
Canadian Association of Professional Apiculturists



Canadian Honey Council

**~~7th National Research-Planning Workshop: Honey Bee and
Pollination Research~~**

**Moncton, New Brunswick
February 1, 2001**

Editor: R.W. Currie

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1. INTRODUCTION

A National Research Planning Workshop was held on the 1st of February in Moncton, New Brunswick by the Canadian Association of Professional Apiculturists and the Canadian Honey Council. The research workshop was structured to assess the current status of the industry and its research infrastructure, to review the objectives of past workshops, to assess the progress that has been made in reaching those objectives and finally to establish research priorities and recommendations for the next five years.

Many individuals contributed information to the reports presented at this meeting and their work in preparing and presenting these reports helped to make the workshop a success. Summaries of the reports that were presented at the meeting are contained within section two of the proceedings.

I would also like to thank, the workshop participants who all contributed to the development of the priorities and recommendations contained within. The participants included industry, extension and research personnel from across Canada and an invited researcher and extension apiarist from the United States. Their names and affiliations are contained in Appendix 1. The research priorities that were established during the workshop and the "emerging issues and recommendations" relating to research personnel and research funding are highlighted in section three.

It is clear from the discussion that occurred at this workshop that the honey-industry faces many new challenges in the coming years that must be addressed through further research to ensure its continued success. However, in order to solve these problems we will require a renewed commitment to build upon the strengths of the existing research and extension community. The priorities and recommendations proposed by the participants of this workshop provide a strategic plan to guide the industry in meeting its goals over the next five years.

R. W. Currie
Research Committee Chair
Canadian Association of
Professional Apiculturists

2. REPORTS

2.1 A Review of the Canadian Honey Market 1996 to 2000 (D. Pearen)

Summary

During the period 1995-2000 the Canadian honey industry witnessed another tumultuous five years with happenings including:

- the continued closure of the border to imports of honey bees from the continental United States (extended to December 2004) to assist in the control of Varroa parasitic mites;
- a rise in the producer price of bulk honey to as high as \$1.35 per pound in 1996 and the subsequent decline in price to around the \$0.75 per pound level in 2000;
- a dramatic rise in the importation of Chinese honey which reached a peak of 24 million pounds (\$21 million) in 1996 and then fell to levels of close to 4 million pounds (\$3 million) in 1999 and 2000;
- Canadian honey production reached an all time high of 101.4 million pounds in 1998 and then generally poor summer weather conditions dramatically reduced production in 1999 and 2000;
- in 1999, concerns were raised about the possible importation into Canada of a “honey analogue”;
- a rise in the exports of Canadian honey which reached levels of 33 million pounds (\$30 million) in 1999 and 2000;
- in 1999, exports of Canadian honey to the European Union were side-swiped by concerns about Genetically Modified Organism (GMO) canola;
- concerns that the small hive beetle may reach Canada after being discovered in the northern United States in the late nineties;
- the closing of the border to imports of honey bees from New Zealand in 2000 after the discovery of Varroa mites in that country;
- in the fall of 2000, the United States initiated an antidumping duty investigation into honey imported from Argentina and China;
- in October 2000, the United States government announced an aid program consisting of non-recourse loans and loan deficiency payments for the 2000 honey crop.

The Honey Bee Population

The Canadian honey bee population peaked at about 700,000 hives in the mid-eighties and dropped to around 500,000 hives in the early nineties. However, in the past decade the number of hives has slowly risen to reach just over 600,000 in 2000. On the other hand, the number of Canadian beekeepers continues its downward trend to number some 9,900 in 2000. This clearly indicates that while there are fewer beekeepers, the average number of hives per beekeeper is on the increase.

Honey Yields

1998 was a record year for honey production in Western Canada with an average yield of just over 200 pounds per hive, due to relatively mild overwintering conditions and ideal summer weather that extended into the fall. The yield improvement was also an indication of the success of research, technology transfer and management skills available to the industry. However, summer weather conditions on the prairies were not nearly so cooperative during the succeeding two years, resulting in the average yield per hive falling to 133 pounds in 2000.

Imports and Exports

Canada is a net exporter of honey by a significant factor. Imports of honey into Canada peaked at 28.5 million pounds in 1996, but have leveled off to about 4.5 million pounds per year since then, which would represent only about 6% of Canadian production in 2000. The vast majority of those imports originate from China with much lesser amounts coming from the United States and Argentina. Exports on the other hand, have been growing steadily since 1997 and are expected to have reached close to 35 million pounds in 2000 which would amount to 50% of Canadian production. The United States is the primary export market, taking over 80% of all shipments, followed by the European Union and Japan. The value of Canada's honey exports in 2000 is expected to reach about \$30 million, the same as it was in 1999.

The Future of the Canadian Industry

The future of the Canadian honey industry looks bright in spite of lower producer prices in recent years. The price of bulk Western Canadian honey peaked at around \$1.35 per pound in 1996, a figure which would cause some consumer buying resistance. Prices since fell to about the \$0.75 per pound range in 2000 and there may be some indication as we enter 2001 that producer prices may rise in response to two years of poorer production in the prairies. However, in the fall of 2000, the United States announced an antidumping duty investigation into honey imported from China and Argentina as well as an aid program consisting of non-recourse loans and loan deficiency payments for the 2000 honey crop. The influences of these two US actions on the future price of Canadian honey is yet to be determined.

Dave Pearen, Agriculture and Agri-Food Canada
January, 2001

2.3 Review of previous research workshops (J. Gates, D. Nelson)

Review of Previous Apicultural Research Workshops
Presented at the 2001 Apiculture Research Workshop
Moncton N.B. February 3, 2001

Since 1970 there have been six Apiculture Research Workshops. Agriculture Canada and the Canadian Association of Professional Apiculturists (CAPA) jointly sponsored the five workshops from 1970-89. The 1996 workshop was conducted by CAPA. A “workshop” held in 1951, was conducted by the Dominion Apiarist.

- 1996, Ottawa, Ontario
- 1989, Winnipeg, Manitoba
- 1986, Charlottetown, PEI
- 1981, Toronto, Ontario
- 1977, Victoria, B.C.
- 1970, Ottawa, Ontario
- 1951, Banff, Alberta

From 1970 to 1989 there was a shift in research priorities from production, wintering and management to control of diseases and pests. This was in part due to the discovery of tracheal mites in 1984 and varroa mites in 1987 in the U.S. In the fall of 1987 honey bee imports from the continental U.S were discontinued. Thus, evaluating and developing mite controls, self-sufficiency in adult bee and queen production and stock selection for disease and pest resistance became high research priorities. In 1989 greater emphasis was placed on pollination with leafcutter bee research and commodity-oriented pollination recognised as important areas of investigation.

In 1996 the Canadian Honey Council and CAPA ranked research priorities within two major categories, General Apicultural Research and Pollination Research. Continuing industry problems with parasitic mites, despite the availability of registered control products, directed General Apicultural Research towards developing more efficient methods of using “current tools”, developing and testing new control methods, preventing mite resistance, bee breeding, studying mite population dynamics and studying disease-pest interactions. Pollination Research priorities were identified as impacts of pesticides on honey bees and hive products, increasing efficiency of honey bees for pollination, quantifying the economic contribution of honey bee pollination, developing economic thresholds for specific crops and studying native pollinators.

SUMMARY OF RESEARCH PRIORITIES OF PAST WORKSHOPS

1996 OTTAWA, ONTARIO

(A) APICULTURAL RESEARCH PRIORITIES

1. Diseases, Parasites and Pests
 - pest/disease interactions, economic impact and control
 - improved use of "current" mite controls
 - alternative mite controls for Canadian conditions
 - pheromone based controls
 - tracheal mite buildup, spread and impact
2. Stock Selection and Breeding
 - selection for mite resistance
 - mating control
3. Colony management
 - pheromone based swarm control
4. Impacts of chemical controls
 - impacts on bees and colony performance
 - hive product contamination

(B) POLLINATION RESEARCH PRIORITIES

1. Pesticide Pollinator Interactions
 - pesticide impact on colonies/potential for hive product contamination
 - alternative agricultural pesticides less hazardous to bees
2. Pollination/Plant related studies
 - improving honey bee management for pollination
 - using pheromones to enhance pollination
 - determining value of pollinators and pollination thresholds
 - relative value of honey bees and native pollinators
3. Native Pollinators
 - biology, habitat, conservation, use

1989 WINNIPEG, MANITOBA

(A) HONEY BEE RESEARCH

1. Mites
 - Detection (tracheal mites)
 - Production and maintenance of mite-free stock (tracheal mites)
 - Control products (both mites)
 - Production of mite-free stock (queens and bees)
 - Economic impacts (both mites)
 - Cultural controls (both mites)
 - Integrated pest management (both mites)
2. Residue in hive products
3. Value of bees for pollination
4. Management for self-sufficiency
5. Pollination requirements for selected crops
6. Chemical control of diseases
7. Non-chemical control of bee diseases

(B) LEAFCUTTER BEE RESEARCH

1. Pathogens -prevention and control
2. Parasites and predators -biology and control
3. Causes of mortality in immature bees
4. Use of leafcutting bees in other crops
5. Management studies
 - equipment evaluations
 - optimum densities of bees
 - sex ratios
 - combining honey bees and leafcutter bees
6. Leafcutting stock selection

(C) COMMODITY-ORIENTED POLLINATION

1. Tree fruits
2. Field crops
 - oil seeds
 - forage legumes
3. Small fruits
4. Greenhouse crops
5. Special crops
6. Pollination for sustainable agriculture

1986 CHARLOTTETOWN, PRINCE EDWARD ISLAND

(A) APICULTURE RESEARCH

- Diseases and pests
- Bee supply
- Colony management
- Stock improvement
- Pesticide-pollinator interactions
- Bee botany

(B) INDUSTRY RELATED RESEARCH

- Marketing research
- Human Health
- Financial management

1981 TORONTO, ONTARIO

(A) PRODUCTION

- stock selection and breeding
- diseases and pests
- improved colony management

(B) REGULATIONS

- chemicals
- evaluation of pesticides

(C) UTILIZATION

(D) EDUCATION

(E) MARKETING

1977 VICTORIA, BRITISH COLUMBIA

(A) PRODUCTION

- stock selection and breeding
- diseases and pests
- improved colony management

(B) UTILIZATION

- nectar production and pollination of specific crops
- new nectar and pollen sources

(C) REGULATIONS

- chemicals
- evaluation of pesticides

(D) MARKETING

(E) EDUCATION

1970 OTTAWA, ONTARIO

- (A) MARKETING AND PRODUCT RESEARCH
- (B) MANAGEMENT FOR HONEY AND POLLEN PRODUCTION
- (C) WINTERING
- (D) POLLINATION
- (E) HONEY-PRODUCING PLANTS
- (F) BEE DISEASE

1951 BANFF, ALBERTA (C.A. Jamison, Dominion Apiarist)

1. Queen breeding for increased productivity:
 - (a) progeny testing of improved strains by longevity, flight activity, and honey production,
 - (b) artificial insemination for development of hybrid lines of greater vigour and productivity.

2. Bee Diseases:
 - (a) American foulbrood; control studies with antibiotics and drugs, spore survival tests in soil, disinfectants with lye solutions, fumigation tests with carboxide, irradiation of spore material in scale, wax, capped cells and honey,
 - (b) sacbrood; effectiveness of various antibiotics and drugs.

3. Pollination:
 - (a) fruits; survey of pollinating insects on cherries and pears in the Niagara District;

 - (b) legumes; determination of the density of honeybee populations for maximum seed set; efficiency of honey bees compared to native pollinators for cross pollination; study of weather conditions, soil conditions and their interactions with respect to honeybee visitations to various crops; the effect of injurious insects on seed setting; the toxicity of insecticides to honey bees under field conditions; nectar concentration and volume as a factor in seed setting; development of different color marking agents for identification of honeybees in the field; the effect of soil conditions, liming cutting etc. on the growth and nectar secretion of sweet clover.

4. Management:
 - (a) wintering - testing of new insulating materials for winter protection; effect of artificial heating on wintering and spring development of colonies,

(b) production - division of colonies for increased production.

5. Honey:

(a) a study of the factors affecting crystallization of honey with the object of developing a satisfactory method of packing a stable liquid product;

(b) a study of factors affecting the stability of recrystallized honey.

Recommendations for new projects by the research committee(1951):

1. Development of efficient heating and cooling equipment for pasteurizing honey;
2. Studies on the control of European Foulbrood and studies to determine the casual organism of the disease;
3. Determination of the stability of sulfa drugs in honey;
4. Determination of the effectiveness of the newer antibiotics and drugs on the control of American Foulbrood;
5. Studies on the fermentation of honey with the object of developing a honey wine.

Literature Cited

Western Canada Beekeeper Vol 14(3)3-4. **March 1951**

Compiled by:

N.J. Gates and D.L. Nelson

2.4 Review of Research Progress 1996-Present (R. Currie)

Canadian bee-research projects that were conducted between 1996 and 2000 are listed below. Projects included are those submitted in response to a request for information that went out to all Canadian bee researchers. Research projects are grouped below by province and institution.

It is evident from examining the list presented below that there has been tremendous progress towards meeting the industry needs that were set out in the previous workshop. A comparison of the research priorities of the 1996 workshop in Ottawa, Ontario, with the following list, indicates that projects have been conducted or are ongoing in all areas that were identified as high or medium priority in 1996. Although many of these high-priority issues have been addressed through various research projects they have not all been fully resolved, and many of these topics will undoubtedly continue as high priority projects in the future. The only areas in which no progress has been made were in those that had been ranked as low priority.

British Columbia:

B.C. Agriculture, Province of British Columbia: (P. Van Westendorp, K. Clark, J. Gates)

Date(s)	Investigator(s)	Project
1995-	N.J. Gates	Management Methods to Control Tracheal Mites
1996-97	N.J.Gates	Comparing the Efficacy of Fall Applications of Menthol Boards and Formic acid to Control Honey Bee Tracheal Mites In Honey Bee Colonies in the North Okanagan of BC
1996-99	N.J. Gates H. Joynt G. Geldart C. Ellison	Beekeeping Enterprise Budgets; -Honey Production and Pollination in the Southern Interior of BC
1998-99	N.J.Gates B. Ruzicka	Evaluating a Floral Foam, Formic Acid Applicator for Fall Control of Varroa Mites in the Okanagan Valley
1999-	N.J. Gates T. Kay	"Looking for George's Bees" Attempts to Locate and Capture a Feral Population of <i>Apis mellifera mellifera</i> in the Central Coast Range of BC
2000-	A. Melathopoulos B. Ruzicka N.J. Gates	Field Evaluation of the Microbial Acaracide <i>Hirsutella thompsonii</i> for the control of the honey bee mite parasite <i>Varroa jacobsoni</i>
2000-01	N.J. Gates A. Melathopoulos	Comparing the Efficacy of Fall Applications of Api-life var, Apiguard and Apistan to Control Varroa Mites in Honey Bee Colonies in the Okanagan Valley of BC

British Columbia (Continued):**CPC Crop Pollination Systems, Burnaby, B.C. (Margriet Dogterom)**

Date(s)	Investigator (s)	Project Title
2001-02	M. Dogterom	Stigma pollen counts used as an effective tool to determine how pollination can be optimised in blueberry and cranberry fields.
2001-03	M. Dogterom	Investigation of the bushy dwarf virus and its effect on raspberry ovule abortion and fruit yield.

Simon Fraser University, Burnaby B.C. (Mark L. Winston)

Date(s)	Investigator(s)	Project
1995-99	M. Dogterom	Is the honey bee the best pollinator of blueberries?
1996-98	A. Melathopolous R. Whittington C. Lindberg	Using neem extracts and essential oils to control diseases and pests of honey bees
1996-99	D. Downey	Effects of dual mite infestations on honey bees
1996-98	A. Janmaat	Nutrition and parasitic mite effects on bees
1996-98	L. Birnie	Sublethal effects of acaricides on bees
1994-99	H. Lin	Pheromones and worker ovary development
1999-00	M. Ledoux	Pheromones and comb production
1997-02	S. Pernal S. Baird K. Slessor A. Birmingham	A semiochemical trapping system for varroa mites
1999-02	H. Sabara R. Whittington A. Birmingham N. Rice H. Higo M. Dogterom	Diversified management systems for pollinating greenhouse tomatoes
1999-01	N. Rice	IPM Management for parasitic mite control
2000-04	M. Winston S. Hoover K. Slessor H. Higo C. Keeling	Behavioral and pheromonal factors influencing the organization and evolution of highly social insect colonies
2000-01	A. Miro D. Tommasi	Once Upon a Bee Project
2000-04	L. Morandin	Effects of GM crops on bees
2001-05	G. Robinson Y. LeConte	From genes to behavior: the mode of action of queen pheromone

Alberta:**Agriculture and Agri-food Canada, Beaverlodge, AB: (Don Nelson)**

Date(s)	Investigator(s)	Project
1996-99	D. Nelson P. Gatien	Long term effect of formic acid and Apistan on honey bee colonies
1997-98	D. Nelson P. Gatien	Effects of colony treatment for mites control during the winter period
1997	D. Nelson K. Clark P. Gatien	Effect of slow release methods of formic acid for the control of tracheal mites.
1997	D. Nelson P. Gatien	Evaluation of bee activity on borage, phacelia, birdsfoot trefoil and canola.
1998	D. Nelson K. Clark Iotron N. Speckt Medivet	Evaluation of high electron beam radiation as a means to control chalkbrood and other diseases in pollen
1998	D. Nelson G. Grant Honey Prod. Coop	Cooperative ELISA technology transfer and promotion project
1998-99	D. Nelson	Borage pollination studies
1999-00	P. Mills D. Nelson	Bear fence and colony weight monitoring
1999-00	S. Daniels D. Nelson K. MacKenzie D. Rogers	Membrane-gel delivery system for formic acid
1999-00	L. Westcott D. Nelson	Hybrid canola pollination studies
2000-01	A. Melathopoulos D. Nelson	Fall treatment of colonies with resistant AFB
2000-01	A. Melathopoulos D. Nelson D. Colter	Evaluation of high electron beam radiation for the control of chalkbrood and AFB in honey & brood combs
2001-03	D. Nelson A. Melathopoulos D. Colter D. Noot K. Manninen P. Sporns	Management of oxytetracycline resistant American Foulbrood disease in honey bees.
2001-02	P. Mills D. Nelson	Bee degree day programming

Saskatchewan:

University of Saskatchewan, Saskatoon, Sask.: (A.R. Davis)

Date(s)	Investigator(s)	Project
1995-98	F.A. Razem A.R. Davis	Physiological and structural aspects of the modified stomata on floral nectaries of pea (<i>Pisum sativum</i>) and <i>Arabidopsis thaliana</i>
1996-01	J. Pontoh N. Low A.R. Davis	Bee enzymes and their influence on carbohydrate composition of honey
1996-01	J.D. Pylatuik P.C. Bonham-Smith A.R. Davis	Design of unisexual lines of canola (<i>Brassica napus</i>) for hybrid-seed production
1997-00	M.W. Langenberger A.R. Davis	Studies of caraway pollination in Saskatchewan
1997-00	M.W. Langenberger A.R. Davis	Studies of nectar secretion and potential honey production of caraway
1998-01	A.L. Silvester A.R. Davis	Nectary presence and structure in floral mutants of Brassicaceae
2000-04	K. Lew N. Low A.R. Davis	Nectar-carbohydrate composition of canola and borage in Western Canada
2001-03	M. Taylor A.R. Davis	Studies of floral characteristics indicative of high nectar carbohydrate production in canola

Manitoba:

University of Manitoba, Winnipeg, Manitoba (R.W. Currie)

Date(s)	Investigator(s)	Project
1992-00	S. Pernal R. Currie	Pollen quality in fresh and one-year old single pollen diets for honey bees
1992-00	S. Pernal R. Currie	The Influence of pollen quality on foraging behaviour in honey bee (<i>Apis mellifera</i> L.) workers.
1992-00	S. Pernal R. Currie	Factors affecting the evaluation of pollen-based foraging cues for honey bee
1992-00	S. Pernal R. Currie	Technical specifications and effectiveness of an improved flight and rearing room for honey bees
1999-00	R. Underwood R. Currie	Formic acid fumigation of indoor-wintered <i>Varroa</i> infested honey bee colonies
1999-00	R. Underwood R. Currie	Effect of temperature and dose of formic acid on efficiency of control of <i>Varroa jacobsoni</i> .
1996-97	R. Currie D. Dixon R. Lafreniere	Effect of Off-spec corn syrup on honey bee survival.

Manitoba (continued):

Date(s)	Investigator(s)	Project
1997-99	R. Currie D. Dixon R. Lafreniere	The interactions between season and syrup quality on survival of worker honey bees.
1997-99	R. Currie D. Dixon R. Lafreniere	Effect of syrup acidity and buffering capacity on survival of worker honey bees.
1999-01	D. Ostermann R. Currie	Interactions between mites, mite controls and bee diseases
1998-01	D. Ostermann R. Currie	Release characteristics and efficacy of different formulations of formic acid for control of varroa.
2000-01	D. Ostermann R. Currie	An evaluation of the efficacy of essential oils against chalkbrood disease.
1998-01	R. Currie D. Vanderwel	An evaluation of the effects of winter Apistan treatment on honey bee colony performance, fluvalinate residues and mite resistance to pesticides.

Ontario:

University of Guelph, Guelph Ontario, OMAF: (C. Scott-Dupree)

Year(s)	Investigator(s)	Project
2000	C. Scott-Dupree	The impact of Gaucho and AMS 13945 seed-treated canola on honey bees.
2000	C. Scott-Dupree	The impact of spinosad (SUCCESS 480SC) on honey bees foraging in sweet corn.
2001	C. Scott-Dupree	Evaluation of a new insecticide and alternative strategies for effective control of European Corn borer with minimal impact on honey bees foraging in sweet corn.
2001	C. Scott-Dupree	Impact of the biological insecticide, spinosad, on pollinators in forest ecosystems.

Ontario (continued):

University of Guelph, Guelph Ontario, OMAF: (G. Otis)

Year(s)	Investigator(s)	Project
1995-00	Otis, G. LeConte, Y.	Mite-resistance of French and Canadian honey bees
1995-00	vanEngelsdorp, D. Otis, G.	Performance of nine genetic families of bees selected for tracheal mite-resistance
1995-00	Nasr, M.E. Otis, G. Scott-Dupree, C.D.	Successful divergent selection of tracheal mite resistance (with and
1995-00	Otis, G.	Role of cuticular compounds in resistance of honey bees to tracheal mites.
1995-00	Kralj, J. Otis, G.	Selection of honey bees with rapid development as a component of Varroa mite resistance.
1995-00	Mattila, H. Otis, G.	Efficacy of Apiguard®, a thymol-based miticide, for control of Varroa and tracheal mites.
1995-00	Anderson, D. Otis, G.	<i>Varroa underwoodi</i> in Papua New Guinea and Indonesia.
1995-00	Hadisoesilo, S. Otis, G.	Confirmation of <i>Apis nigrocincta</i> as a distinct species, through comparison of drone flight times, drone cell cappings, distribution, male genitalia, and morphometric analyses.
1995-00	Damus, M. Otis, G. Smith, D.R.	Biogeography of cavity-nesting honey bees in Southeast Asia
1995-00	Hadisoesilo, S. Otis, G.	Social bees as indicators of habitat quality in Sulawesi.
1995-00	Plettner, E. Keeling, C. Otis, G. <i>et. al.</i>	Mandibular gland chemistry of <i>A. nigrocincta</i> , <i>A. cerana</i> , and other <i>Apis</i> species in Southeast Asia.
1995-00	Otis, G.	Speciation processes in honey bees.
1995-00	Otis, G.	Distributions of recently recognized species of honey bees
1995-00	Bakker, D. Otis, G.	Comparison of habitat selection by <i>A. cerana</i> and <i>A. nigrocincta</i> in Central Sulawesi
1995-00	Moalem, S. Otis, G.	Investigations on the K-wing phenomenon in honey bees.
1995-00	Makvandi-Nejad, S. Otis, G.	Influence of the queen honey bee and QMP on construction of drone comb.
1995-00	Mattila, H.R. Harris, L. Otis, G.	Timing and rate of production of winter bees in temperate honey bee colonies
1995-00	Jarolimek, J. Otis, G.	Relative fitness of large and small drones.

Ontario (continued):

Year(s)	Investigator(s)	Project
1995-00	van Engelsdorp, D. Otis, G.	Spring pollen collection by Buckfast and Canadian bee colonies.
1995-00	vanEngelsdorp, D. Otis, G.	A modified selection index for honey bee colonies.
1995-00	Radloff, S.E. Hepburn, H.R. Otis, G.	Comparative flight machinery of honey bee species.
1995-00	Winston, M.L. Taylor, O.R. Spivak, M. Katz, S. Kukuk, P.F. Otis, G.	Flight times of African and European queens and drones
1995-00	Taylor, O.R. Winston, M.L. Otis, G.	Colony size affects reproductive attributes of Africanized honey bees (with O. R. Taylor and M. L. Winston)

University of Guelph, Guelph Ontario (P. Kevan)

Year(s)	Investigator(s)	Project
99-00	Kevan, P. Robinson, M. Skinner, A.	Comparing honeybees and bumblebees for red clover pollination.
98-01	Kevan, Husband, B. Kron, P.	Apple pollination, pollen and gene flow in high density orchards
99-01	Kevan, P. Husband, B. Kron, P. Feltz, T.	Field cucumbers, pollinator deployment for hand and machine harvest
98-01	Kevan, P. Robinson, M. Skinner, A.	Squash and pumpkin, and the hoary squash bee as a native pollinator
98-01	P. Kevan et al.	Pollinators of highbush blueberry in Ontario
98-01	Kevan, P. Lavery, T. Morandin, L. Khoshla, S. Shipp, L.	Activity and pollination of bumblebees for hothouse tomatoes
99-01	P. Kevan	Sweet corn, pesticides, and honeybees
99-01	Kevan, P. Phillips, T.	Economics of pollinator declines
98-01	Kevan, P. Sutton, J. Broadbent, B.	Delivery of biocontrol agents against tarnished plant bugs on canola by pollinating honeybees.

Ontario (continued):

99-00	Kevan, P. Skinner, A.	Pollination of <i>Echinacea</i>
95-01	Kevan, P. Greco, P.	Functional responses of ambush predators on flowers.
36890	Kevan, P. Chittka, L. Dyer, A.	Salience of UV reflections in nature
36890	Kevan, P.	Colours of fabric for beekeeper protective clothing.

Ontario Beekeeper's Association-Tech-Transfer Program and OMAFRA: (M. Nasr and D. McRory)

Date(s)	Investigator(s)	Project
1994-97	M. Nasr D. McRory A. J. Skinner N. Bradbury	Augmentation of tracheal mite resistant stocks in Ontario
1994-95	M. Nasr P. Kevan E. Southwick A. J. Skinner	Effects of tracheal mites on thermoregulation of honeybees
1994-95	M. Nasr P. Kevan D. McRory A. J. Skinner N. Bradbury	Queen mandibular pheromone effects on pollination and storage ability of apples
1994-95	M. Nasr D. McRory	Development of a safe method (Mite-Wipe) for applying formic acid to control bee mites in honey bee colonies
1994-96	M. Nasr D. McRory A. J. Skinner C. Chong	A field evaluation of four honey bee stocks for tracheal mite resistance and other characteristics of economic importance to beekeepers in Ontario
1994-00	G. Otis M. Nasr B. Davies, P. Montoux, R. Nelson D. McRory	Continued development of Buckfast bees in Ontario
1996-97	M. Nasr B. Davies D. McRory A. J. Skinner C. Chong	Development of a single application of formic acid (Mite-Away) to control parasitic mites
1996-97	M. Nasr A. C. Skinner	Evaluation of using Liquid nitrogen to kill capped honey bee brood cells for evaluating hygienic behaviour of honey bees
1996-00	D. McRory M. Nasr	Development of annual recommendations for disease and pest control in honey bees based on Integrated Pest Management Program
1997-98	M. Nasr N. Calderon A. C. Skinner	Evaluation of spring and fall application of formic acid Mite-Away single application pad on mites

Ontario (continued):

Date(s)	Investigator(s)	Project
1997-00	M. Nasr D. McRory A. J. Skinner A. C. Skinner J. Tam G. Wilson R. Bannister	Breeding mite resistant honey bees: 1. Screening, breeding and amalgamation of hygienic behaviour to Ontario Tracheal Mite Resistant Stocks 2. Maintenance of tracheal mite resistant stocks in Ontario
1997-00	M. Nasr D. McRory	Development of markets for Ontario tracheal mite resistant honey bee queens
1997-00	A. J. Skinner M. Nasr P. Kevan	Impacts of tracheal mites on the respiration and thermoregulation of overwintering honey bees in a temperate climate (A. Skinner's M. Sc. Thesis)
1997-99	M. Nasr S. Corrigan J. Tam G. Wilson	Evaluation of wintering management systems
1998-99	M. Nasr A. C. Skinner J. Tam, S. Melin	Evaluation of hygienic honey bees in removing varroa mite infested brood
1998	M. Nasr J. Tam S. Corrigan	Improving the assay for evaluating varroa resistance to Apistan
1998-00	M. Nasr D. McRory J. Tam S. Corrigan S. Melin G. Wilson	Screening varroa mites for resistance to Apistan in Ontario
1998-00	M. Nasr J. Tam G. Wilson	Evaluation of imported Italian honey bee stock for tracheal mite resistance
1998-00	M. Nasr D. McRory G. Wilson J. Tam S. Melin	Evaluation of efficacy of IPM programs in controlling mites in honey bees (Annual survey)
1999-00	M. Nasr D. McRory G. Wilson J. Tam S. Melin	Evaluation of quality of honey bee queens produced in Ontario
1999-00	M. Nasr G. Wilson J. Tam S. Melin D. McRory D. Servos R. Bannister	Development of IPM tools for varroa management: efficacy of , ApiGuard, Apilife var, Oxalic acid, formic acid Mite-Away, Apistan

Ontario (continued):

Date(s)	Investigator(s)	Project
1999-00	M. Nasr G. Wilson J. Tam S. Melin D. McRory	Development of standards for the seal of quality of effective pollination units
1999-00	M. Nasr G. Wilson J. Tam S. Melin D. McRory	Effects of pollination on apple quality under Ontario conditions
1999-00	M. Nasr G. Wilson J. Tam S. Melin D. McRory	Evaluation of pollination management practices by beekeepers, apple growers, and cucumber growers
1999-01	M. Nasr G. Wilson	Impacts of tracheal mites on acceptance and supersedure of honey bee queens
1999-00	M. Nasr K. Wallner G. Wilson	Residues of miticides in honey and bees wax from Ontario, Canada
2000-01	M. Nasr J. Tam R. Bannister	Re-evaluation of single application Mite-Away pads: hole size, formic acid volume, pad size
2000-02	G. Wilson M. Nasr P. Kevan	Evaluation of Russian bee resistance to varroa mites and their economic traits (G. Wilson's M. Sc. Project)
2000-02	G. Wilson M. Nasr	Study of population dynamics of varroa mites in honey bees in Ontario

Quebec:**M.A.P.A.Q. Deschambeault, Quebec (J. Marceau and others)**

Year (s)	Investigator (s)	Project Title
No projects submitted		

Nova Scotia:**Agriculture and Agrifood Canada, Kentville Nova Scotia (Kenna MacKenzie)**

Date(s)	Investigator(s)	Project
1996-97	K.E. MacKenzie S.K. Javorek R.E. Rogers P. Eggerman B. Wolf	Factors affecting the maintenance of alfalfa leafcutter bee populations used for lowbush blueberry pollination in the Maritimes
1996-98	K.E. MacKenzie R.E. Rogers R.S. Daniels D. Nelson	Honey bee IPM: tools and strategies for managing European Foulbrood, Nosema and Varroa Mite
1996-99	K.E. MacKenzie S.K. Javorek R.E. Rogers	The role of native bees in lowbush blueberry production
1997-98	K.E. MacKenzie M. Robichaud R. Rioux	A comparison of alfalfa leafcutting bees and bumble bees as pollinators of cranberry
1997-99	S.K. Javorek K.E. MacKenzie R.E. Rogers C. Sheffield	The impact of increased pollination of apple fruit production and quality
1998-00	K.E. MacKenzie D. Schiffhauer T. Dittl S.K. Javorek D. Kushniruk	Alfalfa leafcutting bees as an alternative, commercial pollinator of cranberries
1999-00	K.E. MacKenzie S. Chaisson	Approaches for improving alfalfa leafcutting bee productivity
1999-01	R.S. Daniels R.E. Rogers K.E. MacKenzie D. Nelson J. Skinner	Membrane-gel delivery of formic acid vapours for the treatment of honey bee mites
1999-02	K.E. MacKenzie K. Burgher L. Eaton M. Myra	Genetics and wild blueberry pollination
2000-03	S.K. Javorek K.E. MacKenzie	Development of a Maritime-specific management system for alfalfa leafcutting bees used for wild blueberry pollination

Nova Scotia (continued):

Agriculture and Agri-Food Canada, Kentville, Nova Scotia (Steve Javorek)

Date(s)	Investigator(s)	Project
1997- 2000	S.K. Javorek K.E. MacKenzie S.P. Vander Kloet	Comparative Pollination Effectiveness Among Bees (Hymenoptera: Apoidea) at Lowbush Blueberry (Ericaceae: <i>Vaccinium angustifolium</i>)
1998- 2002	S.K. Javorek K.E. MacKenzie	Development of an Environmental Management Strategy for the Conservation and Enhancement of Indigenous Bees within Lowbush Blueberry Agro-Ecosystems
1996- 2002	S.K. Javorek K.E. MacKenzie	Developing Indigenous <i>Osmia</i> Species for Crop Pollination.

2.4 Research, teaching and extension personnel (C. Scott-Dupree)

The following tables summarize the number of personnel that are available to teach or conduct apicultural research and/or communicate research results to the Canadian beekeeping industry.

Personnel - Provincial Government

PROVINCE	PROVINCIAL APIARIST (PPY / #)	APIARY SPECIALIST (PPY / #)	INSPECTORS (TPY / #)	NO. POSITIONS AVAILABLE NOW	NO. POSITIONS AVAILABLE 2001-2005	TOTAL PPY - TPY PRESENT/PAST
BC	1.0 / 1	1.0 / 1	2.0 / 8	0	0	4.0 / 5.5
ALBERTA	1.0 / 1	1.0 / 1	0.75 / 4	0	1	2.75 / 2.0
SASK ...	1.0 / 1	0	0.5 / 2	0	0	1.5 / 1.5
MANITOBA	1.0 / 1	1.0 / 1	1.4 / 9	0	0	2.4 / 3.7
ONTARIO	1.0 / 1	0	2.9 / 24	0	0	3.9 / 4.75
QUEBEC						/ 1.2
NOVA SCOTIA						/ 1.5
NB	0.5 / 1	0	1.5 / 5	0	0	2.0 / 1.5
PEI	0.3 / 1	0	0.1 / 1	0	0	0.4 / .15
NFLD	0	0.1 / 1*	0	0	0	0.1 / 0
Total # in 1996	9	6	69	-	-	-
Total (PPY / #)	5.8/7.0	3.1/4.0	35.25/53.0	0	1	17.05/21.8

*Extension Specialist - Bee and Pollination Extension

Personnel - Universities

UNIVERSITY	ACADEMIC POS'N (PPY / #)	TECHNICAL POS'N (TPY / #)	NO. GRAD STUDENTS (2001 - 2005)	NO. POS'N AVAILABLE NOW	NO. POS'N AVAILABLE (2001-2005)	TOTAL PPY - TPYs PRESENT/PAST
S.F.U.	1.0 / 1	1.0 / 1*	10	0	0	2.0 / 2.0
U. OF SASK.	1.25 / 2	0	5	0	0	1.25 / 1.50
U. OF MAN.	1.0 / 1	0.25 / 1	5	0	0	1.25 / 1.33
U. OF GUELPH	.75 / 2	1.2 / 2	7	0	0	1.95 / 5.0
Total # in 1996	7	5	-	-	-	-
Total (PPY / #)	37351	2.45/4	27	0	0	6.45/9.83

2.4 Research, teaching and extension personnel (C. Scott-Dupree)(continued)

Personnel - Provincial Associations

ASSOCIATION	TECH SPECIALIST (TPY / #)	SUMMER ASSISTANTS (TPY / #)	NO. POSITIONS AVAILABLE NOW	NO. POSITIONS 2001 - 2005	TOTAL (TPY's)
Ontario Beekeepers' Assoc.	1.0 / 1.0	0.67 / 5.0	0		1.67
Total # in 1996	0	0			
Total (PPY / #)	37256				

Federal Institutions

AGRICULTURE & AGRI-FOOD CANADA	SCIENTISTS (PPY / #)	TECHNICAL POS'N (TPY / #)	NO. POSITIONS AVAILABLE NOW	NO. POSITIONS 2001 - 2005	TOTAL PRESENT/PAST
Beaverlodge	1.0 / 1	1.0 / 1	1*	1	2.0 / 2.0
Lethbridge**	0.2 / 1	0.5 / 1	0	0	0.7 / 0
Kentville	1.4 / 2***	0.4 / 1	0	0	1.8 / 1.2
Total # in 1996	6	4	-	-	-
Total (PPY / #)	2.6/4.0	1.9/3.0	1	1	4.5/4.2

*Contractual position - 18-24 month term

**Pollination projects only - not involving honey bees

***Contractual position (0.8 scientist) - 24 month term

Scientist . tech. No. Avail No. 2001-2005 Tot

2.7 1.0 0 0

(3.6)

3.6 Funding For Research (R. Currie)

The following table summarizes funding for apiculture-related research across Canada. The trends in research funding are outlined in figure 1. The rise in research funding that is apparent on the graph is due in part to a greater number of researchers reporting. The funding for 2001 to 2002 is estimated. The funding listed includes that which is reported for all apicultural research across Canada and is not all devoted to research directly related to the honey bees. In some instances the figures include funding for non-apis pollination research.

Research Grants: Canada

Year	Currie† Manitoba	Winston† SFU	Davis† Sask.	Clay† N.B.	Scott- Dupree † Guelph	Otis* Guelph	Kevan† Guelph	Nasr** OBA Tech- Transfer	Nelson† Ag-Can	Clark /Gates† BCMA F	Mackenzie† Kentville, N.S.	Other ***	Total Funding
<i>Actual</i>													
91-92	19,000	166,000	---	7,000	29,000	104,000		---	55,000	4,500	0	0	384,500
92-93	35,000	145,000	---	7,000	29,000	74,000		---	39,000	18,500	0	30,000	342,500
93-94	54,000	145,000	4,000	7,000	29,000	101,000		---	45,000	21,500	0	30,000	436,500
94-95	54,000	130,000	4,000	7,000	29,000	19,000		85,000	24,000	6,500	37,850	30,000	426,350
95-96	23,000	140,000	18,000	7,000	29,000	17,000	58,000	105,000	6,000	3,500	63,900	0	470,400
96-97	6,000	140,000	18,000	---	---	107,390	78,000	105,000		---	32,800		487,190
97-98	6,000	165,000	43,000	---	---	110,000	75,000	175,000	6,000	---	59,300		639,300
98-99	65,000	234,000	44,800	---	15,000	158,650	97,000	205,000	8,500	---	42,000		869,950
99-00	65,000	241,000	70,800	---	15,000	179,600	113,000	200,000	20,000	---	53,200		957,600
00-01	40,000	240,000	51,000	---	62,000	156,000	100,000	95,000	35,000	---	82,070		861,070
<i>Projected</i>													
01-02	41,000	200,000	50,000	---	20,000		55,000	105,000	90,000	---	85,000		616,000
02-03	41,000	200,000	26,000	---	20,000			85,000	75,000	---	75,000		522,000

† Does not include funding for researcher salary or baseline funding from University

* Including OMAFRA program funding support for Researcher Salary, technician and truck (~\$25,000 for direct funding of research).

** Includes program funding support for Researcher and inspection staff.

*** Other projects funded by Honey Council through FSAMII and CBRF

2.6 Needs of Industry (M. Malyon)

Canadian Honey Council -- Research Priorities 2001

Merv Malyon, President of Canadian Honey Council presented the following list of industry priorities. The list was compiled after consultation with research committees of Provincial Associations across Canada and delegates of Canadian Honey Council.

The disease issues listed under section "A" were considered to be those of highest importance although it is recognized that continued research on other pests and diseases is also required. A number of issues related to hive management; honey bee nutrition, pesticides and product development are listed under section "B" and were also considered to be important to industry. These topics were combined with those that were developed by the workshop participants and the final list was prioritized at the workshop.

A. Disease Control

1. AFB
 - OTC alternative
 - Hygienic behaviour

2. Varroa Mites
 - Fluvalinate replacement
 - Hygienic behaviour

3. Small Hive Beetle
 - Detection
 - Control

B. Other Issues

- Economics
- Pesticide damage
- Nectar yield of crops
- Irradiated Pollen (nutritional quality for bee food)
- Import Risk Assessment
- Specialty Honey - nutraceutical quality

3. RESEARCH PRIORITIES AND RECOMMENDATIONS (R. Currie)

The following process was followed to identify and rank the research priorities. First, workshop participants were divided into groups and asked to develop a list of priorities within a subset of topics and rank the topics. These lists were then presented to the group as whole and each participant was subsequently allowed to rank their top three priorities within each category. The topics that were developed and the rankings that were assigned within each category are listed below.

3.1 Apicultural Research Priorities

3.1.1 Diseases, parasites & pests:

Research relating to disease, parasite and pest management were discussed under the following areas:

- Parasites
- Adult bee diseases
- Brood diseases
- Africanized bee
- Viruses
- Other

3.1.1 Diseases, parasites & pests (continued):

Research priorities in this area for the next five years were identified and ranked by each participant. Each participant was allowed to pick three topics within this category that they thought were most important and assign a score of 1=highest to 3= lowest. Projects that were not picked received no ranking. The overall score represents the relative importance of each topic within the category.

Priority Rank 1=highest priority				Priorities
1	2	3	Score	
3	12	5	32 21%	Varroa Resistance management Breeding Cultural Controls Alternative Control Substances
14	3	2	50 34%	AFB Management and Control Cultural Controls Alternative Chemicals
5	5	3	28 19%	Reduction of Chemical Use/Less Toxic Chemicals
1	2	2	13 9%	Tracheal Mites
1	3	6	15 10%	Small Hive Beetles Detection Biology Control Management
0	3	3	9 6%	Other diseases Viruses, Nosema, EFB, Chalkbrood, Africanized Bees

3.1.2 Stock selection and breeding:

Research relating to stock selection and breeding was discussed under the following areas:

- Disease/pest resistance
- Wintering ability
- Honey production
- Pollinating behaviour
- Queen rearing
- Docility
- Longevity

3.1.2 Stock selection and breeding (continued):

Research support is required to evaluate and further select honey bee stocks for the following characteristics. Participants ranked the overall need for this field of research.

Priority Rank 1=highest priority				Priorities
1	2	3	Score	
15	1	1		Varroa tolerance Hygienic behaviour Honey production Wintering ability

It is recommended that Canadian Bee Research scientists pursue this work in close collaboration with international research colleagues and particularly those in the United States of America.

3.1.3 Colony management:

Research relating to colony management* will be discussed under the following areas:

- Wintering
- Package-bee and queen production
- Honey production
- Pollen and other hive products

* see also colony management associated with parasite control

3.1.3 Colony management (continued):

Research priorities in this area for the next five years were identified and ranked as follows:

Priority Rank 1=highest priority				Priorities
1	2	3	Score	
9	7	2	47 35%	Comb replacement for: disease control residue control colony vigour
1	6	5	18 13%	Replacement Bee Production
5	1	2	19 14%	Feeding and Nutrition
6	4	5	31 23%	Requeening
1	2	4	11 8%	Wintering
0	2	5	9 7%	Alternative Hive Products production economics quality control and marketing

3.1.4 Problems associated with chemicals utilized in bee management:

Research priorities in this area for the next five years were identified and ranked as follows:

Priority Rank 1=highest priority				Priorities
1	2	3	Score	
17	2	3	58 39%	Integrated Pest Management for AFB
2	4	0	14 10%	Alternative treatments for Oxytet
1	11	5	30 22%	Alternative methods to chemicals
1	4	0	11 8%	Residues in honey for new chemicals
3	3	11	26 19%	Resistance management strategies

3.2 Pollination Research Priorities

3.2.1 Pesticide-pollinator interactions:

Research priorities in this area for the next five years were identified and ranked as follows:

Priority Rank 1=highest priority				Priorities
1	2	3	Score	
6	12	0	42 36%	Protection from conventional Aerial Applications
0	1	4	6 6%	Protection from Major ULV Spray Programs for Human Health(eg. West Nile Virus)
0	4	11	19 16%	Impacts of pesticides on brood
12	5	0	46 40%	Sublethal effects of new classes of pesticides E.g. Cloronicotinals
0	0	5	5 4%	Effects of herbicide and fungicide applications on bees

3.2.2 Pollination, plant-related studies and Non-Apis Pollinators:

Research relating to pollination and plant related studies will be discussed under the following areas:

- Crop requirements for pollination, nectar secretion, floral morphology etc.
- Efficiency of honey bee pollination

Research priorities in this area for the next five years were identified and ranked as follows:

Priority Rank 1=highest priority				Priorities
1	2	3	Score	
3	2	6	19 13%	Disease and Parasite Biology and Management in Non Apis Spp
2	2	3	13 9%	Landscape Ecology/Habitat Diversity Effects on Native Spp
0	0	3	3 2%	Bees as Biomonitors
6	2	3	45 31%	Plant Nutrition Positive and negative effects of plants on bees Impacts on nectar and pollen production and quality Negative impacts of GMO pollen on bees Carrying capacity of crops for bee species
2	8	3	25 17%	Biology and Management of Alternative Pollinators
4	6	0	24 17%	Pollen Flow (dispersal) related to foraging dynamics in GMO and Hybrid seed production
3	2	3	16 11%	Comparative Effectiveness of Bees on Various Crops

3.3 Emerging Issues and Recommendations:

3.3.1 Research:

There are a large number of challenges facing the industry that must be addressed through further research. The top priorities in the area of disease management were focussed around the emerging threats associated with the recent development of an antibiotic resistant strain of American foul brood, and a parasitic mite, *Varroa destructor*. Methods are also needed to reduce the use of the chemicals that are required to control these and other serious honey bee pests and diseases. These will include the development of integrated pest management strategies, alternative chemicals and an understanding of how to delay the development of pesticide and antibiotic resistance in honey bee pests and diseases.

Reducing the impact of pesticides on honey bees was also identified as an important issue, since problems associated with pesticides used to control crop pests and vectors of human disease (such as West Nile Virus) will continue to cause damage to honey producers in the future. New classes of pesticides were also identified as a concern. For example, a new class of chloronicotinal insecticides (eg. imidiclopid) are being introduced to the market and an examination of the possible sublethal effects of these compounds on bees is required. In addition, methods to reduce the impact of aerial applications of chemicals on honey bees and other pollinators are a priority.

Improvements in colony management to assess the value of comb replacement, improve methods of requeening, and improve honey bee nutrition were also identified as high priority problems. There is also a need for increased understanding of the basis of the positive and negative interactions between plants and bees. This is particularly important since large numbers of new crop cultivars are being developed and released each year. Some of these crops are genetically modified to include insecticidal activity that may be harmful to bees. And the impact of these developments on the beekeeping industry needs to be closely monitored. Since bees are important components in the production of many of these genetically improved crops there is also a need to develop methods to improve the efficiency honey bee pollination in these new cropping systems. A better understanding of pollinator plant interactions would help the industry in developing solutions to these problems.

There is a continuing need for research in stock selection and improvement in order to develop tolerance to parasites, increase worker hygienic behaviour, control disease, increase wintering ability and increase honey production. For this area of research it is recommended that Canadian bee research scientists pursue this work in close collaboration with international research colleagues and particularly with those in the United States of America.

2.3.2 Research and Extension Infrastructure:

There has been a general decline in the number of personnel available for both research and extension across the country. The number of research scientists has declined by 38% percent since 1996, the number of professional extension personnel has declined by 15% and the number of apiary inspectors has declined by 23%.

2.3.2.1 Recommendations for Research Infrastructure

Given the large number of urgent research priorities facing the industry it is clear that there is a need to not only maintain support for existing positions within Canada but to expand the number of federal research scientist positions devoted to the study of apicultural issues.

It is therefore recommended that the Presidents of the Canadian Society of Professional Apiculturists and the Canadian Honey Council meet with the federal Minister of Agriculture to discuss the need for an increase in the number of research scientist positions in Agriculture and Agrifood Canada.

It is predicted that there will be a large turnover in staff at Universities in the next 5 to 10 years. Canadian Honey Council should make Universities aware of the advantages of having biology and entomology positions refilled with Faculty members that would have the skills and training necessary to address problems relevant to the beekeeping industry. There are many challenging problems facing the industry that could provide projects that can be used to train undergraduate and graduate students. Universities would benefit from the financial and in-kind support that would be provided to faculty members by local beekeeping associations and beekeepers would benefit from the resulting research.

Funding levels for existing researchers have also been on the decline. The industry has taken steps to counter act this decline by creating the Canadian Bee Research Fund. Continued growth of this fund is essential if it is going to provide a core source of industry money that can be used by researchers to fund individual projects. The fund has been able to award \$20,000 to \$30,000 per year in support over the last few years but the amount in the endowment or support by beekeepers must continue to grow if we are going to address the needs of the industry. It is therefore recommended that all CAPA members should promote the value of the research supported by the Canadian Bee Research Fund when giving talks on their own research.

2.3.2.1 Recommendations for Extension Infrastructure

There has also been a critical decline in the infrastructure necessary for extension and regulatory activities. There was a consensus that these reductions in infrastructure in the Apiculture industry have reached the point where they threaten the ability of industry to respond to emerging disease challenges. Some provinces do not have any personnel assigned to carry out extension and regulatory activities and in other provinces the disease inspection staff have been eliminated. There are a number of new diseases threatening the industry and there are new forms of old diseases, such as antibiotic resistant American Foul Brood disease, that will require both new research strategies and increased attention to cultural controls. The staff reductions in the area of

extension that have occurred in over the past decade will make it difficult to facilitate technology transfer of new controls developed through research. In addition, the increased regulatory efforts that will be required to prevent the dissemination of these new diseases throughout the industry will not be possible with the resources currently available.

It is recommended that the research chair of the Canadian Association of Professional Apiculturists circulate copies of this report to the Presidents of Provincial Beekeeping Associations, Provincial Apiarists and Provincial Governments and ask them to provide adequate support to provide the necessary personnel to prevent and manage outbreaks of antibiotic resistant American Foul Brood disease.

4.0 APPENDIX 1 -- List of participants

Name	Affiliation
Merv Malyon	President, Canadian Honey Council
Heather Clay	Secretary, Canadian Honey Council
Doug Coulter	Alberta Agriculture, Food and Rural Development
Dave MacMillan	Canadian Honey Council
Gard Otis	Dept. of Environmental Biology, University of Guelph
John Gates	BC Ministry of Agriculture Food and Rural Development
Mark Winston	Simon Fraser University
Kenn Tuckey	Alberta Agriculture, Food and Rural Development
Don Dixon	Manitoba Agriculture and Food
Don Nelson	Agriculture and Agri-Food Canada, Beaverlodge
Jeff Pettis	USDA-ARS Beltsville, MD
Medhat Nasar	Ontario Beekeepers Association
Cynthia Scott-Dupree	Dept. of Environmental Biology, University of Guelph
Steven Javorek	Agriculture and Agri-Food Canada,
Joanne Moran	Nova Scotia Dept. of Agriculture and Fisheries
Adony Melathopoulos	Agriculture and Agri-Food Canada, Beaverlodge
Peter Kevan	Dept. of Environmental Biology, University of Guelph
Rob Currie	Dept. of Entomology, University of Manitoba
Kenna MacKenzie	Agriculture and Agri-Food Canada, Nova Scotia
John Gruszka	Saskatchewan Agriculture and Food
	NB Dept. Of Agriculture, Fisheries and Aquiculture
Doug McRorey	Ontario Ministry of Agriculture and Food
Tony Jadczyk	Maine Dept. Of Agriculture
Phil Velthuis	President, Manitoba Beekeepers Association