and Apicultural extension professionals to attend or present at the Apimodia Congress in Montreal in September 2019. Funding will be provided to supplement that not covered by other sources with the amount available to each applicant restricted by demand on available funds. Student and Post-Doc awards are restricted to applicants studying at a Canadian Institution or to Canadian citizens studying outside of Canada. Awards to apicultural professionals are restricted to CAPA members.

In making requests for support, applicants should indicate what funding will be supplied by other sources such as volunteer activity at Apimondia, other travel grants (e.g. University), other travel funding support e.g. from Supervisor. Eligible expenses include; Registration, Airfare (or other modes of transport), Hotel, Meals (diem rates for meals not covered by other sources). Applicants will be notified of the maximum level of support available to be provided prior to the meeting. Eligible costs will be reimbursed upon submission of receipts to the CAPA Awards Chair, Dr. R.W. Currie, Department of Entomology, University of Manitoba, Winnipeg, Manitoba, Canada. Funding decisions will be made by the awards committee.

In order to be considered for funding applicants **must** present a paper or poster or poster at the meeting or for extension applicants, provide a statement as to how knowledge gained from the meeting will be used in technology transfer. Applications for the Award funding must be submitted by July 1, 2019.

CAPA travel grant award

Dear xxxxxxx:

The CAPA awards committee has reviewed your application for a travel grant to attend Apimondia in Montreal in 2019. We are pleased to inform you that you have been approved for funding of eligible expenses of up to $800. Eligible expenses were outlined on the application form and include

Accommodation, transportation, meeting registration and per diem meal expenses that <u>are not covered</u> by other sources.

Claims will be processed at any point after the meeting is finished but must be submitted before October 18th, 2019. Claims (including scanned copies of receipts) can be submitted to Rob.Currie@UManitoba.ca. Please include CAPA TRAVEL AWARD CLAIM in the header of the e-mail.

Apimondia volunteer	*Do not claim hotel or lunches or registration below	
Other Travel Grants	Indicate $$ support received	$
Supervisor/Institute support	Indicate $$ support received	$
Other Support	Indicate $$ support received	$
Expense category		
Registration		$
Airfare/transport (taxi/train)		$
Hotel		$
Meals/per diem*		$
TOTAL REQUESTED FROM CAPA		$

*Per diem rates Breakfast, $15; Lunch $15; Supper $30;

Please include receipts for airfare, registration and hotel (if room is shared claim portion of bill and indicate who else shares in the room receipt).

MOTION: **Motion to accept the Awards Report as presented.**
MOVED BY: **Steve Pernal**
SECONDED BY: **Medhat Nasr**
CARRIED

CBRF Report
Valérie Fournier

We have received 5 CBRF grant applications this year and we will be doing the evaluations later in February. The average amount that we give out is the average 2-year in the capital fund and this is fairly stable.

We got 3 applications for the Siddoo scholarship, which will be evaluated at the same time as the CBRF.

MOTION: **Motion to accept the CBRF Report as presented.**
MOVED BY: **Rob Currie**
SECONDED BY: **Paul Kozak**
CARRIED

Non-Apis Report
Paul van Westendorp

CAPA – Non Apis Pollinator Report 2019-20

Committee: Rob Currie, Patricia Wolf-Veiga, Graham Parsons, Paul van Westendorp (chair). (Kenna Mackenzie, Robyn McCallum, David Ostermann and Ana Montero-Castano have either retired or moved to other positions).

Bumble Bees

Biobest of Leamington Ontario, a leading supplier of bumble bee nests for greenhouse pollination, has recently received approval and started selling Hunts Bumble Bee (*Bombus huntii*) for open pollination of field crop applications. *Bombus huntii* is a local/native species to Saskatchewan prairie regions and is generally considered safer than the introduction of non-native Bombus species.

Current use appears to be limited to a handful of haskap and orchard producers but may expand. This provides a new opportunity for those producers requiring a robust, effective pollinator. But it also provides challenges. Literature and recent data (Corey Sheffield, Royal Saskatchewan Museum) suggest that managed bumble bees have higher incidence of diseases and pathogens than wild populations. Transfer of pathogens of managed bumble bees in field applications is likely but even in greenhouses, bumble bees often escape and may spread these pathogens to wild populations. The increased use of managed pollinators demands regular surveillance in the future.

Alfalfa Leafcutting Bees

Producers of Alfalfa leafcutting bees *Megachile rotundata* experienced economic challenges in recent years because of high quality seed production across Prairie provinces and south of the border. Conditions were also excellent for bee production which resulted in an oversupply of leafcutting bees and alfalfa seed.

In early 2017 the price for one gallon of bees (10,000 live cocoons) was $100 or more. Since late 2017, the price dropped to $10 or less. To reduce their supplies, most beekeepers are scaling back on acres they pollinate while simultaneously using high stocking rates. When using high stocking rates, bees compete for forage resources and produce fewer offspring. Economic projections indicate that prices of bees and alfalfa seed remain depressed for another couple of years.

With the low price of bees, some producers have been exploring new pollination opportunities. The placement of bees near canola fields and similar crops can demonstrate improved crop yields to farmers. Such pollination services may offer alternative revenue streams for leafcutter bee producers in the future.

Blue Orchard Mason Bees (*Osmia* spp.)

There are approximately 300 species of Osmia. In North America, the most commonly managed species is *Osmia lignaria* which is distributed across the continent. The species is comprised of two distinct subspecies *O. lignaria propingua* of Western Canada and *O. lignaria lignaria* distributed in Eastern Canada.

Since the 1990s, Blue Orchard bees (BOB) cultivation earned increased popularity because of low cost, minimal management requirements, and suitability for urban settings. Additional popularity was gained after various nesting designs were introduced at nurseries, garden centres and even big box stores.

BOBs face a host of predators and diseases whose incidence vary from region to region and from year to year. There are various species of Chalcid wasps that prey on developing cocoons. BOBs can also be affected by Chalkbrood (*Ascosphaera sp*) and hairy-fingered mites (*Chaetodactylus sp*).

There are no federal or provincial regulations in place that govern the shipment of BOBs across the country. Since there is little data available of the distribution and prevalence of pathogens and diseases, and the risks associated with their spread, it may prove difficult to justify the need for regulations.

Additional Developments

- In Manitoba the Pollinator Workshop has set up a website to promote habitat development for pollinators at http://beebettermb.ca/
- David Ostermann's position has not been refilled. He was responsible for leafcutter bees and pollination issues in Manitoba.
- At UoManitoba, Dr. Kyle Bobiwash and Dr. Jason Gibbs were appointed to the Department of Entomology since 2018. Their research priorities include native pollinator ecology and insect taxonomy respectively.

MOTION: **Motion to accept the Non-Apis Report as submitted**
MOVED BY: **Valérie Fournier**
SECONDED BY: **Cameron Menzies**

Publication Sales Report
Stephen Pernal

CAPA Honey Bee Diseases and Pests Publication Sales Report 2019 (3rd Edition)

Orders Filled in 2019

Invoice #	Date	Purchaser	# of Units
-	11 jan 19	Steve Pernal	2
19-01	14-Jan-19	OBA TTP	110
19-02	20-Jan-19	Heather Fenton	50
19-03	25-Jan-19	Mann Lake - Wilkes-Barre	75
19-01-FR	30-Jan-19	Centre de formation Mirabel	33
19-04	03-Feb-19	SBDC	60
19-05	03-Feb-19	Don Fowler	20
19-06	12-Feb-19	Joseph Belsky	1
19-07	12-Feb-19	Nicole Robinson	1
19-09	12-Feb-19	Sue Connelly	1
19-10A	13-Feb-19	Nicole Jewett	1
19-08	18-Feb-19	Erika Butcher	1
19-10B	18-Feb-19	Veronika McCabe	1
19-11	18-Feb-19	Vanda Wood	1
19-12	18-Feb-19	Sonya Detlow	1
19-13	18-Feb-19	Vanessa Lafontaine	2
19-14	26-Feb-19	Honey Exchange	20

= US purchasers
= overseas purchasers
= spanish version
= french version

19-15	26-Feb-19	Okanagan Bkprs	40
19-16	26-Feb-19	Mike Speke	1
19-17	26-Feb-19	Britteny Kyle	1
19-18	04-Mar-19	Cheryl Walker	1
19-19	04-Mar-19	Mary Vonderporten	2
19-20	04-Mar-19	BCHPA	25
19-21	08-Mar-19	Black Bear Acres	50
19-22	08-Mar-19	Bee Culture Solutions	85
19-02-FR	11-Mar-19	André Pettigrew	16
19-23	21-Mar-19	Diane Dunaway	10
19-24	21-Mar-19	Jennifer Dilfer	30
19-25	15-Apr-19	Urban Bee Supplies	30
19-26	15-Apr-19	Paul Norwood	1
19-27	15-Apr-19	BC Bee Supply	50
19-28	26-Apr-19	Cecilia Addy	1
19-29	26-Apr-19	Steve Wohlleben	1
19-30	01-May-19	OBA TTP	55
19-31	30-May-19	Jeff Johnson	2
19-32	30-May-19	Evan Laye	1
19-33	30-May-19	Root Candles/Bee Culture	10
19-34	30-May-19	Jeff Smythe	1
19-03-FR	10-Jun-19	Jean-Simon Dion	2
19-35	11-Jun-19	Erin Ramsay	2
19-36	18-Jun-19	Black Bear Acres	0
-	19-Jun-19	Shelley Hoover	3
-	19-Jun-19	Steve Pernal	10
19-37	04-Jul-19	Shelley Hoover	30
19-04-FR	04-Jul-19	Shelley Hoover	15
19-39	17-Jul-19	Two Hives Honey	15
19-40	23-Jul-19	Frank Wyatt (Books and More)	12
19-41	07-Aug-19	John Crace	1
19-38	13-Aug-19	Ernesto Guzman - U of G	12
19-42	06-Sep-19	Matt Nolte	2
same	06-Sep-19	Matt Nolte	5
19-43	17-Sep-19	Mann Lake - Wilkes-Barre	75
19-05-FR	15-Oct-19	Marie-Hélène Majeau	1
19-44	17-Oct-19	Beemaid	55
19-45	17-Oct-19	Betterbee	40
same	17-Oct-19	Betterbee	10
19-06 F	25-Oct-19	Pierre Moreau	1
19-06-FR	25-Oct-19	Pierre Moreau	1

19-46	04-Nov-19	Brooke Decker	1
19-47	04-Nov-19	Niagara College	12
19-48	04-Nov-19	Vanessa Oliver	1
19-49	12-Nov-19	Becky Gray - UMaine	15
19-50	12-Nov-19	Universidad de Guadalajara	31
19-51	26-Nov-19	Mann Lake - Wilkes-Barre	75
19-52	26-Nov-19	NC Bee Education and Training Inc.	50
19-53	12-Dec-19	Brooke Decker	1
19-07-FR	13-Dec-19	Centre de formation Mirabel	17
19-54	18-Dec-19	Hiveworld	20
19-55	18-Dec-19	Northern Healthy Foods Initiative	25
19-56	19-Dec-19	NC Bee Education and Training Inc.	20
same	19-Dec-19	NC Bee Education and Training Inc.	10
Cash			12
		TOTAL:	**1375**

(APIMONDIA NOT INCLUDED)

		# purchasers	**# copies**		
			english	spanish	french
	= US purchasers	16	229	80	0
	= overseas purchasers	1	0	1	0
	= spanish version (total)	7	-	171	-
	= french version (total)	7	-	-	97

APIMONDIA	Sept 2019	English version	95
APIMONDIA	Sept 2019	Spanish version	43
APIMONDIA	Sept 2019	French version	26

MOTION: **Motion to accept the Publication Sales Report as submitted.**
MOVED BY: **Heather Higo**
SECONDED BY: **Chris Maund**
CARRIED

Research Report
Valérie Fournier

We were asked by CHC to set research priorities for the next fall AGM meeting/research priority workshop. First, these discussions will happen at the provincial level and at the fall meeting we will discuss the priorities set by each province at the national level.

Some of the topics already raised are:

- Bee health
- Queen health
- Genetic selection
- Pollination (e.g. blueberries, canola)
- Emerging threats (e.g. Crithidia)
- AFB surveillance
- Probiotics
- Nutrition (e.g., nutritional supplements during pollination)

There is an interest to make a sub-committee for *Varroa* resistance (proposed by Rassol Bahreini). This item will be discussed at the joint CHC meeting tomorrow.

MOTION: **Motion to accept the Research Report as submitted.**
MOVED BY: **Paul Kozak**
SECONDED BY: **Medhat Nasr**
CARRIED

Full Research Committee Report in Appendix 5

Communication Report
Melanie Kempers

2019 COMMUNICATIONS COMMITTEE REPORT

Committee Chair: Melanie Kempers

Concern over personal data being available on our CAPA website, the members listing was made private and is not available. This is a flaw within the Wordpress system and I have yet to find a solution. Even being behind the members-only section which requires being signed-in to access the list of documents, files can be searched for with a search engine and can be found that way. Perhaps a members listing should not be posted on the site anymore, however, membership listings are always incorporated into the annual reports, which are still posted within the members only section. The only way in which these files are found is if someone searches for a specific name, or word set. i.e. Google search for Melanie Kempers, and a CAPA annual report will show up. Some members have personal phone numbers or emails attached to their members listing, and therefore concern has arisen. I will continue to search for ways in which to make documents "unsearchable" by search engines, but for now, there's no current answer.

My suggestion would be that the members listing at the end of annual reports only have names, and no contact info. This will not fix the fact that all previous versions on the site already have membership listings posted. Those sections of the reports could be removed and reposted without membership listings. This solution may be against by-laws, or historical archive aspects? There must be a way to easily make files more secure, but I haven't had time to find it at this time. Suggestions welcomed.

Analytics did not run for 2019, as expected, so no user/traffic data is unavailable. The settings have been reset and will be checked for functionality within the month to ensure it is working.

Our webhost remains to be Kleurvision, and CAPA owns capabees.com, capabees.org and capabees.ca.

MOTION: **Motion to accept the Communication Report as submitted.**
MOVED BY: **Renata Borba**
SECONDED BY: **Ernesto Guzman**
CARRIED

Africanized Bee Report
Ernesto Guzman for Amro Zayed

Discussion on how the US tests for Africanization. The importation committee will be working with the Africanization committee in the US to gather more information on this topic. The state apiarists do the test and send the certificate. In the US the states have a lot of power, so it is not federally regulated. It is difficult sometimes to get the information from the states. We want to have more clarity on the process that is happening there.

Report on Africanized Honey Bees, 2020

Africanized bees and their range in the US

Africanized honey bees (AHB) are a highly aggressive and invasive hybrid strain of honey bees that is derived from the African honey bee subspecies *Apis mellifera scutellata* with minor genetic contributions from West and East European honey bee races that were present in South and North America prior to the invasion of AHBs in 1956. The USDA (http://www.ars.usda.gov/research/docs.htm?docid=11059&page=6) has confirmed the existence of AHBs in the following states: California, Nevada, Arizona, Utah, New Mexico, Texas, Oklahoma, Louisiana, Arkansas, Florida, and Georgia. Some AHB colonies were reported from Alabama and Tennessee, but it is not clear if AHBs have established in these areas. AHBs where recently confirmed in the East Bay area (near San Francisco), suggesting that AHBs are slowly expanding their northern distribution in that state (Kono and Kohn, 2015).

In 2017, researchers did confirm the expansion of AHBs in California (Lin et al., 2018); Lin et al collected 2699 bees from California and tested for AHB genetics using a maternal mitochondrial DNA marker. Lin et al. confirmed that the northern counties of Napa and Sacramento now appear to be the northernmost range of AHBs in California. A few counties north of Sacramento where sampled (e.g. Butte and Shasta) but AHBs were not found. It is important to note however that Lin et al. did not sample many counties north of Sacramento and Napa, and when they did, they often sampled a small number of workers (e.g. only 6 bees were collected from Yolo county). Another important caveat to consider is the standard mtDNA test employed by the researchers is not an ideal test (see ***detecting methods***).

Risks to Apiculture in Canada

The Canadian Food Inspection Agency (CFIA) published a *"Risk Assessment on the Importation of Honey Bee (Apis mellifera) Packages from the United States of America (V13),*

September 2013." The CFIA noted that

"*…AHB presents a threat to the public and animal health, as well as to Canadian beekeeping industry, because of the significant impact on productivities and potential trade issue with live honey bee material*"

The CFIA estimated AHBs Entry Risk Probability as "Moderate to High" , Exposure Risk Probability as "Small", Consequence Risk Estimate as "Moderate", and overall Risk Estimate as "Low to Moderate".

Annual movement of hives in the US, including from states that are known to have AHB to states that currently do not have AHB continues to be an area of concern for introducing AHBs in Canada. Swarm dispersal across the border is always a possibility, even though there have been no cases of AHB spreading into Canada through that route. Another potential risk factor is the threat of AHBs invading into regions that currently supply most of Canada's imported queens and bee packages, such as Hawaii, northern California, Chile, New Zealand and Australia. It is therefore important that the surveillance and testing used to monitor the occurrence of AHB around the world continues to be a high priority.

Detecting AHBs: mtDNA and morphometrics

There are two methods that are currently used to detect AHBs: Morphometric measurements and mitochondrial (mt) DNA testing. Both methods suffer from some setbacks. First, it is not clear if morphometric measurements are effective at detecting hybrid colonies. Second, mtDNA analysis fail to detect colonies with European queens mated with one or more Africanized drones because mtDNA is maternally inherited – all workers and drones from this colony will carry the European queen's mitotype. The CFIA's latest risk assessment noted this:

"*Certifying populations free of AHB is an issue. The mitochondrial DNA and the morphometric analysis used to identify Africanization in samples of bees are not 100% reliable; mitochondrial DNA is maternally inherited, and hybrids might not be detected through morphometric analysis because of the different degrees of*

hybridization (Guzman-Novoa, 2012)." [citation to Dr. Ernesto Guzman's CAPA AHB report, 2012]

and

"No further developments in identification methods have occurred; testing will not accurately detect the presence of Africanized stock in bee populations or packages."

Detecting AHBs: SNPs

In 2015, a new test for detecting AHBs was developed by Dr. Ben Oldroyd (University of Sydney Australia) and Dr. Amro Zayed (York University) that uses 96 single nucleotide polymorphisms (SNPs). SNP markers reside in the nuclear genome, are bi-parentally inherited, and should allow for estimating a continuous degree of Africanization (i.e. 0 to 100% African, versus mtDNA which provides a binary answer such as African or not African). The test, along with the sequences for the SNP markers and the procedure for testing bees, was published in two peer-reviewed journals (Harpur et al., 2015, Chapman et al., 2015). In Canada, a 25% African ancestry was empirically determined to be the threshold for classifying bees as AHBs (>25% African ancestry) or non AHB (<25% African ancestry).

The test has been shown to accurately (>>95%) detect AHBs vs. typical European managed bees in the US, Australia (Chapman et al, 2015), and Canada (Harpur et al, 2015). The Australian Government is currently assessing the use of this SNP test for screening imported honey bee semen (Dept. of Agriculture and Water Resources, Australian Government. Importation of Honey Bee Semen: Draft policy review. 2015; http://www.agriculture.gov.au/SiteCollectionDocuments/biosecurity/risk- analysis/current-animal/draft-policy-review-importation-honey-bee-semen.pdf)

Currently, the cost of genotyping a single bee at 96 SNPs is substantial ($15 to $20). While suitable for testing semen, certifying colonies as AHB-free would require genotyping many individuals. A honey bee queen mates with 15 to 25 different males. Considering, a European queen mated with 1 out of 20, 2 out of 20, or 5 out of 20 African drones; the probabilities of detecting this level of Africanization if a SINGLE worker was tested are: 5%, 10% or 25% - too low to be acceptable (Zayed, analyses based on the binomial distribution. unpublished). Genotyping 50 workers would substantially improve the odds of detection to: 92.3%, 99.4%, and 99.9% respectively. However the cost of testing this many bees will be $750 to $1000 per colony. A recent study showed that 37 SNPs (out of the original 96 SNPs) can be used to study the ancestry of unknown honey bees, which reduces the cost of the SNP assay by one half to one third (Chapman et al., 2017)

A large scale applied research project funded through Genome Canada (Foster and Zayed, 2015) was recently announced and is expected to improve the cost effectiveness of this assay. The timeline for the updated test is 2 years. Nevertheless, it is important to lay the groundwork for recognizing SNP-based tests for AHBs as a potential CFIA's importation requirements. It is also important to CFIA to work with our queen suppliers to be prepared to meet this new requirement without disruption of queen imports. SNPs are becoming the 'gold-standard' for genotyping, and the current SNP test is significantly more accurate relative to its more historical counterparts.

AHBs in Canada

In 2016, the Canadian National Honey Bee Health Survey (https://www.gprc.ab.ca/doc.php?d=2016NHBHS), carried out by the National Bee Diagnostic Centre, tested bees from 314 apiaries (British Columbia, Alberta, Manitoba, Ontario, Quebéc and the Yukon Territory) for African ancestry using a mtDNA assay (see ***detecting methods***, above); the mtDNA tests were *positive* for Africanization in 26 apiaries (8.2%) and across all sampled provinces and territories. These samples where then independently analysed with a nuclear SNP test (see ***detecting methods***, above); all samples tested *negative* for Africanization (i.e. had African ancestries below the 25% threshold; they ranged between 0.6 to 15.9%).

Two possibilities can explain these conflicting results:

1) The mtDNA AHB test is reflecting African but not *A. mellifera scutellata* ancestry in our Canadian bees. Previous researchers have found African ancestry in managed honey bees from Canada, Australia, and Central/Northern US that may reflect importation of North African and Middle Eastern honey bees in the early 1900's (Harpur et al., 2015).

2) A number of AHB queens were accidently introduced into Canada; daughters of these queens hybridized with European colonies. This process, combined with selection against aggressive colonies, can over time lead to honey bees that have a mostly European nuclear DNA but an African maternal DNA.

Additional work is needed to better understand and put into context the results of the Canadian National Honey Bee Health Survey. Particular, additional tools that specifically track *A. m. scutellata* ancestry, and not generic African ancestry, would be very useful for interpreting the results from mtDNA and SNP testing.

Mitigation plans

It is important to continue to treat the risk of importing AHBs seriously. It is recommended that CAPA, CFIA, and provincial authorities collaborate to ensure that plans are in place to mitigate the risk of accidentally importing the highly invasive and aggressive AHBs into Canada; these plans should use the best tools for detecting AHBs. Provincial Apiary Programs should also develop protocols and strategies for responding to suspected or confirmed cases of AHB. Moreover, it is important to work with major exporting countries to ensure that the international queen bee supply chain is not contaminated with AHB genetics. It is important to note that the annual movement of hives in the US, including from states that are known to have AHB to states that currently do not have AHB, substantially increases the risk of introducing AHBs in Canada. Additionally, consideration should be given for developing a National AHB surveillance system and pest response plan within Canada. It is also important for the beekeeping industry and regulatory body across Canada to consider alternatives for queen sources if African bees have become a problem in regions that supply queens to Canada.

CHAPMAN, N. C., BOURGEOIS, A. L., BEAMAN, L. D., LIM, J., HARPUR, B. A., ZAYED, A., ALLSOPP, M. H., RINDERER, T. E. & OLDROYD, B. P. 2017. An abbreviated SNP panel for ancestry assignment of honeybees (*Apis mellifera*). *Apidologie*.

CHAPMAN, N. C., HARPUR, B. A., LIM, J., RINDERER, T. E., ALLSOPP, M. H., ZAYED, A. & OLDROYD, B. P. 2015. A SNP test to identify Africanized honeybees via proportion of 'African' ancestry. *Molecular Ecology Resources,* 15**,** 1346-55.

HARPUR, B. A., CHAPMAN, N. C., KRIMUS, L., MACIUKIEWICZ, P., SANDHU, V., SOOD, K., LIM, J., RINDERER, T. E., ALLSOPP, M. H., OLDROYD, B. P. & ZAYED, A. 2015. Assessing patterns of admixture and ancestry in Canadian honey bees. *Insectes Sociaux,* 62**,** 479-489.

KONO, Y. & KOHN, J. R. 2015. Range and Frequency of Africanized Honey Bees in California (USA). *PLoS One,* 10**,** e0137407.

LIN, W., MCBROOME, J., REHMAN, M. & JOHNSON, B. R. 2018. Africanized bees extend their distribution in California. *PloS one,* 13**,** e0190604.

MOTION: **To accept the Africanized Bee Report as submitted**
MOVED BY: **Les Eccles**
SECONDED BY: **Chris Maund**
CARRIED

Archives Report
Rob Currie

CAPA Archives Committee Report: by Rob Currie

This year we received a request for a copy of the Varroa Action Plan for Canada from 1988. Shelley Hoover was able to locate this in the CAPA Proceedings from a few years later. The 10 page document s been extracted and will be added to a CAPA "archives" directory that we intend to create on CAPA-L.

At last years meeting, the archives committee was asked to investigate the origins of the CAPA Outstanding Service Award. It was conceived in 2001 and first awarded in 2004. We also were able to track down the name of the artist who CAPA commissioned to create a brass casting of a queen bee to form the CAPA distinguished service award. The artists name is George Foster and he is located in Quebec. His contact information is e-mail Gofoster@abacom.com. 2069, Chemin Labbe, Ayres Cliff, Quebec, JOB 1CO 819 838-4365.

He still retains the molds and kept one original of the statuette to use a basis for manufacturing more if needed. A picture of the artist along with the queen statue and one of his other works is copied below. Our last record of purchase we could locate was for 3 of the statuettes in 2008 for $1286.12.

Past recipients of the award are not listed on our website. It would be nice if the recognition of this award could be displayed in a more public location as is done for the student merit award. A list of awardees compiled from the Proceedings is presented below. Photos of the presentation for the outstanding service award are contained in the proceedings only for John Gruzka and Medhat Nasr. If members have photos of the presentations to Dixon, Nelson, Winston, McRory, please let Rob Currie know.

Year	CAPA Student Merit Award	CAPA Outstanding Service Award
1999	Andony Melathopolus, M.Sc. Simon Fraser U.	
2000	Stephen Pernal, Ph.D. U Manitoba	
2001	No Award	
2002	Nathan Rice, M.Sc. Simon Fraser U.	
2003	Robyn Underwood, Ph.D. University of Manitoba	
2004	No Award	Don Dixon, Provincial Apiarist, Manitoba Agriculture
2005	Lora Morandin , Simon Fraser, U.	Don Nelson, Research Scientist Agriculture Canada Beaverlodge
2006	Shelley Hoover, M.Sc. Simon Fraser U.	Mark Winston, Professor, Simon Fraser University
2007	Rasoul Bahreini, Ph.D. University of Manitoba	
2008	Geoff Williams, M.Sc. Acadia	
2009	Queenie Chan, U. British Columbia	John Gruszka, Provincial Apiarists, Saskatchewan Agriculture
2010	Amanda Van Haga, M.Sc., U. Alberta	Doug McRory, Provincial Apiarist, Ontario Ministry of Agriculture and Food
2011	Suresh Desai, Ph.D. U. Manitoba	
2012	Martine Bernier, M.Sc., Laval	
2013	Brock Harpur, Ph.D. York U.	
2014	Graham Parsons, M.Sc. U. Manitoba	
2015	Olivier Samson-Robert, M.Sc, Laval	
2016	Courtney MacInnis, M.Sc. U. Alberta	
2017	Megan Colwell, Ph.D. U. Manitoba	
2018	Alison McAfee, Ph.D. U. British Columbia	
2019	Nadia Tsvetkov, Ph.D. York U.	Medhat Nasr, Provincial Apiarist, Alberta Agriculture

MOTION: **Motion to accept the Archives Report as presented**
MOVED BY: **Heather Higo**
SECONDED BY: **Gabrielle Claing**
CARRIED

Tech Transfer Team Report
Nicolas Tremblay

Prior to Apimondia, the Canadian and the American TTPs had a meeting to share information about each program.

Apimondia 2019 – BIP and the Canadian Tech Teams Meeting Agenda

Sunday, Sept 8th, 2019

In attendance from Canada: Nicolas Tremblay (Quebec), Renata Borba (Alberta), Hannah Neil (Saskatchewan).

In attendance from BIP (USA): Nathalie Steinhauer (UMD), Jeri Parrent (UMD), Dan Reynolds (UMD), Dan Aurell (Texas TT), Heather Eversole (UMD), Rob Snyder (California TT), Dan Wyns (Michigan TT), Dennis vanEngelsdorp (UMD), Matt Hoepfinger (California TT), Ben Sallmann (Oregon TT), Eric Malcolm (UMD), Karen Rennich (Executive Director, UMD), Nelson Williams (Minnesota TT), Geoff Williams (Auburn University), Anne Marie Fauvel (TT Coordinator UMD)

**See Directory of Participants at the end of the document for everyone's contact information*

Meeting Notes:

10:45-11:30am – BIP & Canadian Tech Team Presentations

Nathalie Steinhauer, Science Coordinator BIP, University of Maryland

Presented slides introducing BIP's many programs and then focused on the Tech Team Program across the nation. 1 team, 5 regions, California, Minnesota, Texas, Oregon, Michigan and the 17 states in which Tech Team Consultants provide sampling services including top 10 honey producing states. Nathalie showed the comparative data of *Varroa* prevalence and load between beekeepers in the Tech Team Program and APHIS national survey participants. Tech Team program participants have significantly lower *Varroa* prevalence and load. She also mentioned the different types of trials we perform, from industry, collaboration with other organizations and academic institutions, etc…

Hannah Neil from Saskatchewan presented slides on what the Tech Team does in Saskatchewan

SK "Technology Adaptation Team".

Bee Made honey coop – SK team sells their honey to this coop

Demonstration Projects:

Queen replacement

Hygienic testing

Spring pollen supplementation Organic acid treatment for Varroa Varroa sampling plans

Long-term projects:

Varroa and viruses

Prebiotic and Probiotic treatment for *Nosema spp*

Outreach & Education

Bee courses IPM, etc..

Future – hoping to provide

Provincial apiarist in SK – Will monitor mite loads upon request and will make house calls for all size operations to check for AFB and EFB

Nicolas Tremblay from Quebec:

Nicolas discussed his paid for sampling/inspection service rendered program in the Province of Quebec. Many of the paying customers are the growers. There is some grant funding available for these services.

Nicolas also described Varroa control success using Flash formic acid in Quebec. The dosage is as follows: (40 – temp in C = XX ml applied to paper towel on tray of a screen bottom board)

Renata Borba from Alberta:

Renata is the very first Alberta Tech Transfer Team in Alberta, therefore she has some ideas on where to start but everything is brand new. There will surely be a research component along with an emphasis on education.

Discussion on Potential collaborative endeavors

1. Mite-a-thon (includes Canada and Mexico)– aimed at backyard beekeepers especially in the fall – sugar roll or alcohol wash data. Generates heat map with the Varroa data. Mobile App
2. Mitecheck – (includes Canada and Mexico) – encourages monitoring throughout the season and then provides some management

a. Promote mite check more – encourage beekeepers in Canada to use it
b. Share links to Sentinel and mitecheck to the tech team people.

11:30am-12:45pm – BIP & Canadian TT Collaboration Brainstorm

Where does our work intersect? Where does one work complement the other? Are there areas of possible collaboration? How can you help us? How can we help you?

- National Survey, long term collaboration on bridging Canada and the US through the Loss and Management Survey.
- What about **Sentinel**? – It seems that Sentinel would be a great fit to launch in Canada. Canadian Tech Teams would like to use as an educational tool.

How do we cross the border with material kits? How do we cross the border with bee samples?

Potential solutions:

- What if the kits were assembled in Canada?
- Could a lab in Canada process the samples?
- Possible grant where both BIP and Canada are paid for training in making kits, how to process samples, allowing BIP to modify our database so that Canada could enter, access and generate reports. Canada could own the Canadian Sentinel program and we could all share data.

Next steps:

1. Find collaborators willing to take on the program management in Canada including:

- Finding collaborators to assemble and ship kits
- Finding a lab willing to process samples for *Varroa* and *Nosema* (standard process) – are there any

current natural candidates for this?

- Research possible grant agencies, write grant, etc…
- Training (kits, materials, management, etc…)
- Data Entry (App use?)
- Data sharing, map construction, etc…

Canadian Tech Teams Contacts:

Directory of Participants

Renata Borba (Alberta) - renata.borba@albertabeekeepers.ca
Nicolas Tremblay (Quebec) - conseilsapi@crsad.qc.ca
Hannah Neil (Saskatchewan) - hannah.mae.neil91@gmail.com
Not in attendance:
Les Eccles (Ontario) - les.eccles@ontariobee.com
Robyn McCallum (Atlantic Provinces) **-** rmccallum@perennia.ca

BIP Contacts:

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MOTION: **Motion to accept the Tech Transfer Team Report as submitted**
MOVED BY: **Paul Kozak**
SECONDED BY: **Julia Common**
CARRIED

USA Apiculture Report (AIA)
Kim Skyrm, AIA President

Just a little summary of what we do, as a group. Our group was formed in 1938. Our focus is to help with the regulations and also the methods about suppressing honey bee diseases, as well as a mutual understanding and cooperation between apiary inspection officials. We work to provide accurate and helpful information for the successful management of honey bees, while seeking new information and ideas in honey bee management and plant pollination. We had a meeting recently in Chicago in conjunction with the American Beekeeper Federation (ABF). Our website is a good place to find out more about us, to find contact information, and where our next meeting will be. We do a meeting in the summer as well, and we discuss and share some data for each state in terms of industry size and diseases reported. Most apiary inspectors suggested that we needed to do more educational work to the community, such as mentoring programs. During these meetings we get to share with the other inspections what programs we conduct in our state and share/learn some information.

The pre-inspection process started by North Dakota at the California-North Dakota border has sped up the border crossing. Packages are inspected as part of our services to make sure packages are secured and the screen is free of wholes. The national health survey is likely to be funded again this year, so we will have another survey at the national level. The honey certification program from Kentucky is very popular, they offer a whole series of criteria.

President Hoover thanked Kim Skyrm for the update.

Power Point presentation located in Appendix 6

AAPA Update Report
Judy Wu-Smart, AAPA President, via videoconference

2020 American Bee Research Conference updates:

- We had a successful conference with a total of 25 poster and 43 paper submissions. This was held in conjunction with the American Beekeeping Federation this year in Schaumburg Illinois.
- Students contributed 8 posters and 15 papers, and AAPA gave out 3 awards total (1 poster, 2 papers)

Engaging with CAPA more:

- CAPA Student travel stipend (up to $1500 to attend) offered to paper winner (Taylor Steele –Virgina Tech: Honey Bee Foraging in Orchard Landscape in Northern Virginia; runner up (Joseph Milone – North Carolina State University) Comparing larval pesticide toxicity and detoxification across honey bee stocks
- AAPA will pay for an officer to represent and attend at CAPA meeting – 2020 officers are:

  Judy Wu-Smart (University of Nebraska-Lincoln, AAPA president)
  Margarita Lopez-Uribe (Penn State University)

Please send us dates, contact information, and conference details for CAPA

Future meetings:

AHPA shifted dates so now it doesn't overlap with ABF. Our next ABRC meeting will be in December 1st -4th, 2020 in Louisiana Baton Rouge

I have strong interests in starting a regular 3-year schedule to bring all together. Will work with CAPA officers and gauge interests in ABF and AHPA.

President Hoover thanked Judy Wu-Smart for her update.

Provincial Reports
Provincial Apiarists

Provincial reports were circulated; main points were highlighted at the meeting.
Full Provincial Apiculturist Reports and summary table in Appendix 6

British Columbia – Paul van Westendorp

- We have an estimated mortality rate of 32%
- We had poorly weather condition
- *Vespa mandarinia* was confirmed in BC. The nest was eradicated but a second nest was reported. No specimen has been collected to date and the nest was not located and eradicated.
- The challenge is that these wasps are ground nesters, which makes it difficult to find the nests.

Alberta – Samantha Muirhead

- Beekeepers number have gone up. We are getting more and more hobby beekeepers every year
- We had lots of calls regarding slow colony build up, and lots of colonies were dying
- Honey production was lower than average
- EFB was found in many colonies
- 22 beekeepers out of 77 inspected had EFB. The EFB was not cleared up as the season continued
- The Nosema levels in the spring were the highest reported. Levels were down in the fall but still close to the threshold. This could be a result of not having fumagillin, but we are not able to draw a connection with the data we have
- We collected samples from colonies that had EFB and sent to the NBDC for disease detections and resistance test
- In the fall we did some Varroa resistance test as per the beekeepers' request. We tested resistance for Apistan, Bayvarol and Apivar. We found that Apivar had an efficiency of 91%, in average, but the results were very variable (71% - 100%).
- We will be focusing our inspections on EFB for this 2020 year

Manitoba – Shelley Hoover for Rhéal Lafrenière

- 905 beekeeper and 114000 colonies
- Annual winter kill was 21.4%
- Several large operations reported high winter losses
- The inspection program was contracted out to a 3rd party. The contract is for a period of 2 years
- Inspections will include diseases and pests such as EFB, AFB and SHB

Ontario – Paul Kozak

- 2570 beekeepers and 91000 colonies. But this data is not updated. Our numbers are likely higher
- We have CAP funding available for beekeepers this year, which may encourage beekeepers to register
- Some beekeepers did really well and some did very poorly. We had a very rainy season.

- Estimated winter mortality was 22.6%
- Resistance – the last time we did a resistance project 2 years ago, modeled after a group from Quebec, we did not have anything conclusive regarding resistance to Apivar.
- 26 new SHB positive bee yards confirmed in 2019. Of these: 14 were in Niagara Region; 6 in Haldimand County; 2 in Elgin County; 1 in Lambton County; 1 in Middlesex County, 1 in Perth County and 1 in Halton Region.
- Our currently policy is that beekeepers are not allowed to move colonies with confirmed SHB
- Some beekeepers have a lack of control but most have a good varroa best management practice

Quebec – Gabrielle Claing

- Our number of register beekeepers have been growing every year. We have 1308 beekeepers and 67000 colonies. We have 425 beekeepers that own more than 5 colonies with a total of 60000 colonies.
- 73% of our beekeepers monitor for varroa using sticky boards. Most beekeepers use organic acids to control for varroa or amitraz.
- 7% of beekeepers use Fumagillin B and there was no difference in winter mortality whether they used fumagillin or not.
- We conducted surveillance over the border. This year we expanded our surveillance territory. We inspected about 300 colonies
- 3 SHB apiaries were reported in 2019

Newfoundland – Karen Kennedy

- 267 beekeepers
- We do not have a registration program. Registration is voluntary. We are working on moving into a mandatory registration. This would be a good way to monitor for Varroa
- We still do not have *Varroa* and we do not import any bees or queens unless its from a *Varroa*-free location
- We are trying to implement an action plan for when varroa comes. Beekeepers have been trained to identify varroa.
- We have been working with a Scientist in the US who has collected samples of our bees and they believe NL bees may carry some mite resistance genetics

PEI – Cameron Menzies

- We have about 3000 (producing) hives, which is probably lower than last year.
- Our average yield was 48lbs, a bit low compared to the national average
- Estimated winter mortality is 54%, which is very high again
- Several of our beekeepers are doing quite well. The winter mortality number is skewed due to a few beekeepers that have very high losses
- Half of our beekeepers monitor for varroa. Half of them treat in the spring and about 90% treat in the fall. Formic acid is the most used treatment.
- Only 1 case of AFB was reported and the colony was destroyed
- EFB levels remain low
- Skunks and shrews are two pests that continue to contribute to colony losses

New Brunswick – Chris Maund

- We have 415 beekeepers, mostly hobbyists (93%), managing about 11000 colonies
- The spring was prolonged and wet, and the end of the summer was dry. Our average yield was about 18 kg
- We overwintered almost 12000 colonies and the winter mortality is estimated to 26.3%
- The major causes of winter mortality in 2018-19 were weather, poor queens and starvation

- We found 2 colonies with AFB and 14 with EFB
- Numerous SHB adults and apparent SHB larvae were found in three apiaries after wild blueberry pollination (Northumberland County) from one beekeeper. These colonies had been near colonies imported from an area in Ontario known to have the SHB

Nova Scotia – Jason Sproule

- 690 beekeepers
- About 25000 colonies, with 8000 being honey producing colonies
- Total honey production dropped about 100,000 lbs from 2018. This is a function of a ~2lb per hive average decrease. Average yield was about 22 kg
- We overwintered 23371 colonies and the winter mortality is estimated to 15.2%
- Causes of winter loss are cited as weak colonies in the fall, inclement weather, poor queen quality, and starvation. Shrews are suspected of causing devastating damage in a few geographically distant operations
- Small hive beetle (SHB) surveillance is being conducted in apiaries near the New Brunswick border. Thirty-seven SHB traps were deployed in at-risk bee yards in late summer. No SHB were detected

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Elections

Medhat Nasr

No nominations were presented for the executive board positions. All executives have agreed to let their name stand for another term.

MOTION: **To accept the results of the 2020 election**
MOVED: **Medhat Nasr**
SECONDED BY: **Steve Pernal**

Unanimous support

Proposed Budget 2020

Budget Committee – presented by Rob Currie (Steve Pernal and Paul van Westendorp)

2019 CAPA Financial Statement

GIC Term Deposit Balance			1-Jan-19			$ 20,732.47
Account Balance			1-Jan-19			$ 46,935.33
Paypal Balance			1-Jan-19			$ 5,123.68
				Account opening balance		$ 72,791.48

REVENUE					**Proposed 2020**	**As of December 31st, 2019**
Membership			cost	members		
12	2020 Full		40	53	$ 1,640.00	$ 480.00
3	2020 Associate		20	13	$ 200.00	$ 60.00
19	2019 Full					$ 760.00
11	2019 Associate					$ 220.00
2	2018 Full					$ 80.00
0	2018 Associate					$ -
1	2017 Full	* We collected some of the 2017/2018 that did not pay their membership				$ 40.00
0	2017 Associate					$ -
Meetings						
1	2018 London Registrations					$ 90.00
5	2020 Ottawa registrations		160	25	$ 3,200.00	$ 800.00
	2020 Langley?				$ 3,500.00	
				number of sales		
2019 ENG Publication Sales				1000	$ 10,000.00	$ 14,401.91
2019 FR Publication Sales				75	$ 750.00	$ 730.00
2019 SP Publication Sales				100	$ 1,000.00	$ 680.00

Shipping/handling on publications			$ 2,000.00	$	1,619.36
Bee art scene Apimondia				$	450.00
GST/HST collected	*on publications and meeting registration		$ 650.00	$	671.74
GIC Term interests			$ 45.00	$	47.32
			$ 22,985.00	**$**	**21,130.33**

EXPENDITURES

Publications					
	S/H charges (all editions)	* for S/H of the reprint	$ (2,000.00)	$	(308.46)
	Reprinting English (5000 copies)		$ -	$	(12,189.00)
	Printing and typesetting of Spanish edition			$	(8,455.00)
	Shipping honorarium (Janet Tam)		$ (150.00)	$	(105.95)
	Queen Document		$0.00	$	(1,200.00)
	storage		$ (800.00)	$	(707.88)
Meetings	2018 AGM London			$	(3,127.65)
	2019 Apimondia	* S/H bee print scene		$	(647.70)
	2020 Ottawa		$ (4,360.00)		
	2020 Langley?		$ (3,500.00)		
	Travel of Executive to meetings (CAPA,AIA, AAPA)		$ (5,000.00)	$	-

IBRA Donation		$ (500.00)	$	-
CBRF Donation?		$ (15,000.00)	$	-
Student Merit Award (travel to langey meeting)	* 600$ + travel expenses	$ (2,700.00)	$	(798.75)
Student Presentation Award (given in some years at research symposium)		$ (500.00)	$	-
CAPA MERIT AWARD new queen model or other		$ (4,000.00)	$	-
AAPA student travel Award (too late to submit to ABRC?) how to do? Sidoo winner?		$ (2,100.00)	$	-
CAPA Website Hosting		$ (600.00)	$	(519.85)
GST/HST Paid		$ (3,000.00)	$	(2,757.12)
2018/19 GST/HST Payment	* 698,41 $, made in early Jan 2020	$ (698.41)	$	-
Misc. (cards, shipping, postage, gift card etc)		$ (50.00)	$	(98.95)
Banking Fees (includes PayPal)		$ (200.00)	$	(183.58)
Consult with Accountant, advice, consult, no formal audit (~40hrs X $100/hr?)		$ (4,000.00)	$	-
CAPA Workshop for professional development of members		$ -	$	-
Holding for Apimondia or give CHC * 5000$ to CHC booth space + the rest for travel awards			$	(17,353.14)
	Expenditures	**$ (49,158.41)**	**$**	**(48,453.03)**
	Revenue-expenditures	**$ (26,173.41)**	$	(27,322.70)

GIC Term Deposit (1 year cashable at 0.40%; Matures 26 May 2020)			$ 10,510.00	$	10,538.63
GIC Term Deposit (30 days renewable at 0.05%; Matures 26 Janyary 2020)			$ 10,242.00	$	10,243.16
PayPal (December 31st, 2019)			$ -	$	3,880.79
Cash in account as of December 31st, 2019			$ 27,630.00	$	20,664.20
	Total Cash / Investments		$ 48,382.00	$	45,326.78
Should maintain at least $15,000 RESERVE	Predicted Surplus/deficit		$ 22,208.59	Dec 31 2019 actuals	

MOTION: **To approve the modified budget as presented.**
MOVED BY: **Rhéal Lafrenière**
SECONDED BY: **Heather Higo**
CARRIED

Committee Selection
Shelley Hoover

President Shelley Hoover reviewed the membership of each Committee and revised accordingly with input from the membership.

2019 CAPA EXECUTIVE & COMMITTEES

Executive	Shelley Hoover	President
	Les Eccles	Vice-President
	Medhat Nasr	Past-President
	Renata Borba	Secretary
	Martine Bernier	Treasurer
Standing Committees		
IPM	Jason Sproule and Les Eccles	Co-Chairs
	Paul Kozak, Nuria Morfin	
	Rhéal Lafrenière, Medhat Nasr,	
	Stephen Pernal, Graham Parsons,	
	Samantha Muirhead, Tom Thompson,	
	Valérie Fournier, Gabrielle Claing	
Importation and Bee Movement	Samantha Muirhead and Paul Kozak	Co-Chairs
	Rob Currie, Ernesto Guzman	
	Cameron Menzies, Gabrielle Claing	
	Les Eccles, Graham Parsons	
	All Provincial Apiculturists ex officio	
Research	Marta Guarna and Valérie Fournier	Co-Chairs
	Leonard Foster, Ernesto Guzman	
	Pierre Giovenazzo, Les Eccles, Heather Higo	
	Amro Zayed, Valérie Fournier, Robyn McCallum	
Awards	Rob Currie	Chair
	Martine Bernier, Samantha Muirhead	
	Nicolas Tremblay, Rhéal Lafrenière, Cameron Menzies	
	Paul van Westendorp, Mylee Nordin, Dan Borges	
CBRF Committee	Marta Guarna	Chair
	(Marta Guarna to take over after the current meeting)	
	Board Rep: Rhéal Lafrenière	
Ad-Hoc Committees Publications	Janet Tam	Chair
	Steve Pernal, Martine Bernier	
	Nicolas Tremblay	

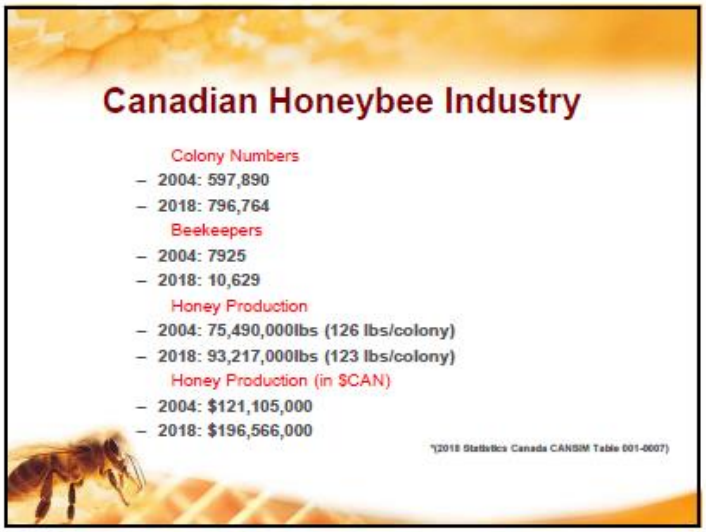
Tech Transfer	Nicolas Tremblay Daniel Borges, Hanna Neil, Robyn McCallum, Miriam Bixby Les Eccles, Renata Borba	Chair
Archives	Rob Currie Melanie Kempers, Mark Winston	Chair
Non-Apis Pollinators	Paul van Westendorp Rob Currie, Robyn McCallum, Patricia Wolf-Veiga, Heather Higo, Valérie Fournier, Graham Parsons, Nicolas Tremblay	Chair
Editorial Disease Publication	Stephen Pernal Rob Currie, Ernesto Guzman, Nicolas Tremblay	Chair
Communications	Melanie Kempers Rob Currie, Cameron Menzies Rhéal Lafrenière, Nicolas Tremblay, Kelsey Ducsharm	Chair
National Winterloss Survey	Gabrielle Claing Stephen Pernal, Melanie Kempers Rhéal Lafrenière, Cameron Menzies, Shelley Hoover Medhat Nasr, All Pa's	Chair
Africanized Bee	Amro Zayed Steve Pernal, Rhéal Lafrenière, Geoff Wilson Les Eccles, Paul Kozak, Ernesto Guzman, Nuria Morfin	Chair

MOVED BY: **Medhat Nasr**
SECONDED BY: **Shelley Hoover**
CARRIED

Meeting adjourned on Tuesday January 21st at 16:32. Moved by Shelley Hoover, seconded Renata Borba.

Appendix 1: CHC Report
Stan Reist, CHC Chair

1



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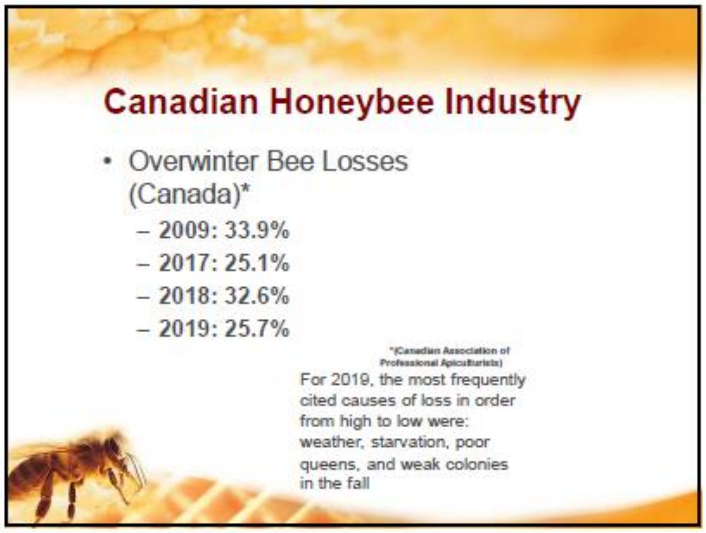


3

4

Work of the Bee Health Roundtable

Referenced guides produced

Canadian Best Management Practices for Honey Bee Health

Planting Forage for Honey Bees in Canada

Consolidated Reference of Practices to Reduce Bee Poisoning from Agricultural Pesticides (NEW)

- A guide to enhance the cooperation between growers and beekeepers

Currently working to develop a National Pollinator Strategy for Canada

5

Industry Growth and issues

Food safety/ biosecurity (SHB)

- Biosecurity affects interprovincial transport which affect domestic stock security
- Safe Food for Canada Act and licencing all food production
- Development of a national surveillance program

6

Industry Growth and issues

Adulteration and transhipping

- Biggest international issue and impacts everyone
- NMR testing in Canada, first ever sponsored by a nations government
- A cooperative effort by CFIA to test imported and domestic honey

7

Industry Growth and Issues

Stock and Stock Replacement

- Recent closure of Queen Exports to the USA
- Queen Imports from Malta/Italy
- Possibility of Ukraine
- Threats to California queens

8

Industry Growth and issues

Labour

- Still the biggest issue facing commercial operations
- Introduction of biometric testing of TFW's last year

9

Industry Growth and issues

Expansion and diversifying honey markets

- The CHC, through AgriMarketing grants and Canadian Pavillion grants plan to attend and market Canadian honey at the following:

- January 7-11 American Beekeepers Federation AGM and Trade Show - Chicago
- January 8-11 AHPA Sacramento
- March 10-13 2020 FoodEx, Chiba, Japan
- April 15 -17 2020 SIAL Canada Montreal at the Palais
- May 13-15 2020 SIAL China in Shanghai
- December 2020 Sial Middle East Abu Dhabi UAE.

10

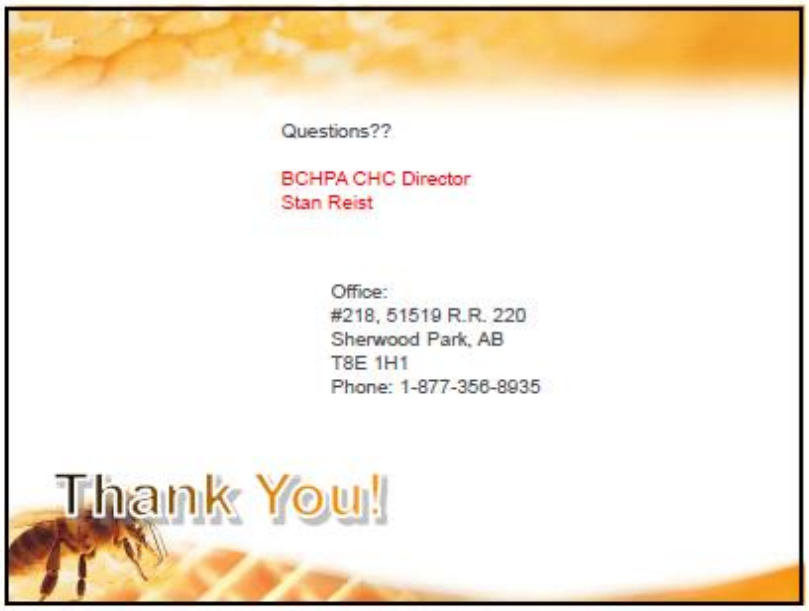
Apimondia

11

Apimondia

- Successfully hosted over 5500 participants
- World class exposition with over 220 booths displaying a wide variety of goods and services
- Tour and workshops fully booked
- Outstanding science program
- Financial results will take a couple months to finalize

12


Questions??
BCHPA CHC Director
Stan Reist
Office:
#218, 51519 R.R. 220
Sherwood Park, AB
T8E 1H1
Phone: 1-877-356-8935
Thank You!

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Appendix 2: AAFC Beekeeping and Honey – Production and Trade National Overview
Stephen Page

Canadian Honey Industry National Statistical Trends

Stephen Page
Sector Specialist
Agriculture and Agri-Food Canada
CHC CAPA Joint Meeting, Ottawa
January 21/22, 2020

1

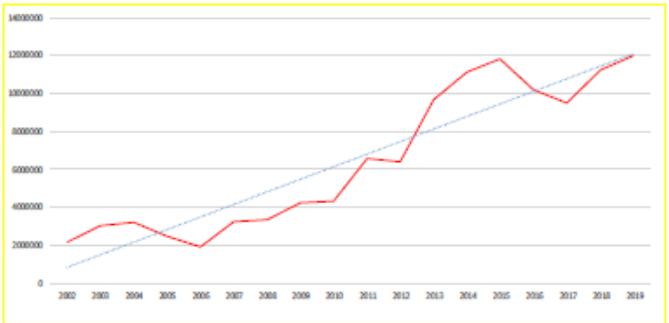
Outline

- Bee Imports
- Honey Production
- Honey Trade

2

2

Canadian Beekeeping Industry Imports Queens and 'Package' Bees

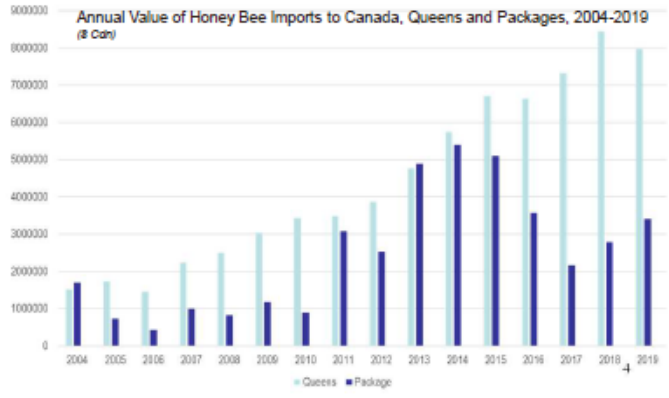


Total Value of Honey Bee Imports to Canada, 2002-2019 (*$ Cdn*), *Source: Stats Can Monthly Trade Stats/CATSNet*

3

3

Total Value of Queen Imports Continues to Grow, Package Bees Vary More



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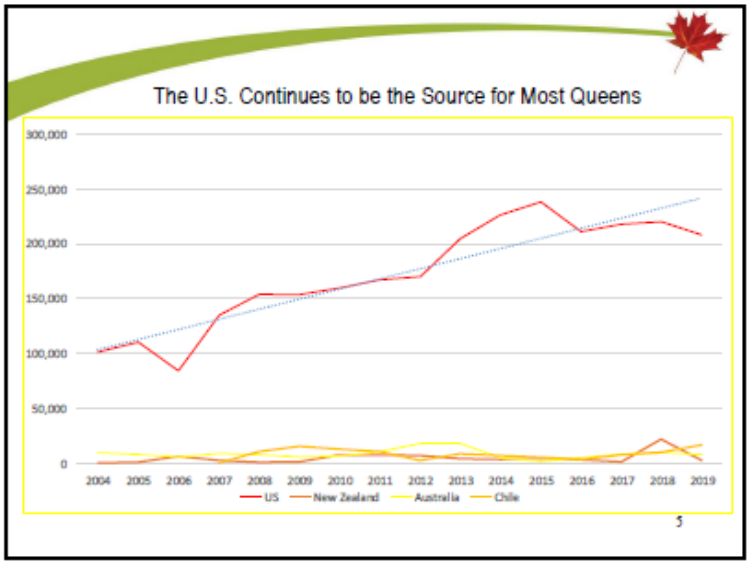
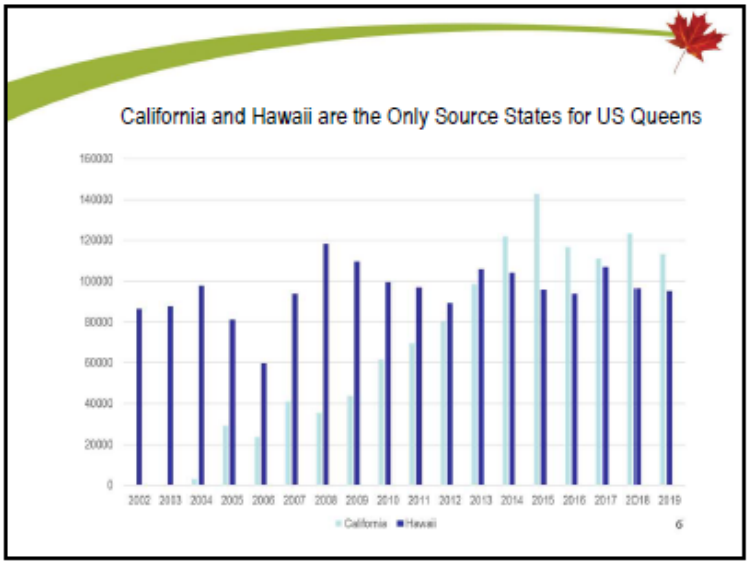
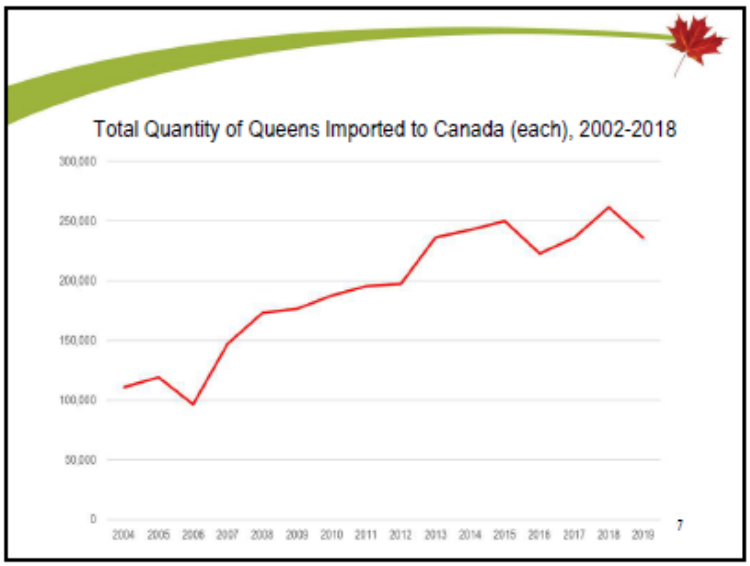

The U.S. Continues to be the Source for Most Queens
300,000
250,000
200,000
150,000
100,000
50,000
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
US
New Zealand
Australia
Chile
5

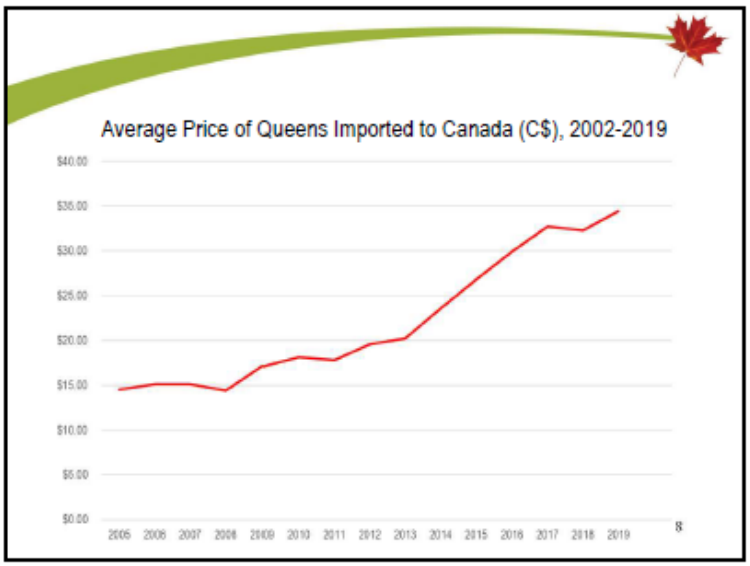
5


California and Hawaii are the Only Source States for US Queens
160000
140000
120000
100000
80000
60000
40000
20000
0
2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
California
Hawaii
6

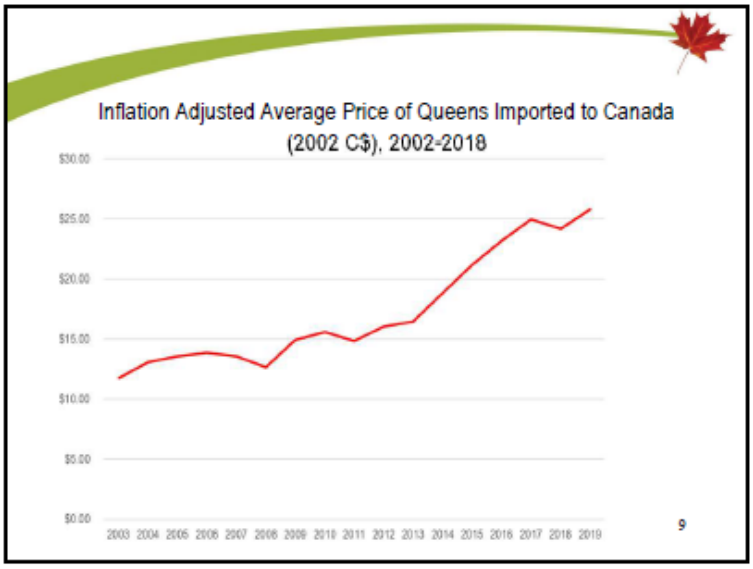
6


Total Quantity of Queens Imported to Canada (each), 2002-2018
300,000
250,000
200,000
150,000
100,000
50,000
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
7

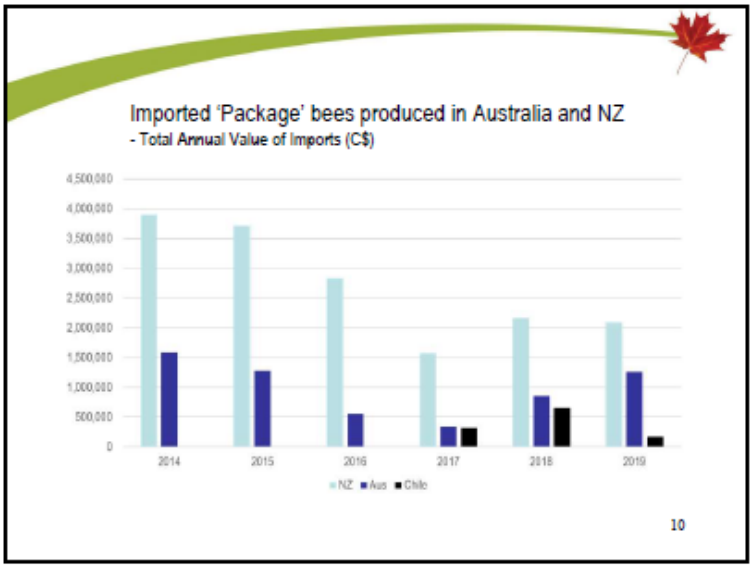
7


Average Price of Queens Imported to Canada (C$), 2002-2019
$40.00
$35.00
$30.00
$25.00
$20.00
$15.00
$10.00
$5.00
$0.00
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
8

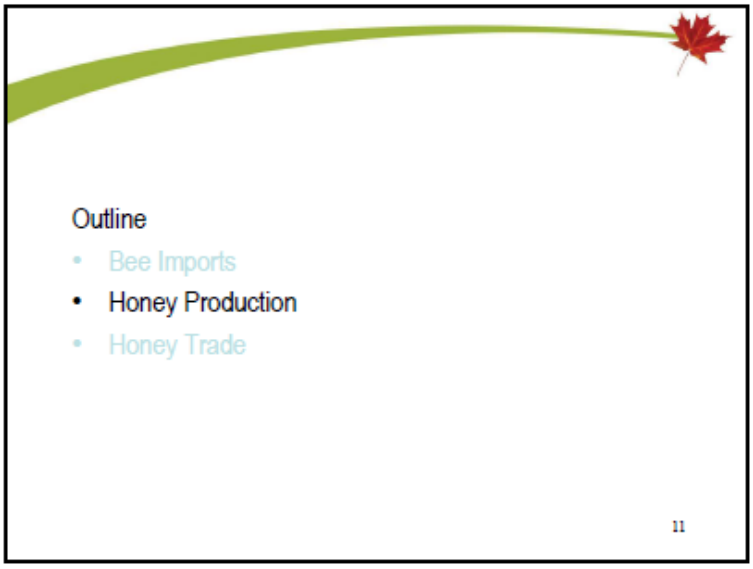
8


Inflation Adjusted Average Price of Queens Imported to Canada
(2002 C$), 2002-2018
$30.00
$25.00
$20.00
$15.00
$10.00
$5.00
$0.00
2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
9

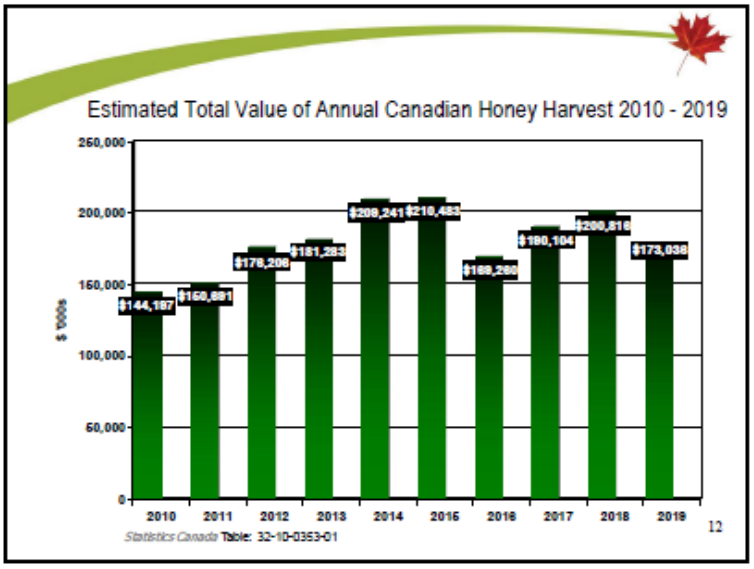
9


Imported 'Package' bees produced in Australia and NZ
- Total Annual Value of Imports (C$)
4,500,000
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
2014
2015
2016
2017
2018
2019
NZ Aus Chile
10

10


Outline
Bee Imports
Honey Production
Honey Trade
11

11


Estimated Total Value of Annual Canadian Honey Harvest 2010 - 2019
$ '000s
260,000
200,000
160,000
100,000
60,000
0
$144,187
$159,891
$178,206
$181,283
$209,241
$218,483
$168,286
$190,104
$209,810
$173,030
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
Statistics Canada Table: 32-10-0353-01
12

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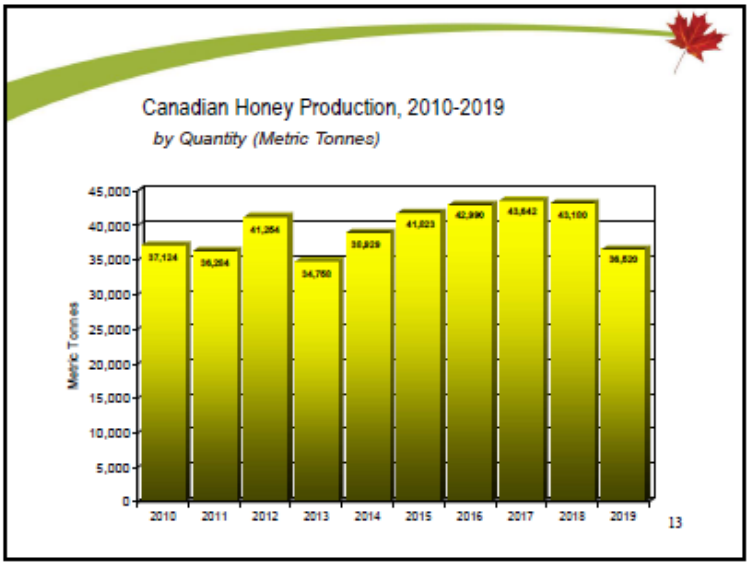
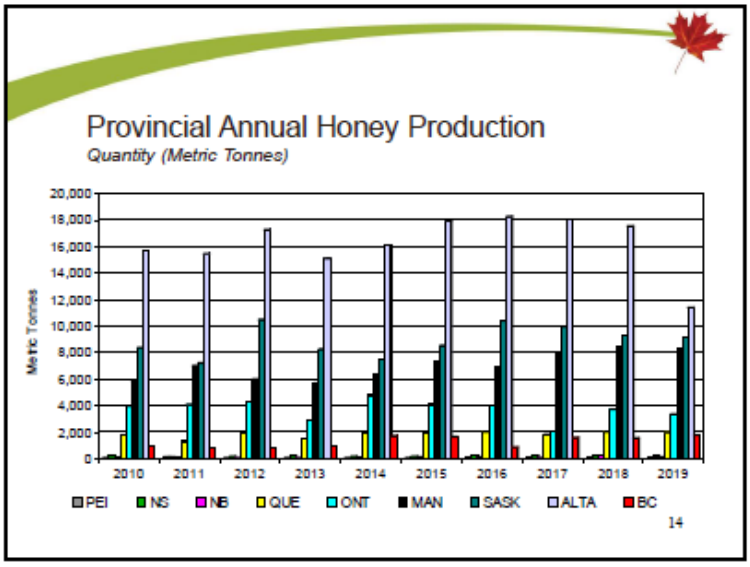
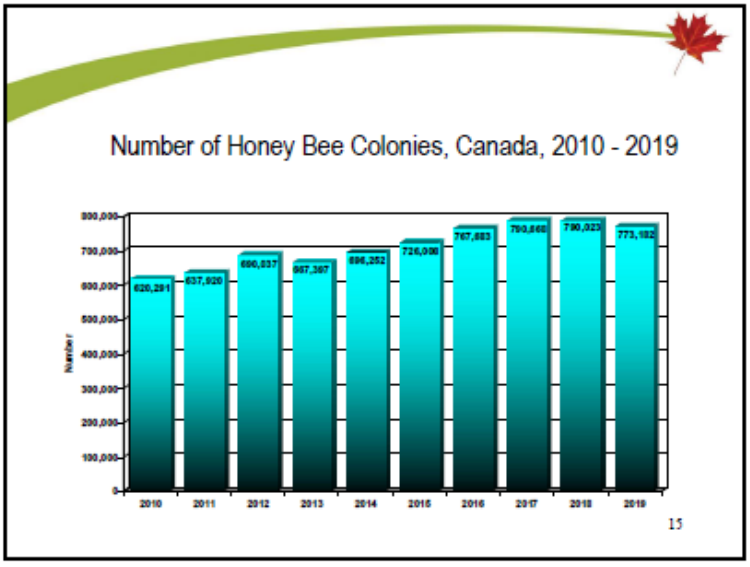

Canadian Honey Production, 2010-2019
by Quantity (Metric Tonnes)
Metric Tonnes
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
37,124
36,264
41,264
34,750
38,829
41,823
42,990
43,842
43,100
36,829
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
13

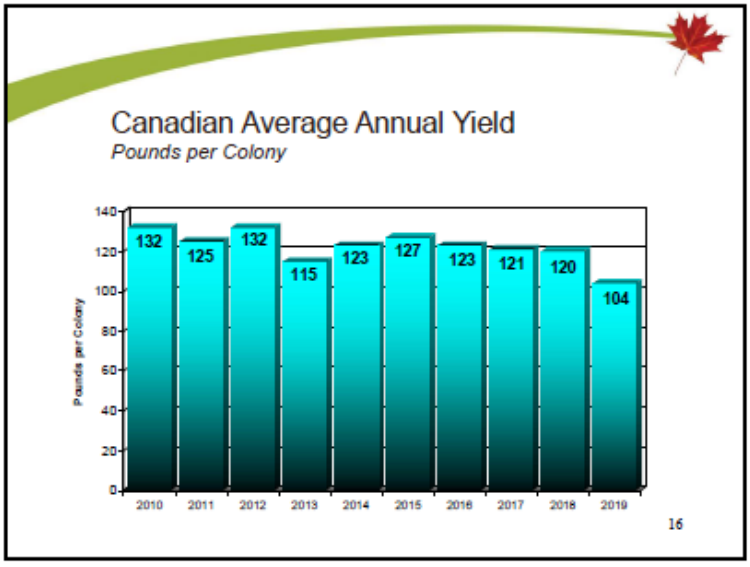
13


Provincial Annual Honey Production
Quantity (Metric Tonnes)
Metric Tonnes
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
PEI
NS
NB
QUE
ONT
MAN
SASK
ALTA
BC
14

14


Number of Honey Bee Colonies, Canada, 2010 - 2019
Number
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
620,291
637,929
690,837
667,367
696,252
726,000
767,683
790,660
790,023
773,182
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
15

15


Canadian Average Annual Yield
Pounds per Colony
Pounds per Colony
140
120
100
80
60
40
20
0
132
125
132
115
123
127
123
121
120
104
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
16

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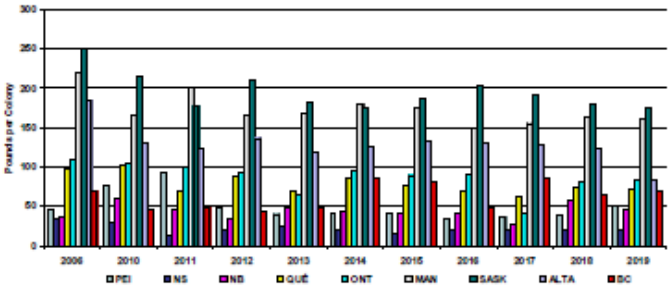
Provincial Average Yields

Pounds per Colony



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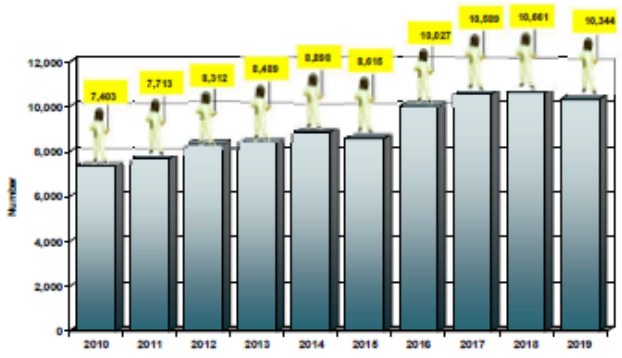
Number of Canadian Beekeepers



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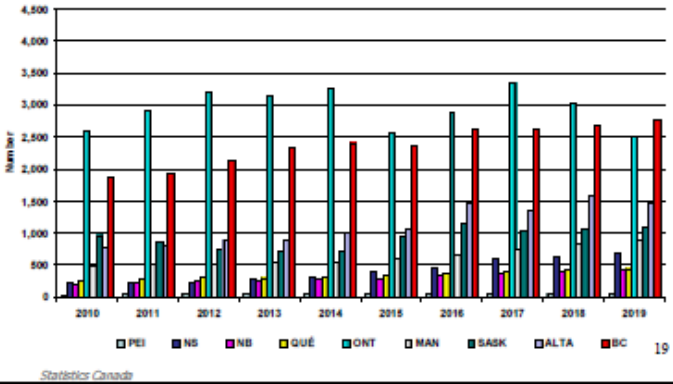
Number of Beekeepers

by Province



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Statistics Canada

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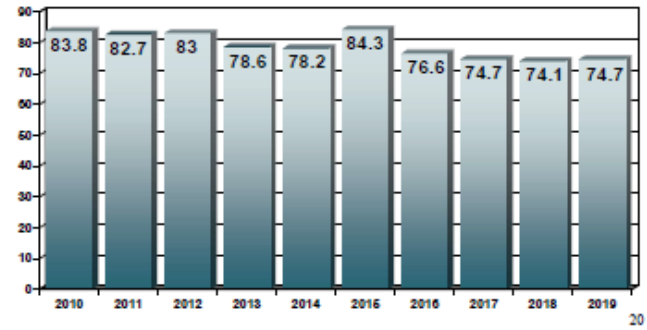
Average Number of Colonies per Beekeeper, Canada



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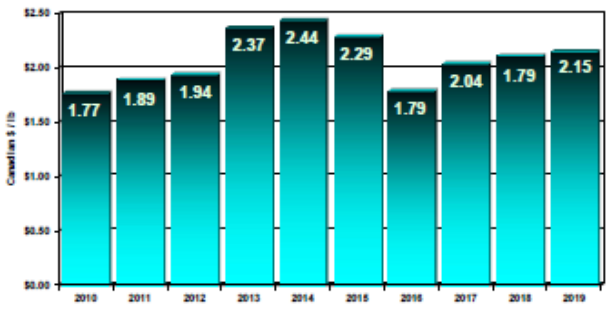
Statistics Canada

20

Average Estimated Canadian Honey Price

per Pound.



Statistics Canada

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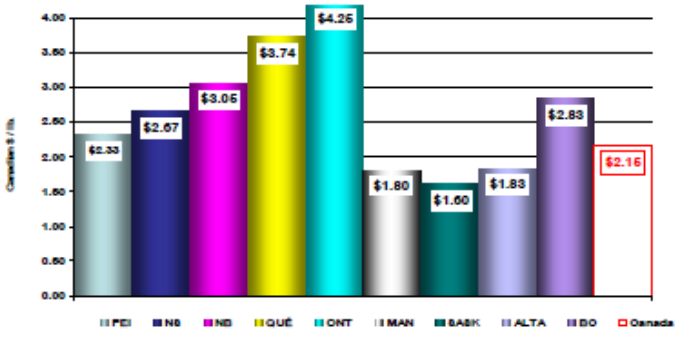
Estimated Honey Price per Pound

by Province, 2019



Statistics Canada. Table 32-10-0353-01 Production and value of honey

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Outline

- Bee Imports
- Honey Production
- Honey Trade

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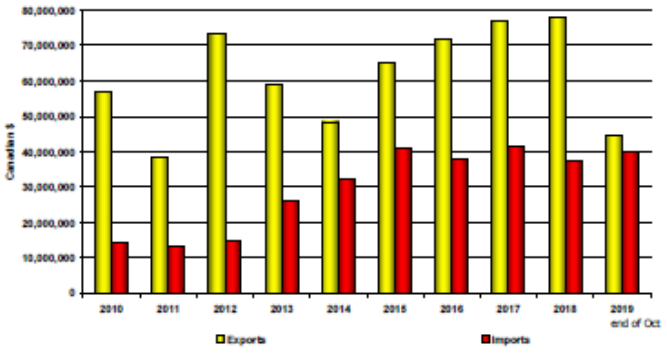
Annual Total Honey Exports and Imports – Canada – Value



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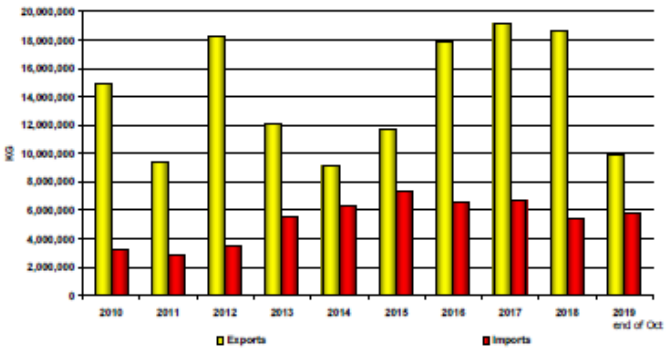
Annual Total Honey Exports and Imports – Canada – Volume



25

EXPORTS to end Oct 2019	C$	KG	YTD Av. Price
TOTAL	44507347	9899037	$ 2.04
United States	29046656	6803628	$ 1.94
Japan	13516870	2749132	$ 2.23
China	1123309	168400	$ 3.03
Korea, South	502682	128080	$ 1.78
Hong Kong	79028	9846	$ 3.65
Barbados	53180	9289	$ 2.60
Taiwan	48399	8595	$ 2.56
Jordan	19868	5015	$ 1.80
Belgium	36531	4592	$ 3.62
France	17188	3090	$ 2.53
Bermuda	17369	2325	$ 3.40
Lebanon	15833	2122	$ 3.39
Viet Nam	15225	2107	$ 3.28
Kuwait	5266	1165	$ 2.05
Netherlands	6104	930	$ 2.98

26

IMPORTS to end Oct 2019			YTD Price
TOTAL	39,947,353	5,807,879	$ 3.13
New Zealand	15,332,272	363,295	$ 19.18
Brazil	5,940,836	1,617,365	$ 1.67
India	2,954,616	914,821	$ 1.47
Thailand	3,447,862	885,952	$ 1.77
United States	2,141,551	481,672	$ 2.02
Spain	2,169,464	473,510	$ 2.08
Australia	2,927,815	264,135	$ 5.04
Saudi Arabia	1,297,348	129,518	$ 4.55
Viet Nam	229,866	118,038	$ 0.89
Ukraine	358,785	112,243	$ 1.45
Greece	811,888	105,280	$ 3.51
Argentina	219,566	66,366	$ 1.50
Turkey	414,682	59,754	$ 3.15
Germany	274,859	41,563	$ 3.01
Cuba	72,436	21,600	$ 1.52

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Gaps:

Domestic queen and nuc production

More complete information on pollination fees/movements

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Appendix 3: PMRA Update
Connie Hart

Clothianidin, Thiamethoxam, and Imidacloprid – Summary of pollinator mitigation

Grey shaded boxes indicate uses that are not registered.

Crops	Chemical	Application Method		
		Foliar	Soil	Seed Treatment
Pome fruit (such as apple or pear)	Clothianidin	Cancel use (CG 11: Pome fruit)		
	Thiamethoxam	Cancel use (apple, crabapple, pear, Oriental pear)		
	Imidacloprid[1]	Cancel use (CG11:Pome fruit)		
Stone fruit (such as cherry, peach, or plum)	Clothianidin	Cancel use (CG 12: Stone fruit)		
	Thiamethoxam	Cancel use (cherry)		
	Imidacloprid	Cancel use (CG12 Stone fruit)		
Tree nuts (such as walnut or hazelnut)	Clothianidin			
	Thiamethoxam			
	Imidacloprid	Cancel use Almond, chestnuts, Chinquapin nuts, Japanese horse-chestnuts -		
		Change in application timing (restricted to application after bloom): Beech nut, Brazil nut, butternut, cashew, Filbert (hazelnut), hickory nut, Macadamia nut, pistachio, pecan, walnut		
Berries [such as Caneberry, Bushberry, Low growing berry, Small fruit vine (other than grape)]	Clothianidin	Cancel use: Strawberry (pre-bloom application only registered berry use)		
	Thiamethoxam	CG 13-07A: Caneberry, CG 13-07B: Bushberry, 13-07G: Low growing berry): Change to application timing (Restricted to application after bloom. For woody berry plants, maintain post bloom use with renovation (cutting back old growth) after harvest*). *. This may only be applicable for low bush blueberry.	Cancel use (CG 13-07G:Low growing berry)	

	Imidacloprid	CG13A: Caneberry, CG13B: Bushberry, CG13G: Low growing berries 13F: Small fruit vine (other than grape): Change to application timing (Restricted to application after bloom. For woody berry plants, maintain post bloom use with renovation (cutting back old growth) after harvest*). *. This may only be applicable for low bush blueberry	CG13A :Caneberry, CG13B: Bushberry, CG: 13F: Berry and small fruit vine (other than grape), CG13G:Low growing berry: Cancel use	

Crops	Chemical	Application Method		
		Foliar	Soil	Seed Treatment
Grapes	Clothianidin	No change		
	Thiamethoxam			
	Imidacloprid	Change in application timing (cannot apply during bloom)	No change	
Ornamentals	Clothianidin			
	Thiamethoxam	Cancel use Outdoor and greenhouse ornamentals that will be planted outside and are attractive to pollinators (excluding ornamentals with no pollinator exposure listed below)	Cancel use Greenhouse ornamentals that will be planted outside and are attractive to pollinators (excluding ornamentals with no pollinator exposure listed below)	
		No change: Coniferous evergreens Ornamental grasses Greenhouse grown cut flowers Greenhouse grown potted plants for use indoors	No change: Coniferous evergreens Ornamental grasses Greenhouse grown cut flowers Greenhouse grown potted plants for use indoors	
	Imidacloprid		Outdoor and greenhouse ornamentals that will be planted outside and are attractive to pollinators (excluding ornamentals with no pollinator exposure listed below): Cancel use	
			No change: Coniferous evergreens Ornamental grasses Greenhouse grown cut flowers Greenhouse grown potted plants for use indoors	
Fruiting vegetables (such as pepper or tomato)	Clothianidin			No change (pepper, tomato)
	Thiamethoxam	Change to application timing (restricted to application after bloom) (CG 8: fruiting vegetables) (outdoor)	Cancel use (CG 8: fruiting vegetables)	
	Imidacloprid	Change to application timing (restricted application after bloom) (CG 8: Fruiting vegetables)	Cancel use (CG 8: Fruiting vegetables (field) and greenhouse pepper transplant drench when they are for transplant outdoors)	No change (Tomato and pepper)
			No change - mature Greenhouse Grown Pepper plants (not transplanted outdoors)	
Cucurbits (such as cucumber, melon or squash)	Clothianidin	Change to number of pre-bloom applications (limited to one pre-bloom application). (Crop Group 9: Cucurbits).		No change (cucumber, melon, squash)
	Thiamethoxam		Cancel use (CG 9: cucurbit vegetables)	No change (CG 9: cucurbit vegetables)

Crops	Chemical	Application Method		
		Foliar	Soil	Seed Treatment
	Imidacloprid		Cancel use (CG 9: Cucurbit vegetables) No change – mature Greenhouse Grown Cucumber plants (not transplanted outdoors)	No change (Cucumber, melon and squash)
Legume vegetables (such as bean, pea, soybean)	Clothianidin			
	Thiamethoxam	Change to application timing (restricted to application after bloom) (soybeans; dry shelled beans (Phaseolus spp., Lupinus spp., Vigna spp., dry fava beans, dry lablab beans, chickpea)		No change Addition of Best Management Practice (does not include fluency agent statements) to seed tag label required. Crop group 6: Legumes) (excluding soybean because BMPs and fluency agency requirements are already present on label)
	Imidacloprid	Change in application timing: All legumes except broad beans/fava beans (*Vicia faba*) – cannot apply during bloom Broad beans/fava beans/*Vicia faba* only – restricted to application after bloom.	Cancel use (CG 6 Legume vegetables	No change (CG 6A: Edible- Podded Legume Vegetables and C6C: Dried Shelled Pea and Bean and soybean) Addition of Best Management Practice (does not include fluency agent statements) to seed tag label required. (No change to soybean because BMPs and fluency agent requirements are already present on label)
Root and Tuber vegetables (such as carrot, potato, sugar beet and sweet potato)	Clothianidin	Potato: No change (cannot apply during bloom)	Potato and sweet potato: No change	Potato and carrot: No change
	Thiamethoxam	Potato and sweet potato: Change to application timing (cannot apply during bloom) No change (CG 1B: root vegetables except sugar beet and 1C: tuberous and corm vegetables)	Potato: No change	Potato and sugarbeet: No change
	Imidacloprid	Potato Change to application timing (cannot apply during bloom) CG1B: Root vegetables (except sugarbeet and ginseng*) and CG 1D: Tuberous and corm vegetables (except potatoes and sweet potato*) No change *foliar application on ginseng and sweet potato not registered	No change CG1B: Root vegetables (except sugarbeet) and CG 1D: Tuberous and corm vegetables and potato	No change (Carrot and potato)
Leaves of Root and Tuber vegetables	Clothianidin			
	Thiamethoxam			
	Imidacloprid	No change (CG 2: Leaves of root and tuber vegetables)	No change (CG 2: Leaves of root and tuber vegetables)	

Crops	Chemical	Application Method		
		Foliar	Soil	Seed Treatment
Bulb vegetables (such as onion or green onion)	Clothianidin			No change (onion, leek)
	Thiamethoxam			
	Imidacloprid			No change (Leek and onion)
Leafy vegetables (such as lettuce, spinach and celery)	Clothianidin			No change (lettuce)
	Thiamethoxam	No change (CG 4: leafy vegetables)	No change (CG 4: leafy vegetables)	
	Imidacloprid	No change (CG 4A: Leafy greens)	No change (CG4A:Leafy greens), and 4B leafy petioles and greenhouse transplant drench on lettuce to be planted outdoors)	No change (Lettuce)
Brassica leafy vegetables (such as broccoli, cabbage, and cauliflower)	Clothianidin			No change (broccoli, cabbage)
	Thiamethoxam		No change (CG 5: brassica vegetables)	
	Imidacloprid	No change (CG5: Brassica (cole) leafy vegetables and CG 5A: Head and stem brassica crop sub-group)	No change (CG5: Brassica (cole) leafy vegetables and greenhouse transplant drench on CG 5A: Head and stem brassica crop sub-group to be planted outdoors).	No change (Broccoli and cabbage)
Cereals (such as barley, corn, or wheat)	Clothianidin			No change Addition of Best Management Practice (does not include fluency agent statements) to seed tag label required. (wheat) (No change to corn because BMPs and fluency agency requirements are already present on label)
	Thiamethoxam			No change Addition of Best Management Practice (does not include fluency agent statements) to seed tag label required. (barley, buckwheat, millet, oat rye, sorghum, triticale, wheat) (No change to corn because BMPs and fluency agency requirements are already present on label)
	Imidacloprid			No change (Barley, oat and wheat) Addition of Best Management Practice (does not include fluency agent statements) to seed tag label required.
Oilseeds (such as mustard,	Clothianidin			No change (canola, rapeseed, mustard, carinata)

Crops	Chemical	Application Method		
		Foliar	Soil	Seed Treatment
canola, rapeseed, or sunflower)	Thiamethoxam			No change (canola, rapeseed, mustard, sunflower)
	Imidacloprid			No change (Canola, mustard and rapeseed)
Turf golf course turfgrass; sod farms; turfgrass in residential, municipal, industrial, recreational areas)	Clothianidin	Change to where it can be applied (restricted to application to golf courses and sod farms) Cancel uses on industrial, municipal and residential turf		
	Thiamethoxam			
	Imidacloprid	No change	No change	
Peanut Tobacco	Clothianidin			
	Thiamethoxam			
	Imidacloprid	Change in application timing: Cannot be applied during bloom when blooms are present	No change	
Hops	Clothianidin			
	Thiamethoxam			
	Imidacloprid	No change		
Herbs	Clothianidin			
	Thiamethoxam			
	Imidacloprid	For herbs harvested before bloom No change	For herbs harvested before bloom No change	
		For herbs harvested after bloom (excluding lavender and rosemary) Change to application timing: maintain post bloom use only	For herbs harvested after bloom and for lavender and rosemary Cancel use	
		Lavender and rosemary Cancel use		
Christmas trees	Clothianidin			
	Thiamethoxam			
	Imidacloprid	No change		

Prepared by: Pest Management Regulatory Agency (March 2018)

Appendix 4: CAPA – Core Winter Loss Survey Questions (2019)

The followings are the core questions that will be used in 2019 by each provincial apiarist for reporting the colony winter losses at the national level. As it has been since 2007, the objective is to estimate the winter kills with a simple and standardized method while taking into account the large diversity of situations around the country. This is a survey so these questions are to be answered by the beekeepers.

1. How many full sized colonies[2] were put into winter in fall 2018?

Outdoor wintering	Indoor wintering	Total

2. How many full sized colonies[1] survived the 2018/2019 winter and were considered viable[3] on May 1st (British Columbia), May 15th (Ontario, Quebec and Maritimes) or May 21st (Alberta, Manitoba, Newfoundland and Saskatchewan)?

Outdoor wintering	Indoor wintering	Total

3. Which method of treatment did you use for varroa control in **spring 2018**? What percent of hives were treated? *(Choose all that apply)*

	Treatment	Percent of hives treated (%)
☐	Apistan (fluvalinate)	
☐	CheckMite+ (coumaphos)	
☐	Apivar (amitraz)	
☐	Thymovar (thymol)	
☐	Bayvarol (flumethrin)	
☐	65% formic acid – 40 ml multiple application	
☐	65% formic acid – 250 ml single application	
☐	Mite Away Quick Strips (formic acid)	
☐	Oxalic acid	
☐	Other *(please specify)* _____	
☐	None	

[2] Does not include nucleus colonies

[3] Viable : A viable colony, in a standard 10-frame hive, is defined has having 4 frames or more being 75% bee-covered on both sides.

4. Which method of treatment did you use for varroa control in late **summer/fall 2018**? What percent of hives were treated? *(Choose all that apply)*

	Treatment	Percent of hives treated (%)
☐	Apistan (fluvalinate)	
☐	CheckMite+ (coumaphos)	
☐	Apivar (amitraz)	
☐	Bayvarol (flumethrin)	
☐	Thymovar (thymol)	
☐	65% formic acid – 40 ml multiple application	
☐	65% formic acid – 250 ml single application	
☐	Mite Away Quick Strips (formic acid)	
☐	Oxalic acid	
☐	Other *(please specify)* _____	
☐	None	

5. Have you monitored your colonies for Varroa during the 2018 season?
   - ○ Yes – sticky board
   - ○ Yes – alcohol wash
   - ○ Yes – other (*please specify*) _____
   - ○ No

6. Which method of treatment did you use for **nosema** control in **spring 2018**? What percent of hives were treated?

	Treatment	Percent of hives treated (%)
☐	Fumagillin	
☐	Other (*please specify*) _____	
☐	None	

7. Which method of treatment did you use for **nosema** control in **fall 2018**? What percent of hives were treated?

	Treatment	Percent of hives treated (%)
☐	Fumagillin	
☐	Other (*please specify*) _____	
☐	None	

8. Which method of treatment did you use for **American foulbrood** control in **spring 2018**? What percent of hives were treated? *(Choose all that apply)*

	Treatment	**Percent of hives treated (%)**
☐	Oxytetracycline	
☐	Tylosin	
☐	Lincomycin	
☐	None	

9. Which method of treatment did you use for **American foulbrood** control in **fall 2018**? What percent of hives were treated? *(Choose all that apply)*

	Treatment	**Percent of hives treated (%)**
☐	Oxytetracycline	
☐	Tylosin	
☐	Lincomycin	
☐	None	

10. To what do you attribute the main cause of death of your colonies? (Please check every suspected cause and rank the causes according to their relative importance.)

	Cause of death	**Rank (1 = the most important)**
☐	Don't know	
☐	Starvation	
☐	Poor queens	
☐	Ineffective Varroa control	
☐	Nosema	
☐	Weather	
☐	Weak colonies in the fall	
☐	Other (*Please specify*) _____	
☐	Other (*Please specify*) _____	
☐	Other (*Please specify*) _____	

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Appendix 5: Research Report

CAPA Research Report 2020
(sorted by alphabetic order of P.I's last name)

Project title: Assessment of honey bee colonies by an intelligent hive management platform

Principle Apicultural Investigator:
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Co-Investigators (including graduate students):
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Abstract (300 words or less):
Colony management and inspection is time-consuming for beekeepers and it may be difficult for them to predict possible problems when they possess multiples hives. Moreover, new beekeepers do not always have the knowledge to take good care of their hives. Continuous monitoring of beehives using smart sensors could detect the defining characteristics of colony health. The interpretation of the data and the decision support system would be a new management method of the apiary to help beekeepers. The objective of the project is to evaluate the impact of: 1) the presence and health status of the queen and 2) swarming on the health and development of colonies with the data collected by smart sensors inside the hives. The development and health status of 48 colonies was measured at regular intervals during the 2019 beekeeping season. The experimental groups were: 1) 12 control colonies (swarm management and presence of the queen); 2) 12 colonies without queen (withdrawal of the queen for a duration of 72h); 3) 12 colonies without swarm management, but attempting to prevent bees from swarming once identified behavior; and 4) 12 colonies in which the swarming phenomenon is imitated (permanent removal of queens in july). The correlation between the zootechnical data and the recorded data on colonies will help optimizing the algorithms for predicting the state of health of the colonies and thus provide a new management tool for beekeepers.

Start Date: July 2017

End Date: August 2019

Total Funding for Project: 121 527$;

Funding Sources: QuébecInnove, Nectar, Centre de recherche en sciences animales de Deschambault

Project Title: Ecology and Species Status of the Giant Himalayan Honey Bee, *Apis laboriosa*

Principal Investigators:

Name: Axel Brockmann
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Abstract:

Apis laboriosa was described in 1871, following which it was considered to be a high elevation subspecies of the widely distributed species *Apis dorsata* for~ 80 years. Although many lines of evidence (e.g., morphometric, morphological, characters, genetic, and behavioural [timing of mating flights]) support the uniqueness of *Apis laboriosa* as a species, some systematists (e.g., M. Engel, 1999) continue to consider this taxon to be a subspecies.

Our research should settle the question of the species status of *Apis laboriosa*:

1) *Co-occurrence at sites in NE India*. N. Kitnya has discovered 5 sites in 3 regions of Arunachal Pradesh where *Apis laboriosa* (golden thoracic hairs, black abdomen) forages sympatrically with *Apis dorsata* (black thoracic hairs, orange-brown anterior abdominal segments). Morphometric analyses of specimens separate them into two non-overlapping clusters. Ocellar structures on the head differ significantly. These results suggest that these two taxa do not hybridize (and by the biological species concept qualify as separate species).
2) *Distribution.* Through our fieldwork and collaboration with researchers from Nepal, Bhutan, and Vietnam, we have extended the distribution of *Apis laboriosa* further to the northwest in Uttarakhand,

India; to the east in Vietnam; southward in the Arakan Mountains to west central Myanmar; and to the Shillong Plateau of Meghalaya, India.

3) *Timing of mating flights.* To be studied in 2020.
4) *Seasonal migration.* Both *A. dorsata* and *A. laboriosa* move to low elevations for the winter, then migrate up river valleys towards Tibet. Ongoing studies, 2019-2021.
5) *Taxonomy of* Megapis. We have collated specimens of workers and drones from throughout the range of all 4 subspecies/species of giant honeybees in order to create a key to discriminate them into 2-4 species.
6) *Genetics.* Genetic analyses of *Megapis* specimens will help to determine their distinctiveness and approximate time of separation.

Start Date: January 2018

End Date: December 2022

Funding: Unknown (Indian funding sources)
Gard Otis uses his personal funds to participate in fieldwork and meetings

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Project title: Getting more bang for your buzz: Does pollination compensate for canola yield lost under sub-optimal soil moisture, nitrogen fertilization and/or seeding rates?

Principle Investigator: Ralph Cartar, University of Calgary
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Telephone: 403-220-3640
Co-Investigators (including graduate students):
Name(s): Georgios Adamidis, University of Calgary; Andony Melathopoulos, Oregon State University; Shelley Hoover, Alberta Agriculture and Forestry; Breanne Tidemann and Steve Pernal, AAFC

Abstract (300 words or less):
Our research investigates the agronomic contexts in which the benefits of honey bee pollination to canola yield might be more pronounced, opening the possibility for strategic management of honey bee pollination at more realistic stocking rates for western Canada (e.g., 0.5 colonies/ha as in Australia). Specifically, we are testing whether the benefits of honey bee pollination to canola yield are enhanced under: 1) sub-optimal growing conditions, and 2) avoidance of late-season compensation in which seed yield results disproportionately from later-maturing side branches versus main branches. These situations exist in three agronomic practices/situations in canola cultivation: 1) reduced seeding rates, 2) nitrogen application below recommended rates, and 3) under conditions of moisture stress during the vegetative growth and seed development (pod filling). The ability of bee pollination to compensate for suboptimal agronomic conditions have recently been observed in orchard and field crops, including canola. The mechanism responsible for this compensation remains poorly understood. In canola we postulate that it stems from (a) a trade-off between early and late allocation of reproductive resources, in which bee pollination optimizes the use of a plant's limited resources during early bloom (the trade-off hypothesis), and/or (b) uncertainty in the timing of the end of the growing season, in which early bee pollination provides greater certainty of high-quality seed by harvest time (the reproductive assurance hypothesis).

Start Date: 05/2016
End Date: 05/2019

Total Funding for Project: $281,625
Funding Sources: Canola Council of Canada, Alberta Beekeepers Commission

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Project title: Impact and control of viruses associated with honey bee comb

Principal Investigator:
Name: Rob Currie, PhD
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Co-Investigators (including graduate students):
Names: Megan Collwel, Steve Pernal,

Abstract or project description (300 words or less):
The occurrence of honey bee viruses on the comb left over from colonies that have died over winter (dead outs) has been shown to have significant negative effects on the performance of bees that are reintroduced into that equipment.

The proposed research will examine: (1) the effects of temperature, (2) time of exposure, (3) presence or absence of bees and (4) various sterilization treatments on the viability of viruses on honey bee comb.
Finally (5) we will also elucidate what comb-related factors may interact with viruses on comb to either enhance their rate of degradation in the hive or interact with them to affect their virulence in adult bees. The results will have significant benefits for producers in that it will provide clear management options and best practices to allow them to maximize their colony performance when recovering from winter losses associated with the accumulation of high levels of virus on honey bee comb in colonies that have died over winter. This research will help to ensure a supply of healthy bee colonies for the pollination of crops and production of honey.

Start Date: April 1, 2014
End Date: March 30, 2019
Total Funding for Project: $175,000 (over 4 years)
Funding Sources: Agriculture and Agrifood Canada, University of Manitoba (UMGF), Canadian Bee Research Fund

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Project title: **Mechanisms of grooming behaviour in honey bees**

Principal Investigator:
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Email: rob.currie@umanitoba.ca
Telephone: 204 - 474-6020
Collaborators (co-pi's): Derek Micholson M.Sc. student, see also Bee Omic's consortium
Abstract or project description (300 words or less):
This study is an offshoot of a larger, Canada-wide study, aimed at measuring economically-264 valuable traits using recognized field assays and developing Marker-Assisted Selection tools using 265 proteomic and genomic analysis of bee samples. One of the traits being measured in this study is 266 grooming behaviour. In this study, we will be selecting high- and low-grooming 267 colonies, based on the results of field assays, to study further in a laboratory setting (see methods 268 below). The overall objective of my study is to better understand the

biological mechanisms by which 269 bees from high-grooming colonies are better able to remove mites from themselves and from other bees.

Start Date: April 1, 2016
End Date: September, 2019
Total Funding for Project:
Funding Sources:
Genome Canada Bee Omics

This study is an offshoot of a larger, Canada-wide study, aimed at measuring economically-264 valuable traits using recognized field assays and developing Marker-Assisted Selection tools using 265 proteomic and genomic analysis of bee samples. One of the traits being measured in this study is 266 grooming behaviour. In this study, we will be selecting high- and low-grooming 267 colonies, based on the results of field assays, to study further in a laboratory setting (see methods 268 below). The overall objective of my study is to better understand the biological mechanisms by which 269 bees from high-grooming colonies are better able to remove mites from themselves and from other bees.

Project title: *Nosema* epidemiology and control in honey bees (*Apis mellifera*) under Canadian prairie conditions

Principal Investigator:
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Collaborators (co-pi's): Rosanna Punko M.Sc. student, Shelly Hoover Alberta Ag, Medhat Nasr, Alberta Ag retired

Abstract or project description (300 words or less):

he first objective of this study is to determine the effect of geographical location and winter management as well as fumagillin treatment timing on nosema mean abundance (the mean number of spores in all sampled bees) and colony performance and survival in Alberta. It is hypothesized that nosema abundance will be higher in the North than the South. Also, outdoor-wintered colonies will have higher nosema mean abundance than indoor-wintered colonies due to temperature-related stress. No fumagillin treatment will negatively affect colony population, total brood area, viability, and survival with the impact on colony winter performance being more severe in colder wintering environments.

The second objective is to determine the seasonal variation and prevalence (the proportion of infected colonies) of *Nosema ceranae* and *Nosema apis* in Alberta. It is predicted that *N. apis* will be more prevalent in more northern locations. Also, *N. apis* will be more prevalent in outdoor wintered colonies whereas *N. ceranae* will be more prevalent in indoor wintered colonies.
Start Date: April 1, 2016
End Date: September, 2019
Total Funding for Project: 50,000
Funding Sources:
Genome Canadian Bee Research Fund, Alberta Beekeepers Development Fund, Alberta Agriculture

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Project title: Reduction of Winter Mortalities by an Early *Varroa destructor* Control During the Summer Period in Quebec Hives

Principle Investigator:

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Co-Investigators

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Address: 120-A Chemin du Roy, Deschambault (Québec), GOA 1S0

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Telephone: (418) 286-3353 p. 249

Name(s): Pierre Giovenazzo

Address: Pavillon Vachon, 2325 Rue de l'Université, Québec City, QC G1V 0A6

Telephone: (418) 656-2131 poste 408081

Abstract (300 words or less):

The role of *V. destructor* (Vd) is crucial in winter hive losses in worldwide beekeeping operations. During the past 15 years, Canadian and Québec winter mortalities ranged from 15% to 35% and the control of Vd infestation levels during the honey season seems to be a major factor. The objectives of this research were: 1) to measure the effects of controlling the varroa threshold during the summer, on the zootechnical performances, health status, winter mortality and spring development of hives; 2) to evaluate the pathogenicity of *V. destructor* on bee colonies in relation to other pathogens. The project will be conducted over 3 consecutive years by evaluating different summer treatment approaches against Vd (year 1); by finding the best treatment period during the summer (year 2); and by transferring one approach to commercial beekeepers (year 3). During the first year, 50 colonies will be allotted to 5 different treatment groups applied in early August: 1- Control (without treatment), 2-VSH (without treatment, but with queens with high Varroa Sensitive Hygienic line) 3- formic acid (Mite Away Quick Strip) 4- oxalic acid (dripping) 5- oxalic acid (slow release in a glycerine matrix). In the second year, a similar protocol will be applied (50 colonies, 5 treatments) with the best approach obtained in year 1 but at modified application times: (1) July 1st; (2) August 1st; (3) July 1st and August 1st; (4) control; (5) VSH. For the third year, the two best approaches of the first 2 years will be retained and applied in 3 Québec zones among commercial beekeepers who will provide 2 apiaries of 24 colonies. This project should provide the information if whether or not maintaining varroa populations below a 5% threshold throughout the summer season and mainly in late summer and early fall will allow a better health status of the hive in early late summer and early fall resulting in better winter survival.

Start Date: May 2019

End Date: April 2022

Total Funding for Project: 208 000$

Funding Sources: Programme Innov'Action agroalimentaire Québec 2018-23 (MAPAQ) and Centre de recherche en sciences animales de Deschambault.

Project title: Sustaining and securing Canada's honey bees using 'omic tools

Principal Investigators:

Name: Leonard Foster (University of British Columbia)
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Name: Amro Zayed (York University)
Address: 4700 Steele Ave, Toronto, ON, M3J 1P3
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Collaborators: Dr. Katherine Baylis (Univ. Illinois Urbana-Champaign), Dr. Miriam Bixby (Univ. of British Columbia) Dr. Carlos Castillo (National Bee Diagnostic Centre), Dr. Robert Currie (Univ. of Manitoba), Dr. Nicolas Derome Université Laval), Leslie Eccles (Ontario Beekeepers Association), Dr. Valérie Fournier (Université Laval), Dr. Pierre Giovenazzo (Centre de recherche en sciences animales de Deschambault), Dr. Marta Guarna (AAFC and Univ. of British Columbia), , Dr. Shelley Hoover (Alberta Agriculture and Rural Development), Dr. Stephen Pernal (AAFC), Dr. Jianhong Wu (York University)

Project description: Honey bees are an essential component of Canadian agriculture, contributing at least $4.6 billion to our economy through their pollination activities and honey production. But Canadian beekeepers have lost an average of 27.1% of their colonies every winter since 2006-07. Diseases that weaken or kill colonies are important causes of these unsustainable declines that, left unchecked, are expected to *pose serious threats to the productivity of major Canadian agro- industries (*e.g. *oilseeds, tree fruits, berries, cucurbits and forage crops*) *and jeopardize our food security.* Canadian beekeepers mitigate high winter losses by importing more than 200,000 queen bees annually, mostly from Hawaii, California, and New Zealand. The heavy reliance on imported queens poses several risks to Canadian beekeepers, including high volatility associated with border closures and the introduction of mal-adapted stock or undesirable genetics. In particular, the Canadian Food Inspection Agency has highlighted the introduction of the highly invasive and aggressive Africanized 'Killer' bees as a serious risk of importing honey bees from the US.

Our group has pioneered the application of 'omic tools to applied bee health. Canadian honey bees have high levels of genetic diversity and most economically valuable traits are highly heritable in bees: these make for ripe conditions to develop 'omics-assisted breeding tools for the beekeeping industry. We will improve the health and sustainability of Canadian honey bees by carrying out a large-scale association mapping study to develop genomic and proteomic markers for selectively breeding 12 economically-valuable traits (**Activity 1**). The integration of 'omics and GE^{3}LS research will allow us to deliver, with supporting science and economics, marker-assisted selective breeding tailored to Canada but potentially applicable across the world. The best way to disseminate stronger breeds of bees will be through the existing queen supply chain but this involves risky importation so in parallel, we will develop a genomic assay to screen imported queens for Africanized genetics (**Activity 2**), in order to eliminate this as a possible cause of border closure. Working with a broad group of stakeholders, end-users, national and international collaborators, we will **deliver**:

1. 'Omic tools needed for selective breeding of healthy and productive honey bee colonies adapted to the Canadian climate, pathogen profile, and beekeeping practices

2. Best-practices for implementing 'omic tools for improving bee health within Canada

3. High-throughput surveillance and compliance tools, and associated regulatory recognition, to quickly and efficiently differentiate Africanized from non-Africanized honey bees in Canada and major exporting countries

These deliverables are expected to generate 9 measurable socioeconomic benefits that range in value from $8 Million/y up to $150 Million/y, annually. The socioeconomic benefits include direct benefits to beekeepers, who will spend less money and make more profits from managing healthy and productive 'omic bred honey bees, indirect benefits to our agro-economy and food security that depend on healthy bees, and social benefits to the Canadian public who are concerned about the health of bees. We will capitalize on an excellent existing infrastructure for knowledge mobilization to engage a wide spectrum of end-users to realize these socioeconomic benefits. In particular, by engaging early adopters and connecting them with 'omic service providers, we expect to start realizing some of our socio-economic benefits by the end of the project.

Our innovative research will generate 21st century tools to solve two major threats facing the Canadian beekeeping industry by improving the health of locally-bred honey bees and mitigating the risks of importing Africanized honey bees. Through these efforts we will realize a stronger, healthier and more sustainable bee population that supports billions of dollars of Canadian crops and ensures our food security. Our research will serve as a road map for improving honey bee health across the globe.

Start Date: October 2015
End Date: September 2019
Total Funding for Project: $7 334 000 (18% in Québec)
Funding Sources: Genome Canada, Genome BC, Genome Quebec, UBC, York University, ACIDF, BCHPA, OBA

Principal Investigator: Valérie Fournier Ph.D.**,** full professor
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2480, boul. Hochelaga
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PROJECT TITLE: Impact of landscape enhancements on bumblebee biodiversity and winter survival in apple orchards

PRINCIPAL IVESTIGATOR: Valérie Fournier (U Laval)
COLLABORATORS: Marc Bélisle (Sherbrooke University); Marc Mazerolle (U Laval)
GRAD STUDENT: Amélie Gervais (PhD candidate)
GRANT PROGRAM: MAPAQ, Prime-Vert
DURATION: 3 years (May 2017 to May 2020)
TOTAL FUNDING RECEIVED: 70 000$
STATUS: **almost ending**

ABSTRACT: Landscape enhancements (e.g. windbreaks, riparian strips, flower strips) installed in several orchards in Quebec could improve the habitat of pollinators in agricultural areas. Early flowering of apple trees greatly benefits from pollination by bumblebees, which, unlike other indigenous pollinators or honey bees, are

more efficient and active earlier in the spring. We assume that orchards with landscape enhancements will have a greater number of species and greater abundance. In order to test this hypothesis, queens from 12 orchards (6 with and 6 without enhancements) were captured using the capture-marking-recapture method. A total of 4290 and 379 queens were respectively collected during 3 springs and 2 falls and represented by 9 different species. Year to year variation made it hard to detect an effect of landscape enhancements on bumblebee richness, but one was found for bumblebee abundance for some species.

PROJECT TITLE: Biodiversity of wild pollinators in the flooding plains area of Lake St-Pierre, Québec

PRINCIPAL INVESTIGATOR : Valérie Fournier (Université Laval)
COLLABORATORS: Dr. Raphaël Proulx (University of Quebec in Trois-Rivières)
GRAD STUDENT: Olivier Slupik (MSC candidate)
GRANT PROGRAM: MAPAQ
DURATION: 2 years (May 2019 to May 2021)
TOTAL FUNDING: 30 000$
STATUS: ongoing
ABSTRACT: not available at this time

PROJECT TITLE: Biodiversity of wild pollinators in boreal forests

PRINCIPAL INVESTIGATOR : Valérie Fournier (Université Laval)
CO-INVESTIGATORS : Dr Mathieu Bouchard (MFFPQ)
GRAD STUDENT : Léonie Carignan-Guillemette (MSC candidate)
GRANT PROGRAM: Plan vert, MFFPQ
DURATION: 2 years (January 2020 to December 2021)
TOTAL FUNDING: 30,000$
STATUS: ongoing
ABSTRACT: not available at this time

PROJECT TITLE: Investigating the impact of agricultural landscape on biodiversity of wild pollinators across Quebec province using citizen science

PRINCIPAL IVESTIGATOR: Valérie Fournier (Université Laval)
CO-INVESTIGATORS: Sabrina Rondeau (University of Guelph); Amélie Gervais (U Laval)
COLLABORATORS : Dr Maxim Larrivée (insectarium of Montreal); Dr Véronique Martel (CFL, Natural Ressources Canada); Dr Marc Bélisle (Sherbrooke University)
GRAD STUDENT: Anne Leboeuf (MSC candidate)
GRANT PROGRAM: Innov'Action MAPAQ
DURATION: 3 years (January 2020 to December 2021)
TOTAL FUNDING: 200,000$
STATUS: ongoing
ABSTRACT: not available at this time but see website (French only): abeillescitoyennes.ca

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2020 CAPA Research Report

Principal investigator

Pierre Giovenazzo PhD
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1- Selection of the Varroa Sensitive Hygiene-VSH behavior in honeybees to control Varroa

Graduate students: Marie-L Morin MSc (2018-20), Stéphanie Rouleau-Breton MSc (2017-19)

Abstract: The objectives of this study are to 1) identify CRSAD-VSH colonies, 2) realize performance assessments of the CRSAD-VSH selected lineages, 3) determine the heritability of the VSH trait, 4) evaluate the relation of the VSH trait with other selection criteria and 5) distribute VSH lineages to Ontario (2x) and Québec (2x) breeders.

Start Date: 2018-04-01
End Date: 2021-03-31
Total Funding for Project: $200 000
Funding Sources: OMAFRA New Directions Research Program (Ontario) and Centre de recherche en sciences animales de Deschambault

2- Stockage et hivernement des reines de l'abeille domestique (*Apis mellifera* L.)

Co-Investigators: Andrée Rousseau (research scientist, CRSAD)
Graduate student Laval University: Mireille Lévesque (2019-21)

Abstract: Queen breeders across Canada produce their earliest queens end of May when mature drones and first virgin queens are produced. But the Canadian beekeeping industry needs queens earlier, after wintering (end March-early April), to replace dead or failing queens / colonies. Consequently, our industry is highly dependent on queen imports (from California USA mainly) at the beginning of the season. The goal of our project is to maintain locally produced mated queens live and fertile from September to April. To accomplish this, various queen banking/storage methods will be tested (temperatures below or above cluster formation and queen density in banks). Efficacy of tested methods will be evaluated by measuring queen survival, sperm viability within queen's spermatheca and the post banking performance of queens introduced in colonies the following season. Hopefully, results from this project will allow beekeepers have access to locally raised queens early spring and thus reduce their dependency toward queen imports.

Start Date: 2019-04-01
End Date: 2022-03-31

Total Funding for Project: $228 000
Funding Sources: Innov'Action, Ministère de l'agriculture des pêcheries et de l'alimentation du Québec et Centre de recherche en sciences animales de Deschambault.

3- Genetic selection of honeybees in northern climates

Graduate student: Ségolène Maucourt PhD (2017-2021)

Abstract: This project aims at increasing self-sufficiency of the Canadian beekeeping industry. My research focuses on honey bee selection, to increase productivity and resistance to pathogens and parasites, with emphasis on the parasitic mite *Varroa destructor*. Major research objectives are to develop honey bee specific statistical models that will assign a genetic value to each colony based on heritability of selected traits and to study Varroa Sensitive Hygiene-VSH behavior and use it as a novel selection trait. Research will be accomplished through controlled experiments and colony assessments in CRSAD colonies. These experiments are grouped in 5 Activities: (Activity 1) Measures of various selection criteria CRSAD colonies; (Activity 2) Calculations of heritability values of selection criteria; (Activity 3) Development of a flexible selection index; (Activity 4) Comparison of marker assisted selection with phenotypic selection; (Activity 5) Fundamental knowledge of Varroa Sensitive Hygiene behavior.

Start Date: 2019-04-01
End Date: 2024-03-31
Total Funding for Project: $152 000
Funding Source : Conseil de recherches en sciences naturelles et génie Canada, Subventions à la découverte SD.

Project title: Apiguard® efficacy for controlling *Varroa destructor* in honey bee (*Apis mellifera*) colonies in Canada

Principle Investigator:

Name(s): Pierre Giovenazzo
Address: Pavillon Vachon, 2325 Rue de l'Université, Québec City, QC G1V 0A6
Telephone: (418) 656-2131 poste 8081

Co-Investigators (including graduate students):

Name: Marilène Paillard
Address: 120-A chemin du Roy, Deschambault (Qc), G0A 1S0
Email: marilene.paillard@crsad.qc.ca
Telephone: 418-286-3353 ext.249

Name: Paulo Mielgo
Address: Vita (Europe) Limited, Basingstoke, United Kingdom

Email: pmielgo@vita-europe.com

Abstract (300 words or less):

Apiguard® is a varroacide with thymol incorporated in a gel matrix. Apiguard® has two complementary modes of action: 1) thymol vapours spread in the colony with the help of ventilating bees and acts against varroa by respiration; 2) the workers transport and spread the gel in the colony by physical contact and trophallaxis and acts against varroa by contact. When Apiguard® is used following the label instructions, it is non-toxic for humans and well tolerated by bees. The object of this work was to conduct an efficacy trial of Apiguard® under typical Canadian apicultural conditions. Trials were realized at apicultural service of the Centre de recherche en sciences animales de Deschambault's (CRSAD). We tested three different treatments on groups of 12 colonies: 1) negative control (no treatment), 2) Apiguard® dosage 100g/colony/6 weeks (2 consecutive applications of 50 g), and 3) Apiguard® dosage 75g/colony/6 weeks (3 consecutive applications of 25 g). Treatments were compared using varroa drop during the treatment period and by calculating efficacy after a follow-up treatment with Apivar® (active ingredient: amitraz). Colony performance was also assessed (honey bee brood population and colony strength) before and after wintering to compare treatments. Apiguard® is currently available in Europe and the USA but not in Canada. However, it could soon be with the results of this trial.

Start Date: August 2018

End Date: Mai 2019

Total Funding for Project: 37 000$

Funding Sources: Vita (Europe) Limited, Centre de recherche en sciences animals de Deschambault

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Project title: Emerging Threats to Pollinators

Principal Investigators:

Name: Steve Pernal, Marta Guarna - AAFC
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Email: marta.guarna@canada.ca; steve.pernal@canada.ca
Telephone: 780-354-5150; 780-354-5135

Co-Investigators and collaborators (including graduate students):

Names: Sophie Cardinal – AAFC, Leonard Foster- UBC, Ryan Schwarz - Fort Lewis College, Carlos Castillo and Patricia Wolf Viega - NBDC

Abstract or project description (300 words or less):

One of the factors implicated with declines in bee health and abundance is the presence of emerging parasites and pathogens including: the newly-introduced microsporidian *Nosema ceranae*, recently characterized trypanosomatids *Crithidia mellificae* and *Lotmaria passim*. There is limited information available on the prevalence of these organisms in bee species, the pathology they trigger and the molecular mechanisms involved in pathogenesis. Better characterized organisms such as *Crithidia bombi*, known to impair bumblebee health, also highlight the potential for pathogen spill-over from managed to native pollinators. Clearly there is

a need to address the paucity of information on emerging disease threats in pollinator communities, and to determine their impact on pollinator health.

This project aims to investigate whether these parasites are widespread in managed and wild pollinator communities, which species are present, and how they affect pollinator health. A survey of honey bees and wild bees collected in different provinces followed by diagnostic testing will provide information on their prevalence in Canada. To address the question on their effect on pollinator health, we will perform controlled infection experiments of honey bees and evaluate molecular and proteomic markers of immune defence of bees, and survival. Infections are planned with the individual microsporidian and trypanosomatid parasites, and with combinations thereof, as we have found that co-infections are common in Canadian bee populations.

Start Date: April 1, 2016
End Date: March 31, 2019
Total Funding for Project: $200,252
Funding Sources: AAFC: $200,252, UBC in kind: $50,000

Project title: Assessing the effect of sperm viability on queen performance and colony productivity

Principal Investigator:

Name: Marta Guarna, Steve Pernal - AAFC
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Telephone: 780-354-5150; 780-354-5135

Co-Investigators and collaborators (including graduate students):

Names: Carlos Castillo - NBDC, Jeff Pettis -Pettis and Associates

Abstract or project description (300 words or less):

Poor queen quality is recognized as an important factor affecting honey bee colony performance and survival. In the 2015 Statement on Honey Bee Wintering Losses in Canada published by the Canadian Association of Professional Apiculturists, beekeepers cited 'poor queens' as a main cause of winter colony losses. Thus, understanding why queens are failing is a priority. There are several factors that can affect queen health and performance including poor mating, disease load, and pesticide exposure. However, the condition of local and imported queens from selected and unselected stocks in Canada is not well documented. In addition, recent data from our collaborator, Jeff Pettis, indicated that the viability of the sperm that queens carry in their bodies can be linked to poor colony performance. It is not clear, however, to what extent decreases in sperm viability affect queen performance and longevity as well as colony productivity and survival. This project aims to address this important question as well as to assess the status of queens used in Canadian operations. The results may help guide queen producers and beekeepers on queen handling and management decisions that may have a profound effect on their operations, reducing the need for frequent queen replacement and improving the productivity and survival of their colonies.

Start Date: April 1, 2016
End Date: March 31, 2019
Total Funding for Project: $207,630
Funding Sources: CBRF: $6,000, PAm cash: $90,000, NBDC+AAFC in kind: $117,630

Project title: Blueberry Pollination and Bee Health

Principal Investigator:

Name: Marta Guarna - AAFC
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Email: marta.guarna@canada.ca
Telephone: 780-978-1690

Co-Investigators and collaborators (including graduate students):

Names: Leonard Foster and Heather Higo - UBC, Steve Pernal - AAFC, Patricia Wolf Veiga - NBDC.

Abstract or project description (300 words or less):

Blueberries are Canada's top fruit export. In 2016, fresh and frozen blueberry exports were valued at over $400 million. Blueberries are cultivated in over 75,000 hectares that produce over 200,000 metric tonnes of fruit. Canada's blueberries are grown in wild (lowbush) and cultivated (highbush) varieties, and most of Canada's cultivated blueberries are produced in British Columbia (BC) and are pollinated by honey bee colonies from BC and Alberta.

There is increasing concern amongst beekeepers that pollinating blueberries is harming the health of their bees and affecting later colony productivity. Beekeepers report poor colony health and increased frequency of European foulbrood (EFB) disease which can result in increased use of antibiotics. Antibiotics may leave residues on the hive and result in the removal of the colony for honey production.

Risk factors that affect health and productivity are not well defined but may include: nutritional deficiency to the characteristics of blueberry pollen combined with lack of supplemental foraging sources, and/or effects of in-hive and environmental chemicals, including agrochemicals. To understand these risk factors and test a potential management strategy, we will monitor colonies with and without nutritional supplementation (via protein patties) before and after they pollinate blueberries. Colonies will be inspected to determine their strength and to assess their disease status. Disease status will be evaluated by recording visual symptoms of disease and molecular analysis of pathogens and parasites, including EFB, AFB (American foulbrood), Nosema spp., and Varroa. Adult bees and pollen samples will also be collected for chemical analysis.

We aim to understand risk factors and finding management strategies to increase bee health during pollination. Increasing pollinator health will ensure that beekeepers continue to confidently offer colonies for pollination and that blueberry growers continue to benefit from the pollination services of managed honey bees to obtain high crop yields.

Start Date: April 1, 2018
End Date: March 31, 2020
Total Funding for Project: $180,000
Funding Sources: Cash: CBRF/CHC: $14,700, BCHPA: $30,000, BC Blueberry Council: $12,500, PAm: $30,000. In kind: AAFC: $33,300, UBC: $7,000, NBDC: $15,000, Beekeepers: $37,500

Project title: Stock Assessment

Principle Investigator: Shelley Hoover, Alberta Agriculture and Forestry

Name: Shelley Hoover
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Email: shelley.hoover@gov.ab.ca
Telephone: 403-317-2170

Co-Investigators (including graduate students):

Name(s): Marta Guarna, Steve Pernal, Beaverlodge Research Farm; Patricia Wolf-Viega, NBDC

Abstract (300 words or less):
There is little empirical information available to Alberta beekeepers on the performance of commercially available imported honey bee stocks in Alberta, especially in comparison to commercially available domestic stocks, which are available later in the year. This project would give us an indication of the variation that exists in performance and initial queen quality among stocks, and also provide data on the productivity of mid-season splits over their first and second summer. It also provides us with valuable data to show queen breeders regarding the performance of their stocks in our environment. Finally, we will be able to use the field data to determine the importance of measurable queen quality parameters to predict colony-level performance.

Start Date: 01/01/17
End Date: 31/12/18
Total Funding for Project: $70,500
Funding Sources: ACIDF, Alberta Beekeepers Commission

Project title: Increased sustainability Managing Bee Pests (Varroa Mites and Nosema) for Alberta Beekeepers

Principle Investigator: Shelley Hoover, Alberta Agriculture and Forestry
Name: Shelley Hoover
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Email: shelley.hoover@gov.ab.ca
Telephone: 403-317-2170
Co-Investigators (including graduate students):
Name(s): Medhat Nasr and Rassol Bahreini, Alberta Agriculture and Forestry; Robert Currie and Rosanna Punko, University of Manitoba

Abstract (300 words or less): This project addresses the lack of options for Varroa and Nosema control

Start Date: April 1 2014
End Date: December 31, 2018
Total Funding for Project: $553,859
Funding Sources: ACIDF, Alberta Beekeepers Commission

Project title: Spring Protein Supplements for build-up of colony populations for pollinating canola

Principle Investigator: Shelley Hoover, Alberta Agriculture and Forestry
Name: Shelley Hoover
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Email: shelley.hoover@gov.ab.ca
Telephone: 403-317-2170

Abstract (300 words or less): This project will compare commercially available protein patties used to feed honey bee colonies. We will measure patty consumption and bee population build-up of colonies fed different supplements during the spring.

Start Date: 01/01/18

End Date: 31/12/20
Funding Sources: Alberta Agriculture and Forestry, Poelman Apiaries Ltd.

Project title: Queen Production in Canola

Principle Investigator: Shelley Hoover, Alberta Agriculture and Forestry
Name: Shelley Hoover
Address: Lethbridge Research and Development Centre
Email: shelley.hoover@gov.ab.ca
Telephone: 403-317-2170

Abstract (300 words or less): This project will evaluate the feasibility and quality of queen production during hybrid canola pollination in southern Alberta.

Start Date: 01/01/16
End Date: on going
Funding Sources: Alberta Agriculture and Forestry

Project title: **Honey Bee Sentinel Colony Project**
Principal Investigator:
Name: Manitoba Beekeepers Association, Daryl Wright and Jack Lee.
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Email: rob.currie@umanitoba.ca
Telephone: 204 - 474-6020
Collaborators (co-pi's): Rheal Lafreniere, Rob Currie

Abstract or project description (300 words or less):
The beekeeping industry in Manitoba has seen a high degree of variability in the health of honey bees over the last 10 years. This has resulted in higher mortality not only during the winter but also during the spring and summer due to weak colonies. Some areas of the province have experienced on going problems with high levels of mortality during the winter and spring, where as other areas have generally experienced consistently lower levels of mortality during the winter but have a greater number of non-producing hives going into summer.

The sentinel hive project will compliment what is being collected in the national survey and offer more real-time data that can be used to better understand the seasonal changes in bee health and the interactions between biological and environmental factors that affect bee health. Currently, there is a large sentinel hive project being conducted in the US and it is showing that there are significant regional difference in bee health as well as management of hives in the US and that it is becoming increasingly important to track bee health on a regular basis in order to effectively manage it before it is beyond repair.

Environmental conditions will be monitored throughout the year. This will be accomplished by using in-hive monitoring systems a s well as regional weather station data. A hive monitoring system will be established at each site. This system will provide 24 hour updates on colony status. This data will include weight gains or loss, brood production, foraging and fanning activity and colony development throughout the season. These monitoring systems will be left in place for 12 months to record data during the period of suspected high mortality. The analysis of these different biological and environmental components throughout the year will provide detailed information to the beekeeper.

Informed management decisions can be made to protect colonies from decreased production and mortality by using timely disease and parasite treatments and, determine the effectiveness of these treatments.

Start Date: March, 2016
End Date: March 31, 2018
Total Funding for Project:
$50,000

Atlantic Tech Transfer Team for Apiculture (ATTTA)
Research Report for Canadian Association of Professional Apiculturists
December 2019

1) Project title: Evaluating the effect of feeding pollen substitute to honey bee colonies destined for wild blueberry pollination

Principal Investigators:
Name: Robyn McCallum & Sawyer Olmstead
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Telephone: (902) 957-3274

Abstract or project description:
We studied the effect of sending hives to blueberry pollination with 0, 1, and 2 lbs of pollen substitute (Ultra Bee™) on colony growth (measured as seams of bees), % blueberry pollen collection (measured with pollen traps), and presence and absence of European Foulbrood (EFB). A report on this research is available on our website (https://www.perennia.ca/wp-content/uploads/2019/10/ATTTA-FactSheet-Oct-2019.pdf). Pollen samples were submitted to a laboratory for further diagnostic work (pollen identification).

Start Date: May 2019
End Date: August 2020
Total Funding for Project: N/A **Funding Sources:** Atlantic Tech Transfer Team for Apiculture

2) Project title: Evaluating the effect of late summer pollen substitute to honey bee colonies

Principal Investigators:
Name: Robyn McCallum & Sawyer Olmstead
Address: 199 Dr. MacDonald Drive, Bible Hill, Nova Scotia B6L 2H5
Email: rmccallum@perennia.ca; solmstead@perennia.ca
Telephone: (902) 957-3274

Abstract or project description:
In 2018, we studied the effect of feeding pollen substitute to summer splits (hives that are divided to prevent swarming, make up for hive losses, or grow the number of hives in an operation) during August to determine if there was an effect on growth of the colonies late summer into the fall, and if there was an effect of feeding pollen substitute on the size of the colonies in the spring. In 2018 we compared two different pollen substitutes, Ultra Bee™ and Nutra Bee™ with control colonies, which were not fed any pollen substitute.

This trial was repeated in 2019 comparing colonies fed with Ultra Bee™ and control colonies fed no pollen substitute. Nutra Bee was not used in 2019 due to being unavailable in 2019. The feeding portion of this trial concluded in September 2019, and 3 the overwintering data and spring growth data will be collected in spring of 2020. A final report will be made available as soon as possible in the spring of 2020.
Pollen was collected in both 2018 and 2019 using pollen traps and was submitted to a lab to determine the crude protein content and amino acid profile of fall pollen in NS.

Start Date: August 2018
End Date: June 2020
Total Funding for Project: N/A **Funding Sources:** Atlantic Tech Transfer Team for Apiculture

3) Project title: Pollination in Wild Blueberry Fields

Principal Investigators:
Name: Robyn McCallum & Sawyer Olmstead
Address: 199 Dr. MacDonald Drive, Bible Hill, Nova Scotia B6L 2H5
Email: rmccallum@perennia.ca; solmstead@perennia.ca
Telephone: (902) 957-3274

Abstract or project description:
ATTTA has conducted pollination research in wild blueberry fields from 2017 to 2019 in both New Brunswick and Nova Scotia. Several questions have been studied, including:

- The impact of honey bee stocking density on pollination success, berry mass, and yield
- The impact of honey bee stocking density on colony growth
- The impact of honey bee stocking density on abundance and diversity of bees in wild blueberry fields
- The effect of sending honey bee hives to blueberry pollination with pollen supplementation (covered in greater detail above)

A report on these research findings will be released in early 2020.
Questions that remain to be studied (until March 2023) include:

- The effect of moving honey bee hives during pollination
- The optimal timing (percent bloom) of placing honey bee hives in blueberry fields
- Best management practices for pollination of wild blueberry (BMP document will be completed once research has finished)

Start Date: May 2017
End Date: August 2023
Total Funding for Project: N/A **Funding Sources:** Atlantic Tech Transfer Team for Apiculture 4

4) Project title: Queen Research in Atlantic Canada

Principal Investigators:
Name: Robyn McCallum & Sawyer Olmstead
Address: 199 Dr. MacDonald Drive, Bible Hill, Nova Scotia B6L 2H5
Email: rmccallum@perennia.ca; solmstead@perennia.ca
Telephone: (902) 957-3274

Abstract or project description:

ATTTA conducted a queen selection and production project in 2018 and 2019 in collaboration with a commercial beekeeping operation in New Brunswick. The objective of the project was to track the costs (time, labour, materials, etc.) of establishing a queen selection and rearing program on-farm. More than 500 queens were raised over the two-year project. In addition to working closely with a beekeeper to begin building a breeding program best suited to the operation's needs (e.g. gentle bees, high honey production, good spring build up, hygienic behaviour), ATTTA also developed resources for any beekeeper to adopt. These resources include a hands-on queen rearing workshop (2018), queen production and case study findings presentations (2018 and 2019), and developing a single page "cheat sheet" outlining setting up and execution of setting up a cell builder using the cloake board method (used and preferred by the University of Guelph Honey Bee Research Centre). A report outlining the process of establishing a queen production program, as well as the cost of producing queens, will also be developed and shared with industry.
Hives that had our 2019 queens installed this past summer will be evaluated once again in spring 2020 for overwintering success. This project will be used as a case study to lay the foundation for future beekeepers to consider self-sustainability, select high-quality queens, and incorporate queen rearing on-farm. This project also speaks to the need for high-quality queens for wild blueberry pollination (e.g. available early in the season, adapted to our climate and unique Maritime conditions, are selected for rapid spring build up, etc.). Moving forward, we will continue to work with our collaborating queen research beekeeper with the goal to increase overwintering success and spring build up through our queen selection. We will also expand our outreach to assist other beekeepers with considering and potentially starting to rear queens on-farm.
We have also collaborated with other researchers on a national queen paper to analyze and compare costs and benefits of on-farm queen rearing in Canada.

Start Date: May 2018
End Date: August 2020
Total Funding for Project: N/A **Funding Sources:** Atlantic Tech Transfer Team for Apiculture

5) Project title: Nosema Research in Atlantic Canada

Principal Investigators:
Name: Robyn McCallum & Sawyer Olmstead
Address: 199 Dr. MacDonald Drive, Bible Hill, Nova Scotia B6L 2H5
Email: rmccallum@perennia.ca; solmstead@perennia.ca
Telephone: (902) 957-3274

Abstract or project description:
We monitored the seasonal trends (presence and quantity) of *N. apis* and *N. ceranae* in treated (received Fumagilin-B at the label rate) and untreated Nova Scotia honey bee colonies over a thirteen month period. We also evaluated the efficacy of Fumagilin-B against nosema during both spring and fall treatments in these same colonies, following label directions. We investigated whether Fumagilin-B would influence the species composition and prevalence in bees throughout the 13 month period. Interestingly, the only species detected in the samples was *Nosema ceranae*. We are continuing to prepare our manuscript on this project to share with both industry members and the greater scientific community. This paper will provide tangible and useful recommendations to beekeepers on when to treat for nosema using Fumagilin-B, the only antimicrobial product registered for use against Nosema spp., and share a better understanding for seasonal nosema levels, and implications for hive management.

Start Date: February 2018
End Date: May 2020

Total Funding for Project: N/A **Funding Sources:** Atlantic Tech Transfer Team for Apiculture

6) Project title: Miticide Research

Principal Investigators:
Name: Robyn McCallum & Sawyer Olmstead
Address: 199 Dr. MacDonald Drive, Bible Hill, Nova Scotia B6L 2H5
Email: rmccallum@perennia.ca; solmstead@perennia.ca
Telephone: (902) 957-3274
Co-Investigators: Cameron Menzies, Chris Cutler, Kathleen Glasgow

Abstract or project description:
We compared two treatment techniques for Formic Pro to 65% liquid formic acid for varroa mite management in Nova Scotia honey bee colonies. The study was accepted for publication and is available here: http://acadianes.org/journal/papers/menzies_19-5.pdf
We also compared the efficacy of Apivar and Bayvarol across the Maritimes in 2017 and 2018. The study was accepted for publication and is available here: http://acadianes.org/journal/papers/olmstead_19-7.pdf

Start Date: June 2017
End Date: November 2019
Total Funding for Project: N/A **Funding Sources:** Atlantic Tech Transfer Team for Apiculture
Project title: Comprehensive Comparison of Therapeutic Efficacy of Fumagillin, Prebiotics and Probiotics against Nosema Infection of Honey Bee Colonies

Principal Investigators:

Name: Hanna Neil, Lead Researcher, Technology Adaptation Team
Address: Saskatchewan Beekeepers Development Commission, P.O. Box 42 Clavet, SK, SOK 0Y0
Email: hannah.mae.neil91@gmail.com
Telephone: (343) 540-9008

Name: Elemir Simko, DVM, DVSc, Diplomate ACVP
Address: Western College of Veterinary Medicine (WCVM), University of Saskatchewan, 52 Campus Drive, Saskatoon, SK, Canada, S7N 5B4
Email: elemir.simko@usask.ca
Telephone: 306-966-7307

Co-Investigators:
Igor Medici de Mattos, MSc, PhD, Postdoctoral fellow, WCVM, University of Saskatchewan
Colby Klein, DVM, MSc candidate, WCVM, University of Saskatchewan
Sarah Wood, DVM, MSc, PhD candidate, WCVM, University of Saskatchewan
Ivanna Kozii, DVM, PhD candidate, WCVM, University of Saskatchewan

Abstract or project description (300 words or less):

The goal of this research project is to determine if Nosema prevention by prebiotics and probiotics is comparable to the standard therapeutic prevention by antibiotics using Fumagillin B which has been used effectively for many years in North America. This research project will generate data based on which the evidence-based decision could be made regarding necessity of Fumagillin for prevention of Nosema infection in honey bee colonies and the efficacy of alternative prevention.

Start Date: April 2018
End Date: Oct 2020
Total Funding for Project: $532,000
Funding Sources:

Saskatchewan Agriculture Development Fund
Saskatchewan Beekeepers Development Commission
Alberta Beekeepers Commission
Mitacs

Project title: AFB Surveillance and Management

Principal Investigator:

Name: Stephen Pernal
Address: AAFC Beaverlodge, P.O. Box 29, Beaverlodge, AB T0H 0C0
Email: Steve. Pernal@agr.gc.ca
Telephone: 780-354-5135

Co-Investigators: Patricia Wolf Veiga (Grande Prairie Regional College)

Abstract or project description:

Paenibacillus larvae is typically diagnosed via extraction of bacterial spores from honey, adult bees or from infected pupal remains and then culturing on selective microbiological media. Though this has nominal value in quantifying levels of environmental spores of the pathogen, no predictive models exist to provide a risk assessment of the probability that hives will develop clinical symptoms. Moreover, minimal research has been done using molecular tools to provide quantification of infection levels or to directly compare with microbiological methods of detection.

We propose to: 1) Characterize Canadian strains of P. larvae by establishing relatedness, virulence and assessing resistance to oxytetracycline and tylosin; 2) Enhance AFB diagnostic techniques by improved culturing on selective media and detecting and quantifying the pathogen using molecular techniques; 3) Establish models to predict the likelihood of developing clinical expression of the disease by analyzing bacterial spore levels in adult bees or honey and correlating these with the expression of clinical symptoms in bee colonies.

Our work will result in an important surveillance tool that will predict the likelihood of developing clinical symptoms of AFB within apiaries. In the future, these data can also be used for area-wide management of AFB and to assist veterinarians in their requirements to have diagnoses obtained before therapeutic antibiotics are prescribed. Information from the risk model will also be integrated with antibiotic resistance data to provide a more comprehensive disease management framework. Overall, this will reduce risk for the beekeeping industry, mitigate undesirable antibiotic residues in honey, and provide tools that the beekeeping industry can use in compliance with restricted access to antimicrobials.

Start Date: 1 Apr 2018
End Date: 31 March 2021
Total Funding for Project: $150,00 **Funding Sources:** AAFC

Project title: Beneficial bacteria and targeted approaches to reduce honey bee decline

Principal Investigators:

Name: Gregor Reid (University of Western Ontario)
Address: St. Joseph's Hospital
Lawson Health Research Institute
268 Grosvenor Street
London, ON N6A 4V2
Canada
E-mail: gregor@uwo.ca

Name: Graham Thompson (University of Western Ontario)
Address: Biology Department
1151 Richmond St
London, ON N6A 5B7
Canada
E-mail: graham.thompson@uwo.ca

Project description: The collapse of honey bee colonies is a major issue for humankind, despite the banning in Ontario of neonicotinoid pesticides. Pathogenic mites and bacteria, plus other chemical agents and loss of habitat continue to take their toll of this single-most important pollinator species. As with humans, bees contain a microbiome that plays key roles in health, in particular through enhancement of immunity and ability to degrade toxins. We propose that

supplementation of beneficial microbes plus essential nutrients will allow the bee to counter pathogens and the Varroa mite infestations which otherwise reduce the expression of antimicrobial peptides, dampen immunity function, facilitate virus amplification, and affect the expression of genes related to behavior. In doing so, there would be less reliance of antibiotics which currently are a mainstay in managing resultant infections. We hope to maximize bee activity, longevity and ultimately survivorship, even in the face of persistent environmental

challenges. Our objectives are to:

1) Design BioPatty containing a probiotic Lactobacillus plus nutrients that invigorates the health of worker, queen and larval bees.

2) Assess probiotic viability in patties with different temperature, moisture and storage conditions.

3) Assess the appetite of honey bees for BioPatty, the lifespan of patty under realistic field conditions, and any changes in worker microbiota and immune function measured by gene expression and antimicrobial peptides.

4) Perform a replicated field test using managed hives in which the BioPatty or control is added to a queenright colony in Spring along with standard antibiotic therapy. Then, we will measure worker foraging efficiency, brood production, honey load, pollen load, and pathogen burden including fungi, gut and hive dysbosis, and antibiotic resistance.

5) Offer BioPatty for trial to Ontario Beekeepers, to test at apiary scale over winter.

Initial results can be found here:

Daisley BA, Pitek AP, Chmiel JA, Al KF, Chernyshova AM, Faragalla KM, Burton JP, Thompson GJ, Reid G. 2019. Novel probiotic approach to counter *Paenibacillus larvae* infection in honey bees. The ISME Journal. https://doi.org/10.1038/s41396-019-0541-6

Start Date: April 2018
End Date: March 2021
Total Funding for Project: $200 000 (over 36 months)
Funding Sources: OMAFRA - New Directions Research Program

Project title: Mass storage of honeybee queens during winter in Canada

Principle Investigator:

Name: Andrée Rousseau
Address: 120-A Chemin du Roy, Deschambault (Québec), GOA 1S0
Email: andree.rousseau@crsad.qc.ca
Fax: (418) 286-3597
Telephone: (418) 286-3353 p. 272

Co-Investigators (including graduate students):

Name(s): Pierre Giovenazzo
Address: Pavillon Vachon, 2325 Rue de l'Université, Québec City, QC G1V 0A6
Fax:
Telephone: (418) 656-2131 poste 8081

Abstract (300 words or less): Queen breeders across Canada produce their earliest queens end of May when mature drones and first virgin queens are produced. But the Canadian beekeeping industry needs queens earlier, after wintering (end March-early April), to replace dead or failing queens / colonies. Consequently, our industry is highly dependent on queen imports (from California USA mainly) at the beginning of the season. The goal of our project is to maintain locally produced mated queens live and fertile from September to April. To accomplish this, various queen banking/storage methods will be tested (temperatures below or above cluster formation and queen density in banks). Efficacy of tested methods will be evaluated by measuring queen survival, sperm viability within queen's spermatheca and the post banking performance of queens introduced in colonies the following season. Hopefully, results from this project will allow beekeepers have access to locally raised queens early spring and thus reduce their dependency toward queen imports.

Start Date: July 2018
End Date: April 2020
Total Funding for Project: 7500$
Funding Sources: Canadian Bee Research Fund, Centre de recherche en sciences animals de Deschambault

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Project title: Improving Honeybee Queen Shipping Methods

Principle Investigator:

Name: Andrée Rousseau
Address: 120-A Chemin du Roy, Deschambault (Québec), GOA 1S0
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Fax: (418) 286-3597
Telephone: (418) 286-3353 p. 272

Co-Investigators (including graduate students):

Name(s): Pierre Giovenazzo
Address: Pavillon Vachon, 2325 Rue de l'Université, Québec City, QC G1V 0A6
Telephone: (418) 656-2131 poste 8081

Abstract (300 words or less):

Recent studies have documented adverse conditions in Canadian and USA honeybee queen shipments. Objectives of this project were: 1) to measure environmental conditions experienced by queens shipped from USA to Canada and within Canada and 2) to test different queen shipping methods (cage models and presence of attendant worker bees) on the internal cage temperature, queen survival and sperm viability in queen spermatheca. During spring and summer 2017 and 2018, we placed data loggers (temperature and relative humidity) in several commercial honeybee queen shipments. During summer 2018, we measured the impact of various shipment temperatures (6, 26 and 40 °C) on sperm viability within the queen's spermatheca (N=60 queens). Additionally, a sample of these queens was introduced in colonies to evaluate colony performance and survival (N=35 colonies). Knowledge obtained from his study will help improve queen shipping conditions to maximise sperm viability, queen acceptance and colony performance.

Start Date: May 2017
End Date: March 2019
Total Funding for Project: 79 092$
Funding Sources: Agriculture and Agri-Food Canada, Centre de recherche en sciences animales de Deschambault, Canadian Bee Research Fund, Bee Maid, Api-Culture Hautes Laurentides, Pope Canyon Queens

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2019 CAPA Research Report

Project title: Improving Honeybee Queen Shipping Methods
Principle Investigator:

Name: Andrée Rousseau

Address: 120-A Chemin du Roy, Deschambault (Québec), GOA 1S0
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Fax: (418) 286-3597
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Co-Investigators (including graduate students):

Name(s): Pierre Giovenazzo
Address: Pavillon Vachon, 2325 Rue de l'Université, Québec City, QC G1V 0A6
Telephone: (418) 656-2131 poste 8081

Abstract (300 words or less):

Recent studies have documented adverse conditions in Canadian and USA honeybee queen shipments. Objectives of this project were: 1) to measure environmental conditions experienced by queens shipped from USA to Canada and within Canada and 2) to test different queen shipping methods (cage models and presence of attendant worker bees) on the internal cage temperature, queen survival and sperm viability in queen spermatheca. During spring and summer 2017 and 2018, we placed data loggers (temperature and relative humidity) in several commercial honeybee queen shipments. During summer 2018, we measured the impact of various shipment temperatures (6, 26 and 40 °C) on sperm viability within the queen's spermatheca (N=60 queens). Additionally, a sample of these queens was introduced in colonies to evaluate colony performance and survival (N=35 colonies). Knowledge obtained from his study will help improve queen shipping conditions to maximise sperm viability, queen acceptance and colony performance.

Start Date: May 2017

End Date: March 2019

Total Funding for Project: 79 092$

Funding Sources: Agriculture and Agri-Food Canada, Centre de recherche en sciences animales de Deschambault, Canadian Bee Research Fund, Bee Maid, Api-Culture Hautes Laurentides, Pope Canyon Queens

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2019 CAPA Research Report

Project title: Mass storage of honeybee queens during winter in Canada
Principle Investigator:

Name: Andrée Rousseau
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Co-Investigators (including graduate students):

Name(s): Pierre Giovenazzo
Address: Pavillon Vachon, 2325 Rue de l'Université, Québec City, QC G1V 0A6
Telephone: (418) 656-2131 poste 8081

Mireille Levesque, M.Sc. student, Université Laval

Abstract (300 words or less): The Canadian beekeeping industry requires an important number of honeybee queens in the spring of each year to replace winter mortality of colonies, for nucleus production and colony division. Canadian queen breeding industry cannot meet spring demand of queens because of limiting weathers conditions. Consequently, our industry is highly dependent on queen imports (from California USA mainly) at the beginning of the season. The goal of our project is to maintain locally produced mated queens live and fertile from September to April. To accomplish this, various queen banking/storage methods will be tested (temperatures below or above cluster formation and queen density in banks). Efficacy of tested methods will be evaluated by measuring queen survival, sperm viability within queen's spermatheca and the post banking performance of queens introduced in colonies the following season. Hopefully, results from this project will allow beekeepers to have access to locally raised queens early spring and thus reduce their dependency toward queen imports.

Start Date: July 2018

End Date: Mars 2022

Total Funding for Project: 296 909$

Funding Sources: Programme Innov'Action agroalimentaire 2018-2023 (MAPAQ), Centre de recherche en sciences animales de Deschambault, Université Laval, Canadian Bee Research Fund (Canadian Honey Council), Api Culture Hautes Laurentides, Les reines de la pollinisation.

2019 CAPA Research Report

Project title: Surveillance and improved control of American foulbrood (AFB) in honey bees in Saskatchewan

Principal Investigator:

Name: Elemir Simko, DVM, DVSc, Diplomate ACVP
Address: Western College of Veterinary Medicine (WCVM), University of Saskatchewan, 52 Campus Drive, Saskatoon, SK, Canada, S7N 5B4
Email: elemir.simko@usask.ca
Telephone: 306-966-7307

Co-Investigators:
Musangu Ngeleka, DVM, MSc, PhD, Diplomate ACVM, Diagnostic Bacteriologist, Prairie Diagnostic Services Inc, University of Saskatchewan
Tasha Epp, DVM, PhD, Epidemiologist, WCVM, University of Saskatchewan

Anatoliy Ttrokhymchuk, DVM, MSc, Molecular Epidemiologist, Prairie Diagnostic Services Inc, University of Saskatchewan
Sarah Wood, DVM, MSc, PhD candidate, WCVM, University of Saskatchewan
Ivanna Kozii, DVM, PhD candidate, WCVM, University of Saskatchewan
Igor Medici de Mattos, MSc, PhD, Postdoctoral fellow, WCVM, University of Saskatchewan
Colby Klein, DVM, MSc candidate, WCVM, University of Saskatchewan
Graduate Students:
Michael Zabrodski, DVM, MSc candidate, Department of Veterinary Pathology, Western College of Veterinary Medicine, University of Saskatchewan

Abstract or project description (300 words or less):

There is a fundamental difference between monitoring health of individual animals (e.g. pets and backyard small operations) and monitoring herd health and risk assessment for large scale food animal commercial operations (e.g. feedlots with 15,000 heads etc.).

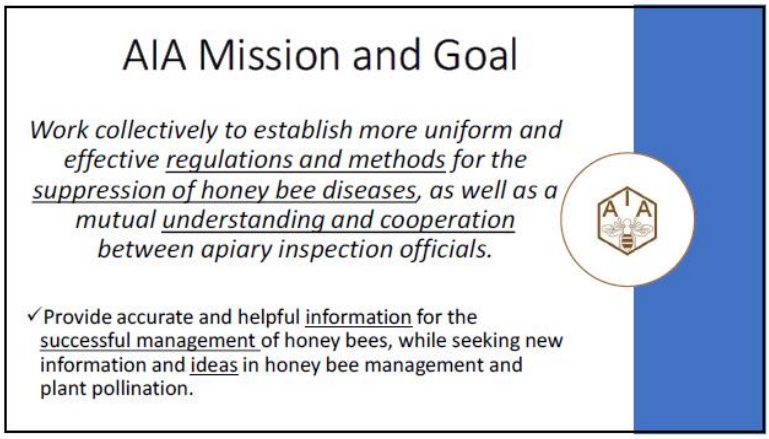
Our current prognostic parameters for American foulbrood (e.g. spore count in bees [or honey samples] from one hivec) are focused on assessment of AFB risks for an **individual** hive, rather than for an entire yard or group of yards (hence no "herd health risk assessment").

Our current, study enrolled 100 hobbyist and 50 commercial beekeepers that own more than 75% of honeybee colonies in Saskatchewan. The overall goal of this study is to perform surveillance and develop risk assessment parameters for AFB based on pooled honey extracted from the entire yard (or several yards). Using sporulation enhancers, we developed a high sensitivity bacterial culture protocol for AFB spores that is 10-100 times more sensitive than the currently used culture protocols in diagnostic labs. This improved protocol will enable us to detect even low numbers of spores in pooled honey samples which will facilitate more accurate risk assessment.

Start Date: April 2019
End Date: Oct 2021
Total Funding for Project: $325,000
Funding Sources:
Saskatchewan Agriculture Development Fund
Saskatchewan Beekeepers Development Commission
Interprovincial Graduate Student Fellowship

Appendix 6: USA Apiculture Report (AIA)

1



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Find Out More: https://apiaryinspectors.org/

5

AIA 2020 Meeting Survey

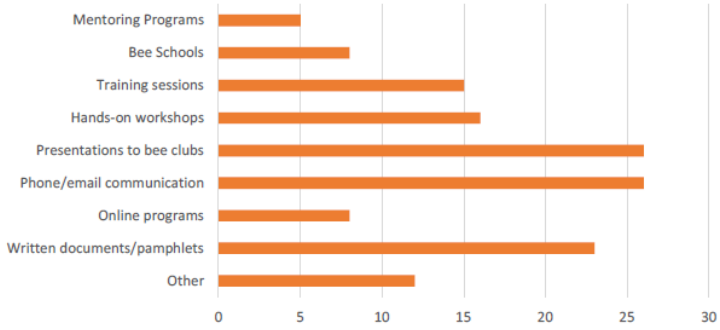
- Number of inspectors in state/province
  - Ranged from 1 to 13 total inspectors
- Total number of beekeepers in state or province
  - Ranged from 150 to 10,000
    - Hobbyist beekeepers – 95 to 9500
    - Sideliners – 0 to 300
    - Commercial – 0 to 250
- Total number of hives in state/province: 600 to 670,660
- Positive cases of AFB = ~94 colonies
- Positive cases of EFB = ~578 colonies

6

- **Does your state/province have a honey promotional program?**
  Yes – 7, No – 22
- **Does your state/province have an apiculture extension agent or a apiculture researcher who has extension requirements?**
  Yes – 17, No – 12
- **Is apiary/hive/beekeeper registration required by law in your state/province?**
  Yes – 18, No – 11
- **Are beekeepers required to renew their registration on an annual basis?**
  Yes – 15, No – 9, Other – 5
- **Are there fees associated with registration?**
  Yes – 11, No – 18

7

Educational opportunities for beekeepers



8

State of the States (& Providences) 2020

1. California pre-inspections
2. Package bee inspections
3. USDA-APHIS Health Survey
4. Invasive pest surveys – AGH, AHB
5. Aerial mosquito spray monitoring – EEE
6. Honey certification program & marketing
7. Outreach education
8. State diagnostic lab
9. Expand program staff – several states hiring

9

California Pre-Inspections

10

Package Bee Inspections

11

USDA-APHIS Health Survey

12


Invasive Pest Surveys

13


Aerial Mosquito Spray Monitoring

14


Honey Programs & Marketing
Kentucky State Beekeepers Association
Certified Kentucky Honey Producers
MASSGROWN MAP

15


Outreach Education

16

Appendix 7: Provincial Reports
British Columbia

2019 PROVINCIAL APIARIST(S) ANNUAL REPORT

Provincial Apiarist(s): **Paul van Westendorp**

BEEKEEPING STATISTICS:

Number of Beekeepers:	**2,763**
Number of Producing Colonies:	**55,781**
Average Yield/Colony (kgs) & (lbs):	**32 kg / 70 lb.**
Total Estimated Crop (Kgs x1000) & (lbs x1000):	**1,774 K kg / 3,903 K lb.**
Colonies Wintered (2019-20):	**54,706**
Estimated Percent Winter Mortality (%):	**32%**

INSPECTION STATISTICS:

Number of Colonies Inspected:	**3,600 (+2,000 Prairie cols.)**
Number of Beekeepers Inspected:	na

GENERAL COMMENTS:

Wintering comments:

Glorious, mild winter conditions held the promise of an exceptional wintering season until the end of January; suddenly the temperatures dropped far below freezing with exceptionally strong Arctic outflows for 6 weeks. Thousands of colonies succumbed. The end result was many weakened colonies and dead colonies.

Then, in late spring, the annual dearth period kicked in which proved far stronger than normal. Many colonies had over-extended their brood rearing and with the sudden interruption of forage availability, many colonies abandoned their brood. EFB incidences rose rapidly but promptly disappeared when forage availability resumed.

Overall production was below normal to normal. Many beekeeping areas experienced wet, cold summer conditions.

Inspection comments:

- No unusual circumstances of disease were reported other than the sudden upsurge of EFB associated with the strong dearth period.
- Some parts of BC's interior beekeepers continue to experience problems with the "mystery" brood disease which produce EFB-like symptoms.
- No SHB sightings have been reported anywhere despite ongoing monitoring.
- Asian Giant Hornet (AGH) *Vespa mandarinia* first reported in Nanaimo in mid-August. Surveillance and rapid-response reporting in close cooperation with local beekeepers resulted in eradication of the single nest. A single specimen was recorded in White Rock in October and another confirmation was reported in Blaine, Washington, just 2 km south of the Canada-US border. Ongoing negotiations with WA officials, USDA-APHIS to develop and implement an surveillance & eradication program for 2020.

Production comments:

- Honey production value representing wholesale and retail was estimated at $11 million.
- Wax was estimated at $470,000 with an average price of $14.91/kg.

- Pollen sales were estimated at $46,000 at an average price of $21.79/kg.
- Crop pollination contract services involved to total of 66,396 colonies for a total value of $8.3 million.
- Combined, the BC beekeeping industry generated a total sales value of $19,862,000

Alberta

2019 PROVINCIAL APIARIST(S) ANNUAL REPORT

Provincial Apiarist(s): Samantha Muirhead

BEEKEEPING STATISTICS:

Number of Beekeepers: Currently have 1801 registered beekeepers (392 still need to register for 2019)

Number of Producing Colonies: 303,115 (potentially 318,000)

Average Yield/Colony (kgs) & (lbs): Not yet available

Total Estimated Crop (Kgs x1000) & (lbs x1000): Not yet available

Colonies Wintered (2018-19): 261,985

Estimated Percent Winter Mortality (%): 22.3%

INSPECTION STATISTICS:
Number of Colonies Inspected: 1,551
Number of Beekeepers Inspected: 77

GENERAL COMMENTS:
Wintering comments:
The overwintering results were taken from all beekeepers registered in Alberta as of December 23, 2019. This represents 95.5% of colonies overwintered in 2018/2019. Wintering losses in 2019 (22.3%) were down slightly from 2018 (24.8%).

Inspection comments:
The 2019 beekeeping season was exceptionally difficult on Alberta's beekeepers. Although the winterkill was low, there were numerous reports regarding slow colony build up and a few operations reported colony death. This left beekeepers unable to make up for their winter losses by making splits. This slow build up also seems to have resulted in lower than average provincial honey production. Inspectors documented higher than average levels of EFB in colonies. It was expected that EFB would clear up as conditions (weather, nectar and pollen resources) improved, however, inspectors continued to find of EFB in colonies throughout the summer. The average Nosema levels in the spring and summer were the highest documented in Alberta's history. The average infestation (millions of spores per bee) in the spring was 3.9 (n=431) and 2.7 in the summer (n=136). Nosema samples taken in the fall saw an average of 0.6 millions of spores per bee (n=556).

Clinical symptoms of AFB were found in seven operations. Corrective actions were taken to address issues. 180 bee samples from 48 operations were sent to the NBDC to determine AFB risk level (based on colony forming units) as well as determine rAFB (resistant AFB) prevalence. Sixteen operations (33 samples) were at risk of having symptoms of AFB. Ten of the 16 operations (18 samples) had rAFB to tetracycline.
In late fall inspectors were contacted by 3 beekeepers regarding poor varroa mite control. Apivar strips had been in the colonies for over 30 days and some colonies had counts with over 50 mites when using the mite shaker. Inspectors performed resistance tests on colonies from these operations as well as others throughout the season. Results showed that Apivar had an average efficacy of 91% (results were variable 71%-100%),

Apistan 52%, Bayvarol 47%. Further resistance tests will be performed in the upcoming 2020 season.

Production comments:
Survey results on honey production were not available at the time of writing this report. Statistics will be available in early 2020. However, preliminary reports indicate that honey production was down significantly from previous years.

Manitoba

2019 PROVINCIAL APIARIST(S) ANNUAL REPORT

MB Provincial Apiarist: Rhéal Lafrenière & Inspection Service Contractor (DLJ Consultants)

BEEKEEPING STATISTICS:

Number of Beekeepers: 905

Number of Producing Colonies: 114,668

Average Yield/Colony (kgs) & (lbs): (72.7 kgs) & (160 lbs)

Total Estimated Crop (Kgs x1000) & (lbs x1000): (8,339 kgs x1000) & (18,347 lbs x1000)

Colonies Wintered (2019-20): 114,098

Estimated Percent Winter Mortality (%): 21.4%

INSPECTION STATISTICS:
Number of Colonies Inspected: 5,665
Number of Beekeepers Inspected: 287

GENERAL COMMENTS:
Wintering comments:
Although early predictions of wintering losses being reported by some beekeepers to the media and at some of the beekeeping meetings suggested higher than normal wintering losses in Manitoba (i.e. >30%), data collected through the annual provincial wintering loss survey revealed closer to normal losses (i.e. 21.4%). Several large beekeepers had been reporting high losses and that became the narrative about wintering losses in Manitoba until the survey data was available. This just reconfirms the importance of conducting reputable surveys and getting good data from the beekeepers before making assumptions about wintering losses. Similar to past surveys, poor queens, starvation and weather were the top three reported factors contributing to losses during the winter.

Inspection comments:
The bee inspection program in Manitoba was again contracted out to a 3rd party Inspection Service Contractor (ISC). The contract was awarded to DLJ Consultants based out of Winnipeg, Manitoba. The contract will be for a period of two (2) years concluding on April 30, 2021. There will be an option to renew for one (1) additional option year, ending April 30, 2022. The proposed contract was to inspect 4% – 5% of the honey bee colonies in the province (i.e. between 5,000 to 6,000 honey bee colonies per annum). The focus of the program was directed toward inspecting for diseases and pests like AFB/EFB and SHB inspection, but also included varroa monitoring for inter-provincial movement. This year, the ISC was able to inspect a total of 287 beekeeping operations and approximately 5,665 colonies. Four (4) beekeeping operations tested positive for AFB/EFB with one additional operation reporting EFB as a results of a sample they submitted on their own to the National Bee Diagnostic Centre.

Production comments:

In 2019, honey production in Manitoba would be considered below average at 160 lbs per colony. July and August were very dry months. Although this provided optimal foraging weather for the bees, it also ended the honey season early in many parts of Manitoba and cause drought stress in some of the nectar producing crops. At the time of writing this report (Dec, 2019) much of the 2019 bulk honey crop has not been sold, so honey pricing information is very preliminary. Early estimates suggest that the price will likely be between $1.60 - $1.70 per lbs, therefore total bulk production is being estimated to be valued at 16.9 million dollars. A survey of honey sale's price is scheduled to be completed in February 2020, at which time, estimated honey prices and total production values will be updated.

Ontario

2019 PROVINCIAL APIARIST(S) ANNUAL REPORT

Provincial Apiarist(s): Paul Kozak – Ontario Ministry of Agriculture, Food and Rural Affairs (Ontario)

BEEKEEPING STATISTICS:

Number of Beekeepers: 2,570 (registered for the 2019 season)

Number of Producing Colonies: 91,953 colonies (registered for the 2019 season)

Average Yield/Colony (kgs) & (lbs): 37.24 kg / 82.11 lbs (preliminary estimate) **Total**

Estimated Crop (Kgs x1000) & (lbs x1000): 3,377 kg and 7,445 lbs

Colonies Wintered (2019-20): NA (Registration is for winter 2020 had not begun at the time of this report)

Estimated Percent Winter Mortality: 22.6 % including non-viable colonies

INSPECTION STATISTICS:
Number of Colonies Inspected: 2,735 colonies (brood nest inspection), representing 29,830 colonies in the 577 (473 unique) yards inspected.
Number of Beekeepers Inspected: 244

GENERAL COMMENTS:
Wintering comments:
The level of estimated winter loss (22.6 %) was lower than in recent years. This likely reflects success that beekeepers are having with varroa mite management, as a result of continued education and training of the apiary sector. It should be recognized that this is an average so there are beekeeping operations that had higher and lower winter losses than the estimated level.

The most common causes of winter mortality self-identified by beekeepers were: starvation (1^{st}); poor queens (2^{nd}) and weather (3^{rd}). This implies that many beekeepers were confident in their ability to manage varroa mites. It should be noted that the success of varroa treatment relies on proper timing of treatments, efficacy of treatments and the general pest and disease management of beekeepers – including regular monitoring for pest levels; and that successful control of varroa is a constant challenge for beekeepers.

Other factors such as weather patterns, timing of feeding, additional pests and diseases and environmental stressors may also influence winter survival. However, these are outside the scope of this report.

Inspection comments:

There were 577 inspections conducted by the Ontario Apiary Program during the 2019 season. 492 of these inspections (85%) are classified as general inspections covering brood diseases, varroa levels, presence and levels of small hive beetle and addressing a variety of regulatory requirements (domestic sales, export for pollination and sales, setback distance complaints and general health). 85 of these inspections (15%) were part of a coordinated bee health monitoring program whereby 32 randomly selected yards of commercial beekeepers were inspected and sampled three times (spring, summer and fall) for varroa levels, brood diseases, and other pathogens such as viruses.

The data from all categories of inspections were combined for the following statistics on pests and diseases in the 2019 season:

- American foulbrood:
    - 13 positive yards out of 492 inspected (2.64 % of yards inspected)
    - 41 (average 3 colonies per yard) positive colonies out of 2,735 inspected (1.50% of colonies inspected)
- European foulbrood:
    - 1 positive yard out of 492 inspected (0.2 % yards inspected)
    - 1 positive colony out of out of 2,735 inspected (0.03 % colonies inspected)
    - At present, Ontario does not appear to be experiencing some of the concerns that other jurisdictions are with EFB – either through inspection reports or directly from beekeepers.
- Small Hive Beetle:
    - There were 26 newly positive beeyards confirmed in 2019. Of these: 14 were in Niagara Region; 6 in Haldimand County; 2 in Elgin County; 1 in Lambton County; 1 in Middlesex County, 1 in Perth County and 1 in Halton Region.
    - A detailed distribution map of small hive beetle in Ontario is publicly available:
    - https://ontarioca11.maps.arcgis.com/apps/webappviewer/index.html?id=4c52b96dcd3c47 0886c1579326df2611
    - Effective March 14, 2019, the Chief Veterinarian for Ontario revoked the small hive beetle quarantine that was in place for the county of Essex and the municipality of Chatham-Kent.
- Varroa Mites:
    - At the time of writing, varroa data is still being analyzed.
    - Most inspection results demonstrate that beekeepers are managing their varroa levels below damaging thresholds. However, there are also examples of beekeepers with very high levels of varroa. Many beekeepers reported high levels of varroa mites in early and late fall. While this is concerning, further information must be gathered to determine the scope and scale and separate this from potential reporting bias.

Production comments:

The 2019 beekeeping season was characterized by a very late and rainy spring in most areas of Ontario. These conditions may have delayed the build up of many colonies in Ontario and nectar flows may have been impacted. Late summer was characterized by consistently hot weather in many regions of Ontario which may have allowed colonies to build up and provided conditions for adequate nectar flows.

Overall, the number of beekeepers who responded to the annual honey survey was much smaller than in typical years. The honey crop was estimated at slightly lower than a typical year.

Quebec

2019 PROVINCIAL APIARIST(S) ANNUAL REPORT

Provincial Apiarist(s): Gabrielle Claing (acting PA)

BEEKEEPING STATISTICS:

Number of Beekeepers: 1 308

Number of Producing Colonies: 67 025

For beekeepers owning >5 colonies in 2018 [425 beekeepers, 60 439 colonies]:

Average Yield/Colony (kgs) & (lbs): 36.3 kg

Total Estimated Crop (Kgs x1000) & (lbs x1000): 2,029.3 kg*1000

Colonies Wintered (2019-20): 65 128

Estimated Percent Winter Mortality (%): 24,7%

INSPECTION STATISTICS:
Number of Colonies Inspected: 2,846 (8,725 colonies present)
Number of Beekeepers Inspected: 118 (178 interventions)

GENERAL COMMENTS:
Wintering comments:
Summary:

In 2019, the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ) sent survey questionnaires by mail or email to the 1,200 beekeepers who registered in the spring. Among the 316 beekeepers who owned ten or more bee colonies, 248 responded to the questionnaire (78% participation rate). The objectives of this survey are to report winter losses in bee colonies, to determine the probable causes of death according to beekeepers and to draw a brief portrait of beekeeping practices concerning the control of varroasis, nosemosis and American foulbrood.

Highlights:

- According to beekeepers, mortality was mainly caused by unfavorable weather conditions, colonies too weak in the fall, starvation and queen related problems. Mortality causes were thoroughly discussed (data from scientific literature, multifactorial causes, possible confusion between causes);
- 73% of beekeepers screen for varroa;
- Most commonly used treatments for varroa are organic acids (formic and oxalic acids). Amitraz is the most commonly used synthetic acaricid. In smaller businesses (10-49 colonies), the absence of treatment against varroa is significantly associated with a higher winter mortality ($p<0.05$). Larger businesses all used treatments to control varroa. There was no significant difference in winter mortality between businesses using synthetic acaricids and those using organic acids;
- 7% of beekeepers use fumagillin B to control Nosema. There is no significant difference in winter mortality between businesses using fumagillin B and those not using it;
- 5% of beekeepers use oxytetracyclin to control American foulbrood. There is no significant difference in winter mortality between businesses using oxytetracyclin and those not using it.

Inspection comments:

- The majority of inspections are carried out by request of beekeepers who suspected a disease or a problem in their hives or who need a health attestation by our bee veterinarians. Small hive beetle (SHB) surveillance is the only one mandatory surveillance in Québec.

- For 2019, active surveillance for SHB was again carried out in southwestern Québec along the U.S. (Montégérie) and Ontario (Vaudreuil-Soulange) border in August and early September. 300 colonies were inspected by Top bar inspection and Beetle Bee Gone (BBG) traps installed during 10 to 14 days (503 colonies present in apiaries). These colonies were located in 39 apiaries owned by 30 beekeepers. One adult beetle was found in this active surveillance, in an apiary located in the east of the Montérégie region (Brome-Missisquoi). Quarantine and treatment orders were issued.
- All hives introduced from Ontario have been inspected by OMAFRA before being allowed to enter Quebec.
    - Visual Top bar inspection was done in 256 Ontarian hives placed in Quebec's blueberry fields (25% of 1,000 introduced hives).
    - Visual Top-bar inspection was done in 100% of the 149 hives bought in Ontario by Quebec's beekeepers.
    - No SHB was found in these inspections.
- All 478 hives from Quebec returning from Ontario or New-Brunswick (for honey production or pollination) were inspected.

- Notification of SHB infestation is mandatory in Québec since 2012. Three SHB cases (other than the one found during active surveillance) were reported in Québec in 2019:
    - In May, SHB adults were found in a follow-up inspection of an apiary positive in the fall of 2018 in the Montérégie region (Haut Saint-Laurent). Quarantine and treatment were continued. Inspection of every apiary in a 10 km radius around the infested apiary has been carried out and no SHB was found.
    - In August, a registered beekeeper reported SHB presence in their only apiary, in the Montérégie region (Brome-Missisquoi), which is very close to the USA border. Quarantine and treatment orders were issued. Inspection of every apiary in a 10 km radius around the infested apiary has been carried out and no SHB was found.
    - In September, an unregistered beekeeper from the Bas Saint-Laurent region (Rimouski-Neigette) reported SHB presence in their only colony. The colony, which was very weak, was destroyed. Possible sources include migratory apiaries of the region and colony transit across the Trans Canada Highway (NB: mandatory permit and transportation conditions for transit, traffic control carried out). Inspection of every apiary in a 10 km will be carried out in the spring.
- For 2019, 9 declarations led to an investigation by MAPAQ staff. In 3of these suspicions, the concentration of pesticides in bees was high enough to explain the observed acute mortality. All 3 cases were linked to the use of Spinosad during cranberries pollination (as was the case in 2018). Regarding the caged queens incident from last year, it is highly suspected that topical treatments (imidacloprid and moxidectin, as well as permethrin) used for parasite control on the owner's dog were involved (clinical trial conducted at the Université de Montréal).
- No AFBr strain was detected in the 3 samples tested in 2019.

Production comments:

- Based on ISQ (Institut de la statistique du Québec) report for 2018 season (published on 2019 July). Total honey production and average honey production per colony increased by about 20% compared to 2017.
- ISQ report will be available in 2020 for 2019 production

New Brunswick

Provincial Apiarist: Chris Maund (New Brunswick)

BEEKEEPING STATISTICS:

Number of Beekeepers: 415 [31 (7%) commercial; 384 (93%) hobby]

Number of Producing Colonies: Total (producing and non-producing honey) 11,302 [9,779 (87%) commercial; 1,523 (13%) hobby]. Total honey producing colonies: 4,120

Average Yield/Colony (Kgs) & (lbs): (18.6 Kgs) (41 lbs)

Total Estimated Crop (Kgs x1000) & (lbs x1000): (76.7 Kgs X 1000) (169 X 1000 lbs)

Colonies Wintered (2019-20): 11,998

Estimated Percent Winter Mortality (%): 26.3

INSPECTION STATISTICS:
Number of Colonies Inspected: 614
Number of Beekeepers Inspected: 78

GENERAL COMMENTS:
Wintering comments: The four major causes of high colony winter losses in 2018 to 2019, ranked from most to least important, were: weather, don't know, poor queens, starvation. The four major causes of high colony winter losses from beekeepers who reported higher than 25% losses in 2018 to 2019, ranked from most to least important, were: poor queens, don't know, weather, ineffective varroa control.

Inspection comments:

Colonies with American foulbrood: 2 (2 beekeepers).
Colonies with European foulbrood: 14 (9 beekeepers).
Colonies with chalkbrood: 9 (2 beekeepers).

The small hive beetle (SHB), *Aethina tumida* Murray, was found in NB for the third year in a row, since the first New Brunswick report in 2017.
Inspections for the SHB in 2019: Colonies (imported from an area in Ontario known to have the SHB for wild blueberry pollination) with small hive beetle adults: One colony with one adult (Gloucester County). Nearby NB colonies were inspected and there were not any SHB found.

Small hive beetle (SHB) adults in NB colonies: Numerous SHB adults and apparent SHB larvae were found in three apiaries after wild blueberry pollination (Northumberland County) from one beekeeper. These colonies had been near colonies imported from an area in Ontario known to have the SHB.

So far, there have not been any reports of a reproducing spring population of SHB in NB colonies.

Production comments: The spring was prolonged and wet. Beekeepers who had colonies inland, away from the coast, reported a dry end of summer and less honey production.

Nova Scotia

2019 PROVINCIAL APIARIST(S) ANNUAL REPORT

Provincial Apiarist(s): Jason Sproule (Nova Scotia)

BEEKEEPING STATISTICS:

Number of Beekeepers: 690

Number of Producing Colonies: 24,958 total; 8,650 honey producing

Average Yield/Colony (kgs) & (lbs): 48.36 lbs or 22 kg

Total Estimated Crop (Kgs x1000) & (lbs x1000): 418 lbs

Colonies Wintered (2018-19): 23,371

Estimated Percent Winter Mortality (%): 15.2%

INSPECTION STATISTICS:

Number of Colonies Inspected: 822
Number of Beekeepers Inspected: 75

GENERAL COMMENTS:

Wintering comments:

An early estimate of winter loss for 2019 was reported in the CAPA Winterloss Statement to be 19.8%. This was based on a survey distributed to 41 commercial beekeepers (≥50 hives) of which 20 responded. Respondents collectively account for 64% of all NS hives. A final estimate of 15.2% loss was later determined from data submitted by all registered beekeepers. Causes of winter loss are cited as weak colonies in the fall, inclement weather, poor queen quality, and starvation. Although not rated one of the top issues, shrews are suspected of causing devastating damage in a few geographically distant operations.

Anecdotal reports indicate healthy colonies going into the winter of 2020. However, there is some concern over high incidence of brood rearing terminating several weeks earlier than usual and whether there are sufficient winter bees to carry colonies through to spring.

Inspection comments:

There are 4 bee inspectors with the NS Dept of Agriculture. Inspections are performed whenever ownership of bees or used hiveware is transferred, typically prior to sale. Guidelines are to inspect 10% or ≥10 hives in each apiary bees are sold from. Following inspection, the Provincial Apiculturist provides a decision whether the sale is allowed, or if certain conditions (treatment, detainment, etc) must first be satisfied.

Seventy-nine inspections were performed in 2019. In total 822 colonies were inspected representing an average ~30% of hives present at all locations. American foulbrood was not identified or reported in 2019. Minor incidence of deformed wings (<1% of inspected colonies), chalkbrood (2.6%), sacbrood (<1%), and EFB(<1%) were observed. Only 3 yards were not permitted to produce bees for sale, due to elevated pest/disease presence.

Approximately 4,256 queens were imported into NS and all cages were inspected (usually at the airport) before being released to beekeepers.

In addition to our regular inspection program, small hive beetle (SHB) surveillance is being conducted in apiaries near the New Brunswick border. Thirty-seven SHB traps were deployed in at-risk bee yards in late summer. No SHB were detected.

Production comments:

Production data is collected as part of beekeepers' annual registration renewal. Much of the data concerning

honey quantity and values are provided on a voluntary basis and so not all statistics are provided by every beekeeper.

Total honey production dropped about 100,000 lbs from 2018. This is a function of a ~2lb per hive average decrease as well as ~1,700 less hives dedicated to honey production from the year prior. In many regions there was a slow start to the season with cold periods extending into early summer. This caused slow colony build-up, chilled brood and delayed bloom for important forage plants. Early termination of brood rearing in late summer/early fall may also have prevented a late season honey crop for many.

16,307 NS hives were rented for commercial pollination of crops, primarily lowbush blueberry followed by apple, haskap, strawberry and others. Rental rates have seen a decline over the past 3 years as lowbush blueberry growers dealt with damaging frosts and an unrelated price drop for berries, forcing many to reduce crop inputs (such as pollination) or take lower yielding fields out of production. Rental rates are expected to improve for 2020 as the berry price rebounds. Average rental price was $138.30 which represents a $10/hive improvement from 2018.

Prince Edward Island

2019 PROVINCIAL APIARIST(S) ANNUAL REPORT

Provincial Apiarist(s): Cameron Menzies (Prince Edward Island)

BEEKEEPING STATISTICS:

Number of Beekeepers: 50

Number of Producing Colonies: 3,750

Average Yield/Colony (kgs) & (lbs): 22 kg; 48 lbs

Total Estimated Crop (Kgs x1000) & (lbs x1000): approx. 78,000 kg; 171,000 lbs (note: not multiplied by 1,000)

Colonies Wintered (2019-20): 5,000

Estimated Percent Winter Mortality (%):

2018/ 2019: 54%

2019/ 2020: too early in winter to determine

INSPECTION STATISTICS (2019):
Number of Colonies Inspected: 310
Number of Beekeepers Inspected: 19

GENERAL COMMENTS:
Wintering comments:
For example: provincial winter survey results synopsis (3 paragraphs).

Approximately 5,530 hives were put into winter in the fall of 2018. Come May 15 2019, 2,448 had survived and were considered viable. On average, 54.1% of hives were lost over the winter.

The range of loss across PEI's beekeepers was very high. Some smaller beekeepers lost less than 10% and many mid-sized beekeepers had reasonable losses at around 20%. Unfortunately, some larger beekeepers lost 50% or greater, which contributed to a skewed overwinter loss average. It is important to note the median overwinter loss was 33.4% - significantly less than the average.

The cited causes for overwinter loss were largely the same across beekeepers with low to high levels of loss. Poor weather, starvation, and ineffective varroa control were the top three causes. Long Maritime winters in which natural pollen and nectar do not become available until late April or May make it difficult for colonies with little stored honey and pollen or those with winter bee populations weakened by pests and disease to remain viable leading up to pollination season. Interesting to note however, was the fourth cited cause of colony loss: shrew predation. Pigmy shrews remain a significant cause of colony loss on PEI despite the relative ease of prevention.

Inspection comments:
For example: inspection program priority setting, disease inspection and analysis synopsis (3 paragraphs).

Annual colony inspection is performed by the New Brunswick Provincial Apiary Inspectors in partnership with the PEI government for one week in July on PEI. The 2019 inspection report concluded AFB levels on PEI remain low after the initial cleanup in recent years. Provincial Inspectors continue to educate and caution the beekeepers to do effective biosecurity to prevent outbreaks and spread of the disease.

The inspectors also concluded they are seeing a trend, not just in PEI but across the Maritimes that EFB is becoming the biggest disease concern. This will continue to happen as long as hives are used in blueberry pollination, which puts them under stress conditions. Beekeepers need to be able to recognize the symptoms and understand it can damage a hive to the point that it will not recover. The use of oxytetracline is very effective with EFB.

Finally, skunks and shrews are two pests that continue to contribute to colony losses, which beekeepers need to watch more closely. Their ability to damage colonies is greatly underestimated. Both of these problems can be easily addressed.

Production comments:
The total number of commercial bee hives used for honey production and pollination on PEI has decreased in recent years, largely due to the high overwinter losses and difficulty accessing sufficient labour to sustain expanding beekeeping operations.

Total honey production in 2019 did not vary greatly from 2018, despite an increase in average yield per hive (i.e. 38 lbs/ hive in 2018 vs 48 lbs/ hive in 2019). The increase in production per hive could be attributed to a less severe summer drought in 2019 than 2018 but the difference could be seen as either marginal or caused by changes in hive management instead of the environment.

For the purposes of wild blueberry pollination, 2,176 hives were imported from outside the province, up from 1,832 hives in 2018. However, fewer local PEI hives were available for rent in 2019, resulting in a lack of pollination of some blueberry fields, in turn contributing to a relatively low wild blueberry yield.

Newfoundland and Labrador

2019 PROVINCIAL APIARIST(S) ANNUAL REPORT

Provincial Apiarist(s): Karen Kennedy - NL

BEEKEEPING STATISTICS:

Number of Beekeepers: 9 of 10 reported

Number of Producing Colonies:	262
Average Yield/Colony (kgs) & (lbs):	49 lbs
Total Estimated Crop (Kgs x1000) & (lbs x1000):	49,000 lbs
Colonies Wintered (2019-20):	510
Estimated Percent Winter Mortality (%):	13%

INSPECTION STATISTICS:

Number of Colonies Inspected:	253
Number of Beekeepers Inspected:	0 – beekeepers have self-reported

GENERAL COMMENTS:

Wintering comments:

For example: provincial winter survey results synopsis (3 paragraphs).

The majority of the beekeepers are wintering their hives outside as doubles.
Two of the ten commercial beekeepers have overwintered approximately 1/3 of their hives inside.

Inspection comments:

For example: inspection program priority setting, disease inspection and analysis synopsis (3 paragraphs).

There is no bee inspector in NL.
Commercial beekeepers have been educated and trained on how to identify for pests and how to monitor for Varroa.
For 2019, all inspection results are from commercial beekeepers self-reporting.

Production comments:

For example: honey production statistical data collection and information synopsis (3 paragraphs).

Honey production numbers may be low because a few beekeepers are focused on growing colonies sizes instead of honey and do not have the colony numbers to fulfill the two goals concurrently yet.

Appendix 8: CAPA Bylaws

CANADIAN ASSOCIATION OF PROFESSIONAL APICULTURISTS
L'ASSOCIATION CANADIENNE DE PROFESSIONELS DE L'APICULTURE

BYLAWS

Objectives of the Association

1. To promote, develop and maintain good fellowship and cooperation among professional apiculturists (individuals whose work in government, university, or similar professional capacity involve managed bee species)
2. To create a meeting of administrative and research professionals for the purpose of discussing common interests related to bee management and effectively coordinating, where possible, their activities.
3. To aid in the dissemination of information regarding the beekeeping industry in all its forms.
4. To maintain a consultative rapport with the Canadian Honey Council and other organizations concerned with managed bee species.
5. To maintain a rapport with professional in apiculture and related fields in other countries.

ARTICLE I - **Membership**

I (1): Full membership, with voting privileges is open to personnel employed by Canadian Federal and Provincial governments, universities or college, and consultants who are employed in the field of apiculture or other related fields as:

- Federal apiculturist
- Provincial apiculturist
- Full-time or part time extension apiculturist
- Full-time or part time teaching and/or research apiculturist
- Full-time or part-time apiary inspectors or bee disease / pest inspection staff
- Full-time or part-time apicultural technicians or technicians associated with personnel or projects involving managed bee species
- Full-time or part time professionals in any other capacity whose work involves managed bee Species

I (2): Non-voting, associate membership in the association may, upon receipt of application, be granted to persons who are:

- Part or full-time graduate students involved in projects involving managed bee species
- Seasonal and / or casual apicultural technicians or technicians associated with personnel or projects involving managed bee species
- Seasonal and / or casual apiary or bee disease / pest inspection staff
- Representatives of appropriate programs within federal government agencies such as Agriculture and Agri-Food Canada, the Canadian Food Inspection Agency and the Pest Management Regulatory Agency
- The representative of the Canadian Honey council and a representative of any other organizations concerned with managed bee species.
- Members of the American Association of Professional Apiculturists
- Members of the Apiary Inspectors of America.

I (3): Membership or associate membership may be extended to persons other than those defined in Clauses I and II upon ratification by a majority of the membership.

I (4): The privileges of membership in the Association shall terminate when a current member resigns or retires from the position which established his/her eligibility.
I (5): Membership fees shall be prescribed by the members in general meeting.
I (6): Every member shall receive a copy of the bylaws annually.
I (7): Privileges of membership shall be restricted to those holding current membership.
I (8): The decision to grant life memberships, honorary memberships, and awards of merit shall be made by a 75% majority of the members present at the general meeting.

ARTICLE II - General Meeting

II (1): The annual meeting shall be held at a time and place designated by the executive.
II (2): The secretary shall send all members a notice of a general meeting sixty (60) days in advance of the date of such a meeting unless a majority of the members waive the sixty day requirement.
II (3): A quorum of a duly called general meeting shall be ten (10) members.
II (4): Attendance at the Association's meeting shall be limited to members and guests invited by the executive.
II (5): Minutes of the general meeting shall, when printed, be of a confidential nature and permission to use the information presented must be obtained from the executive.

ARTICLE III - Finances

III (1): The fiscal year of the Association shall be from January 01 to December 31 of the calendar year.
III (2): All monies and securities held by the Association shall be in the name of the Canadian Association of Professional Apiculturists.
III (3): All money transactions made by the Association shall be made by cheque signed by the Treasurer and the President.
III(4): If required, a member of the executive (Vice-President, Secretary, or Past-President) will be chosen to act as Designate by the executive to have signing authority on behalf of the President.

ARTICLE IV - Officers of the Association

IV(1): The members shall, at the general meeting, through personal attendance or virtual attendance via electronic means (e.g. telephone, video conferencing), elect a President, Vice-President, Secretary, and Treasurer and appoint the Past-President into the executive. The executive may in turn appoint other officers and committee members as may be required.
IV (2): All officers shall be elected for a two year term of office and no officer shall serve more than two consecutive terms in the same office position.
IV (3): The president shall preside over all meetings of the Association and shall be ex-officio, a member of all committees.
IV (4): The vice-president shall perform the duties of the president in his/her absence or inability to act.
IV (5): The secretary shall:

1. Record the minutes of all meetings of the Association and distribute copies of these minutes to the membership sometime during the sixty (60) days following a meeting, and,
2. Send information and notices of motions and meetings etc. to the membership as required, and,
3. Maintain an up-to-date membership list, and,
4. Make arrangements to hold an annual general meeting, and other Association business.

IV (6): The Treasurer shall:

1. Look after all financial matters (including collection of annual fees from each member) of the Association and maintain accurate financial records.

IV (6): The Past-President shall be that person who has most recently completed a term of Association President. Should the offices of the President and Vice-President both become vacant, the Past-President

shall fill the office of President until an election can be held.

ARTICLE V - Amendments of Bylaws

V(1): Bylaws may be amended only by a recognized quorum at a general meeting and all members must be notified by the secretary of any proposed changes in the thirty (30) days in advance of the meeting date.

The foregoing are the Bylaws of the Canadian Association of Professional Apiculturists as amended at an annual general meeting held in Saskatoon Saskatchewan, at the Radisson Hotel, December 1 2015.

Appendix 9: CAPA Membership list

First name	Last Name	Member	City	Province
Alexandra	Panasiuk	Full	Spruce Grove	Alberta
Amanda	Gregoris	Full	Beaverlodge	Alberta
Amro	Zayed	Full	Toronto	Ontario
Andrée	Rousseau	Full	Deschambault	Quebec
Cameron	Menzies	Full	Charlottetown	Pince Edward Island
Christopher	Maund	Full	Fredericton	New Brunswick
Clement	Kent	Full	Toronto	Ontario
Cynthia	Scott-Dupree	Full	Guelph	Ontario
Daniel	Borges	Full	Kitchener	Ontario
Daniel	Thurston	Full	Guelph	Ontario
Daryl	Wright	Full	Winnipeg	Manitoba
Diane	Dunaway	Full	Williams Lake	British Columbia
Elemir	Simko	Full	Saskatoon	Saskatchewan
Émile	Houle	Full	Deschambault	Quebec
Erika	Plettner	Full	Burnaby	British Columbia
Ernesto	Guzman	Full	Guelph	Ontario
Fletcher	Colpitts	Full	Glenvale	New Brunswick
Gabrielle	Claing	Full	Saint-Hyacinthe	Quebec
Georges	Martin	Full	Deschambault	Quebec
Graham	Parsons	Full	Prince Albert	Saskatchewan
Graham	Thompson	Full	London	Ontario
Hannah	Neil	Full	Prince Albert	Saskatchewan
Heather	Higo	Full	Vancouver	British Columbia
Ida	Conflitti	Full	Toronto	Ontario
Igor	Medici	Full	Saskatoon	Saskatchewan
Jason	Sproule	Full	Truro	Nova Scotia
Jeff	Kearns	Full	Lethbridge	Alberta
Jennifer	Zechel	Full	Guelph	Ontario
Julia	Common	Full		

Julie	Ferland	Full	Québec	Quebec
Karen	Kennedy	Full	Corner Brook	Newfoundland
Kelsey	Ducsharm	Full	Guelph	Ontario
Leonard	Foster	Full	Vancouver	British Columbia
Les	Eccles	Full	Guelph	Ontario
Lynae	Ovinge	Full	Lethbridge	Alberta
Marilene	Paillard	Full	Deschambault	Quebec
Mark	Winston	Full	Vancouver	British Columbia
Marta	Guarna	Full	Beaverlodge	Alberta
Martine	Bernier	Full	Deschambault	Quebec
Medhat	Nasr	Full	Edmonton	Alberta
Melanie	Kempers	Full	Guelph	Ontario
Melissa	Girard	Full	Neuville	Quebec
Michael	Peirson	Full	Beaverlodge	Alberta
Nicolas	Tremblay	Full	Deschambault	Quebec
Patricia	Wolf Veiga	Full	Beaverlodge	Alberta
Paul	Kelly	Full	Guelph	Ontario
Paul	Kozak	Full	Guelph	Ontario
Paul	van Westendorp	Full	Abbotsford	British Columbia
Pierre	Giovenazzo	Full	Québec	Quebec
Rassoll	Bahreini	Full	Edmonton	Alberta
Renata	Soares Borba	Full	Beaverlodge	Alberta
Rhéal	Lafrenière	Full	Winnipeg	Manitoba
Rob	Rupert	Full	Thunder Bay	Ontario
Rob	Currie	Full	Winnipeg	Manitoba
Robyn	McCallum	Full	Bible Hill	Nova Scotia
Samantha	Muirhead	Full	Edmonton	Alberta
Sebastian	Ibarra	Full	Charlottetown	PEI
Shelley	Hoover	Full	Lethbridge	Alberta
Stephen	Page	Full	Ottawa	Ontario
Stephen	Pernal	Full	Beaverlodge	Alberta
Timothy	Olchowy	Full	Calgary	Alberta

Valérie	Fournier	Full	Québec	Quebec
Zoe	Rempel	Full	Winnipeg	Manitoba
Alexandra	Sebastien	Associate	Vancouver	British Columbia
Anna	Chernyshova	Associate	Toronto	Ontario
Anne-Marie	Beaudoin	Associate	Deschambault	Quebec
Candice	Coombs	Associate	Grande Prairie	Alberta
Claude	Dufour	Associate	Levis	Quebec
Colby	Klein	Associate		
Derek	Micholson	Associate	Winnipeg	Manitoba
Ivanna	Kozzi	Associate		
Janet	Tam	Associate	Guelph	Ontario
Kim	Skyrm	Associate	West Springfield	Massachusetts
Lora	Morandin	Associate	Victoria	British Columbia
Megan	Colwell	Associate	Winnipeg	Manitoba
Michael	Zabrodski	Associate		
Miriam	Bixby	Associate	Victoria	British Columbia
Mylee	Nordin	Associate	Niagara on the Lake	Ontario
Nuria	Morfin-Ramirez	Associate	Guelph	Ontario
Phil	Craft	Associate	Wilmore	Kentucky, USA
Sarah	Wood	Associate	Saskatoon	Saskatchewan
Sawyer	Olmstead	Associate	Londonderry	Nova Scotia
Stephanie	Otto	Associate	London	Ontario
Taeyoon	You	Associate	North York	Ontario
Chris	Jordan	Honourary		Prince Edward Island
Claude	Boucher	Honourary	St-Georges	Quebec
Don	Dixon	Honourary	Narol	Manitoba
Don	Gray	Honourary	Portland	Ontario
Don	Nelson	Honourary	Beaverlodge	Alberta
Doug	McCutcheon	Honourary	Armstrong	British Columbia
Doug	McRory	Honourary	Guelph	Ontario
Gard	Otis	Honourary	Guelph	Ontario
Heather	Clay	Honourary	Vernon	British Columbia
Joanne	Moran	Honourary		Nova Scotia
John	Gates	Honourary	Armstrong	British Columbia

John	Gruszka	Honourary		Saskatchewan
Kenn	Tuckey	Honourary	Edmonton	Alberta
Kerry	Clark	Honourary	Dawson Creek	British Columbia

Appendix 10: 2019/20 AGM Photo

Back row (left to right): Pierre Giovenazzo, Stephen Pernal, Rob Currie, Mark Winston, Cameron Menzies, Melanie Kempers, Paul Kozak, Les Eccles, Stephen Page.
Middle row (left to right): Renata Borba, Connie Rajzman, Karen Kennedy, Gabrielle Claing, Nicolas Tremblay, Chris Maund, Ernesto Guzman, Julia Common.
Front row (left to right): Shelley Hoover, Heather Higo, Paul van Westendorp, Medhat Nasr, Nuria Morfin, Valérie Fournier.