Canadian Association of Professional Apiculturalists

Proceedings of the 6th National Research-Planning Workshop: Honey Bee and Pollination Research

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Editor: R.W. Currie

Contents

1. INTRODUCTION

A National Research Planning Workshop was held by the Canadian Association of Professional Apiculturalists and the Canadian Honey Council to establish research priorities for the next five years, assess the availability of research resources and discuss potential funding sources for apicultural research.

Many individuals contributed information to the reports presented at this meeting. I would like to thank in particular, the workshop participants, and those individuals who compiled and synthesized the information contained in the reports that are summarized in this document.

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 two. This is followed by the final section which contains summaries of the reports that were presented at the meeting on: the status of the industry, the number of personnel available for teaching, research and extension, the priorities resulting from past workshops, a summary of recent apicultural research in Canada, the current research needs expressed by industry, and the problems and solutions associated with funding apicultural research in Canada.

It is clear that the honey-industry faces many challenges in the coming years. The priorities and recommendations proposed by the participants of this workshop should help to establish guidelines for funding research that will address the Canadian honey industry's needs.

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

2. RESEARCH PRIORITIES AND RECOMMENDATIONS (R. Currie)

The following research priorities and recommendations were proposed by the participants of the Research Planning Workshop:

2.1 Apicultural Research Priorities

2.1.1 Diseases, parasites & pests:

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

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

Research priorities in this area for the next five years were identified and ranked (high, medium or low) as follows:

Rank	Priorities
High	- Economic impact of diseases, parasites and their interactions and efficient methods to control pest-disease complexes. *e.g.* *Nosema* and tracheal mites, *Nosema* and viruses, interactions between tracheal and varroa mites *e.g.* Broad spectrum controls for honey bee diseases and parasites
High	- Methods to improve control of the varroa mite using "current tools" *e.g.* Timing, dosage rates, length of exposure, reuse of Apistan strips
High	- Economical controls for the varroa mite *i.e.* Alternatives to currently registered products
High	- Acaracide treatments suited to Canadian management conditions *e.g.* Methods of applying acaracides while wintering bees

2.1.1 Diseases, parasites & pests (continued):

Rank	Priorities
High	- Acaracide management techniques related to delaying development of pesticide-resistance in the varroa mite *e.g.* Proper dosage and length of exposure, implications of leaving apistan strips inside colonies, development of management strategies that involve different classes of pesticides
High	- Factors that influence population buildup and local distribution of tracheal mites *i.e.* Geographical and/or management effects, impacts of mite levels on honey production, wintering etc.
Low	- Better detection methods for the tracheal mite *i.e.* Lower detection limits for ELISA, refinement of ELISA to enhance ease of use
Low	- Cultural control techniques and integrated pest management controls for bee mites
High	- Pheromone based control methods for parasites and pests *e.g.* Brood pheromone for control or monitoring of varroa populations
Low	- mating disruption for greater wax moth* * project nearing completion

2.1.2 Stock selection and breeding*:

* It was noted that breeding programs require stable long-term funding that is not likely to be available for the next five years. In addition to demonstrating efficacy of resistant stock, methods to distribute and maintain stock would have to be implemented.

2.1.2 Stock selection and breeding (continued):

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

Research priorities in this area for the next five years were identified and ranked (high, medium or low) as follows:

Rank	Priorities
Low	- Mating-control for honey bees to promote and enhance tracheal mite resistant stock
Medium	- Honey bee stock selection for resistance to the varroa and tracheal mites

2.1.3 Colony management:

Research relating to colony management* was 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

Research priorities in this area for the next five years were identified and ranked (high, medium or low) as follows:

Rank	Priorities
Low	- Swarm control using pheromones* * research now in progress

2.1.4 Problems associated with chemicals utilized in bee management:

Research priorities in this area for the next five years were identified and ranked (high, medium or low) as follows:

Rank	Priorities
High	- Negative impacts of acaracide use (short and long term) on colony performance
High	- Residue concerns (honey and wax)

2.2 Pollination Research Priorities

2.2.1 Pesticide-pollinator interactions:

Research priorities in this area for the next five years were identified and ranked (high, medium or low) as follows:

Rank	Priorities
High	- Impact of herbicide and pesticide use on colonies* and potential for residues in honey and wax
High	- Research into alternative insecticides of low bee-hazard or low bee toxicity

* see also "Pollinator conservation"

2.2.2) Pollination and plant-related studies:

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

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

2.2.2 Pollination and plant-related studies(continued):

Research priorities in this area for the next five years were identified and ranked (high, medium

or low) as follows:

Rank	Priorities
High	- Improve effectiveness of honey bees as pollinators
High	- Determine the economic contribution (and thresholds) for pollinators on specific crops *e.g.* fruit crops, field crops, ginseng, hybrid canola
High	- Develop methods of enhancing bee activity (e.g. pheromones)
High	- Biological and economic comparisons between honey bees and alternative pollinators

2.2.3 Native Pollinators*:

Research priorities in this area for the next five years were identified but not ranked.

Priorities

- Investigation of the biology of native pollinators
- Pollinator conservation
- Nesting habitat
- Pesticide usage

* Research priorities related to the study of native pollinators are not likely to be a priority for funding by the honey bee industry.

2.3 Emerging Issues and Recommendations:

2.3.1 Research:

The research priorities listed above that were ranked as "high" were assessed and the following were identified as the most urgent issues to address within each of the two major categories (General Apicultural Research and Pollination Research). The following areas were identified within the general apicultural research category: developing more efficient and effective methods of controlling the varroa mite using "current tools"; development and testing of "other" economical control measures for the varroa mite; determining factors that influence the population build up of the tracheal mite; and the study of disease-parasite interactions and the most efficient methods to control pest-disease complexes.

Pollination research was identified as a separate area of concern and within this category, the priorities were as follows: impacts of agricultural pesticide use on honey bee colonies, honey and hive products; developing methods to enhance the efficiency of bee management for crop pollination, quantifying the economic contribution of honey bees to crop pollination and developing economic thresholds for specific crops.

2.3.2 Research Support:

i) Support for apicultural research in Canada is drastically declining as a result of cutbacks in personnel and reductions in federal grants to support apicultural research. Therefore it is recommended that the Presidents of the Canadian Association of Professional Apiculturalists and Canadian Honey Council meet with the federal Minister of Agriculture to discuss support for funding apicultural research.

ii) It is recommended that the Canadian Association of Professional Apiculturalists and Canadian Honey Council work towards the establishment of a Research Endowment Fund and/or Federal Checkoff system that can be used to support research projects that are of importance to the beekeeping industry.

2.3.3 Support for Specific Research Programs:

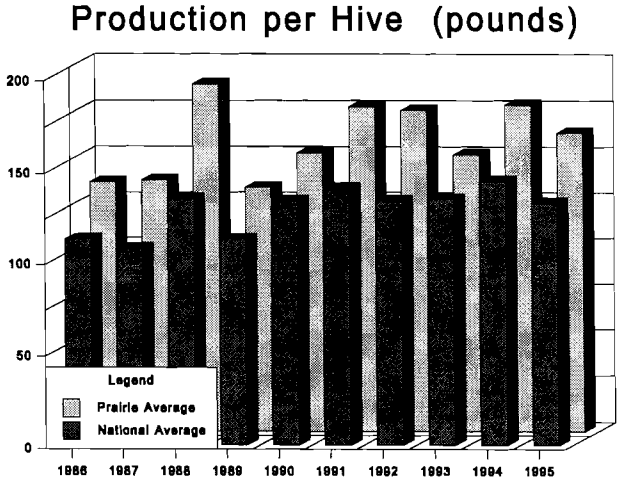
The staffing component of the Canadian research community has been severely eroded to the point where further reductions are a matter of grave concern. It is recommended that the Presidents of the Canadian Association of Professional Apiculturalists and Canadian Honey Council approach the University of Guelph to ensure that the Apiculture faculty positions and program funding for apiculture are retained.

3. REPORTS

3.1 Status of the Industry 1986 to Present (G. HERGERT)

A Review of the Canadian Honey Market - 1986 to 1996

Introduction



The honey industry has seen one of the most tumultuous decades in Canadian history: Happenings included:

- the outbreak of tracheal mites in 1986,

- the closing of the border to imports of honeybees from the United States in 1987 to control the spread of Varroa parasitic mites,

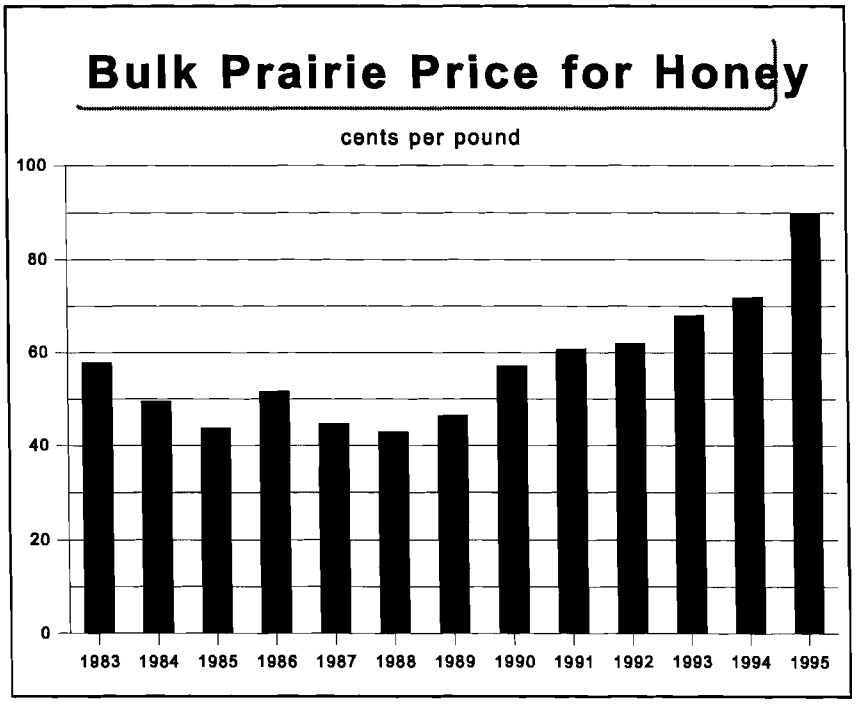
- the policy change in 1986 by the United States Commodity Commercial Corporation which ended a situation where it was more advantageous for American packers to buy imported honey than to purchase honey from the United States government that had been forfeited under a loan guarantee program,

- and the United States quota on imports from China put in place in 1995, leaving American packers about 17 million pounds short of their import requirements.

The last two occurrences have caused dramatic swings in honey prices. Prices in 1986 were in the 56 cents per pound range, dropping to 43 cents per pound (some sales as low as 34 cents) by 1988 and returning to profitable prices by 1990. The United States quota on Chinese honey in 1995, coupled with a decline in world honey production suddenly pushed domestic prices above 90 cents per pound.

The Honey Bee Population

The Canadian honeybee population declined substantially in the late 1980's, due in part to the import ban on honeybees, and largely due to the decrease in honey prices. The number of hives dropped from 700,000 in 1986, reaching 500,000 in 1990 and has remained steady since. The stagnant situation is a result of a number of constraints:



- the unavailability of the hive structures because many were sold and/or destroyed during the price downturn,

- the high price of domestic and imported beestock. The Canadian Honey Council continues to voice concerns over importing honeybees from the United States and the import ban remains in place.

- over-wintering problems with losses attributed to parasitic mites and to weather.

Honey Yields

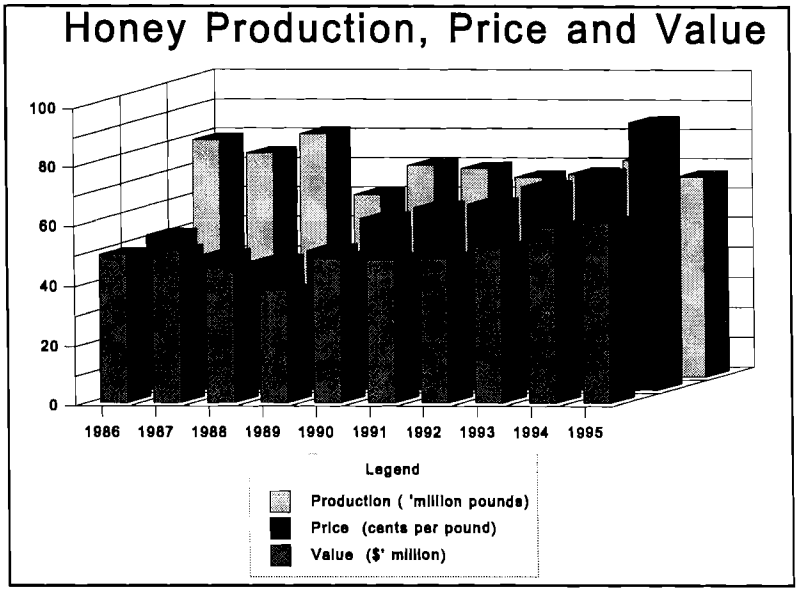
The bright spot on the honey production scene is the year to year improvement in yields per hive. Based on Prairie production, honey yield per hive has increased from a 2 year moving average of 132 pounds/hive in 1986 - 87, to 170 pounds/hive in 1994 - 95. This improvement is substantial in that increased production per hive indicated improved profitability for a fixed investment. The improvement is also an indication of the success of research, technology transfer and management skills available in the industry.

The World Honey Situation

A world-wide decline in honey production should help to maintain prices at or near to existing prices. The decline is caused mostly by cultural change in China and Mexico where alternate occupations are paying better than small scale beekeeping. In other countries, the effects of parasitic mites, africanized genetics and other diseases are restricting activities of small production or hobby beekeepers. Future growth will probably be dependent on the growth of commercial beekeeping operations in the United States, Canada, Mexico, Argentina and Australia. There does not appear to be any other countries emerging as net exporters of honey.

Industry Profitability

The Canadian honey industry has suffered through a period of exceedingly low prices in the late 1980's. Honeybee stocks declined with the falling honey prices. Since 1990, a trend to higher prices has increased the total value of honey produced from $37 million in 1989 to over $60 million in 1995. This increase has been accomplished through a near steady honeybee population, a reduced number of beekeepers and only a slight increase in production.



The future for the Canadian honey industry is bright. There is always a concern that trade actions may disrupt present markets. For example, a relaxation on the recently announced quota on honey entering the United States from China could depress prices somewhat. The bigger picture, and the challenge to the world beekeeping industry, is that if the present honey shortage persists, and prices continue to rise, consumer resistance could become a factor in future price increases.

Conclusion

There is no doubt that research has helped Canada achieve a reputation for having the best quality honey while obtaining the highest yields in the world. Research will, of course, continue to be an important function of maintaining the viability of the Canadian industry. For example, research on over-wintering prepared the industry to address a decision on prohibiting imports in an effort to control the spread of Varroa mite infestations. Many of the beekeepers had already switched to over-wintering to capitalize on increased profitability from the practice. Industry financed research on natural occurring phenol concentrations have provided an understanding of phenol residues that were being challenged as a trade barrier.

There will continue to be new issues that must be addresses by the honey industry. For example, Canada is moving toward being both an importer and exporter of honey. Canadian honey is respected world-wide as one of the best honies in the world. We, as a country, are now both an exporter of honey (25 million pounds estimated for last year!) and an importer (6 million pounds estimated for last year). But we should be exporting larger amounts of value added packaged honey. Can research into packaging, floral source identification and other ways of improving the status of Canadian honey help to sell a value added product world-wide?

The requirements of pollination for fruit, vegetable and field crop producers should also continue to be addressed. Higher prices for honey could cause reluctance for renting hives for pollination. Improving the efficiency of honeybee pollination and improving honey yield while on pollination sites are possible objectives.

Trade actions on sugar will increase the cost of sugar in Canada. Beekeepers have traditionally purchased imported sugar for winter feeding. Research into alternate products may be required.

There is also the challenge of funding. In the past, it has been the government, and government programs that have funded research. There is no doubt on the need for continuing research, but it will be increasingly the responsibility of the honey industry to raise its own funds in order to fund and to help fund much of the research in the future.

Gary Hergert
Market and Industry Services Branch
Agriculture and Agri-Food Canada
Prepared for presentation to the Canadian Association of Professional Apiculturists Research Workshop, January 17, 1996

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

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

Personnel -- Provincial Government

PROVINCE	PROVINCIAL APIARIST (PPY/#)	APIARY SPECIALIST (PPY/#)	INSPECTORS (TPY/#)	NO. POSITIONS AVAILABLE NOW	NO. POSITIONS AVAILABLE 1996-2001)	TOTAL PPY-TPY's
B.C.	1.0/1	2.0/2	2.5/10	0	0	5.5
Alberta	1.0/1	1.0/1	0	0	1	2
Saskatchewan	1.0/1		0.5/2	0	0	1.5
Manitoba	1.0/1	1.0/1	1.7/12	0	0	3.7
Ontario	1.0/1	0.75/1	3.0/22	0	0	4.75
Quebec	0.4/1	0	0.8/8	0	0	1.2
Nova Scotia	0.5-0.7/1	0.5/1	0.5/2	0	0	1.5-1.7
New Brunswick	0.5/1	0	1.0/14	0	0	1.5
P.E.I.	0.05/1	0	0.10/1	0	0	0.15

Personnel Universities

University	Academic Position (PPY/#)	Technical Position (TPY/#)	No. Grad Students (1996-2001)	No. Positions Available Now	No. Positions Available (1996-2001)	Total PPY-TPY's
S.F.U.	1.0/1	1.0*	10	0	0	2.0
U of Sask.	1.5/2	0	5	0	0	1.5
U of Man.	1.0/1	0.33/1	4	0	1(Tech)	1.33
U of Guelph	2.5/3	3.0/3**	7	0	0	5.0

* Contractual Position

** Reduced to 2 positions May 1, 1996

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

Federal Institutions

AAFC*	Scientists (PPY/#)	Technical Positions (TPY/#)	No. Positions Available Now	No. Positions Available (1996-2001)
Beaverlodge 1995-96 1996-97	 3.0/3 1.0/1	 2.0/2 1.0/1	 0 1***	 1(Tech) 0
Lethbridge 1995-96 1996-97	 2.0/2** 0/0	 ? ?	 0 0	 0 0
Kentville	0.5/1	0.4/1	0	0

* Agriculture and Agri-Food Canada
** Research in Leafcutter bees and Pollination
*** Technical position may be available in May, 96

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 DISEASES

Compiled by:
N.J. Gates and D.L. Nelson

3.4 Review of research progress 1989-present (R. Currie)

Canadian bee-research projects that were conducted between 1990 and 1996 are listed below. Projects included were those submitted in response to a request for information to all Canadian bee researchers. Research projects are grouped by province and institution.

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

Date(s)	Investigator(s)	Project
1990-96	T. Pankiw M. Winston E. Plettner K. Slessor J. Pettis H. Higo	Genetic aspects of worker responses to honey bee queen mandibular pheromone
1990-96	E. Plettner M. Winston K. Slessor G. Sutherland G. Robinson R. Page	Biosynthesis and caste-specific activity of honey bee queen mandibular pheromone
1990-94	L. Kaminski K. Slessor G. King M. Winston N. Hay J. Borden T. Pankiw	Semiochemicals of queen mandibular glands
1990-96	A. Melathopolous M. Winston S. Colley J. Pettis T. Pankiw K. Slessor A. Collins H. Higo	Inhibition of queen rearing and swarming by honey bee queen pheromone
1990-94	K. Naumann M. Winston K. Slessor G. Prestwich B. Latli F. Webster	Movement of queen pheromone within colonies and between workers

Date(s)	Investigator(s)	Project
1990-95	H. Higo M. Winston K. Slessor K. Naumann M. Smirle	Queen pheromone effects on foraging, brood rearing, and pollination

	R. Currie D. Mayer S. Colley T. Pankiw J. Pettis A. Janmaat	
1990-96	M. Winston K. Slessor J. Schmidt J. Pettis M. Malyon K. Naumann M. Wyborn J. Villa W. Rubink	Applications of queen pheromone for honey bee management
1990-92	L. Willis M. Winston K. Slessor	Queen pheromone and worker ovary development
1990-96	J. Fewell C. Eckert M. Winston P. Schmid-Hempel R. Ydenberg K. Naumann	Colony state and worker behaviour
1990-94	M. Winston	Biology and management of Africanized honey bees
1990-96	L. Willis M. Winston B. Honda E. Plettner G. Otis K. Slessor	Honey bee phylogeny
1990-94	M. Wyborn M. Winston P. Laflamme	Overwintering honey bee queens
1995-96	J. Pettis H. Higo T. Pankiw M. Winston	Brood effects on queen rearing**Date(s)**

Date(s)	**Investigator(s)**	**Project**
1995-96	A. Melathopolous L. Birnie M. Winston	Effects of pesticides on bees and bee pests
1995-96	A. Janmaat	Influence of Varroa on bee behaviour

	M. Winston	
1996	S. Kuhnholz M. Winston T. Seeley	Regulation of water collection in honey bee colonies
1994-96	J. Pettis H. Higo G. Robinson M. Winston Z. Huang	Neuromodulators and queen rearing
1993-96	H. Lin M. Winston R. Currie N. Haunerland	Factors affecting worker ovary development
1994-96	J. Pettis	Grooming behavior in honey bees
1994-97	M. Dogterom M. Winston	Development of effective pollinators for commercial crops

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

Date(s)	Investigator(s)	Project
1989-92	N.J. Gates	Monitoring TM Spread from Infested to Noninfested Apiaries.
1990	K. Clark N.J. Gates E. Huxter T. Szabo	Selection of breeder stock for resistance to tracheal mites.
1990	K. Clark J. Macdonald	Field trials of Menthol as a control for tracheal mites.
1990	K. Clark	Field comparison of vegetable oil patties and menthol as controls for tracheal mites.
1991	K. Clark	Winter survival times of colonies infested at various levels by tracheal mites.
1991-93	K. Clark N.J. Gates	Field trials of tracheal mite control using formic acid, vegetable oil, or menthol (DATE #316 & #340)
1991-93	N.J. Gates J. Macdonald	Comparative Studies on Honeybee Nucleus Colony production and performance (DATE #329).
1991-96	K. Clark E. Huxter	Selection and development of tracheal mite resistant bee stock with good commercial qualities.
1992	K. Clark	Human exposure to formic acid from treatments applied against tracheal mites.
Date(s)	**Investigator(s)**	**Project**

1993-94	A. Gunner N.J. Gates	Beekeeping Enterprise Budgets;-Honey Production in Selected Regions -Nucleus Colony Production, Southern Interior BC -Queen Rearing
1993-96	K. Clark	Fields trials for management of varroa mites, comparing Apistan, dust, and various formic acid formulations, including prolonged-release packets (DATE #356 & #408).
1993-96	K.Clark N.J. Gates P. van Westendorp	Regulatory and strategic options for the management of varroa mites
1993	P. van Westendorp	Demonstration of early detection and monitoring of Varroa jacobsoni in selected beekeeping areas and along the CAN/US border (DATE #352)
1994	P. van Westendorp	Kashmir Bee Virus in Honeybee Colonies in BC (DATE #386)
1994		

Agriculture and Agri-Food Canada, Beaverlodge, AB: (Don Nelson)

Year(s)	Investigators	Project Title
1990	D.L. Nelson G.A. Grant D. McKenna	Comparison of colony with cage trails for evaluating queen lines for susceptibility to honey bee tracheal mites.
1990- 1992	D.L. Nelson D. McKenna	Infestation levels of nuclei from colonies infested with tracheal mites.
1991	J. Befus-Nogel D.L. Nelson L.P. Lefkovitch	Observation on the effect of management procedures on chalkbrood levels in honey bee colonies.
1991- 1993	D. L. Nelson G.A. Grant	Development of an ELISA detection method specific to honey bee tracheal mites.
1992	D.L. Nelson P. Sporns P. Kristiansen P. Mills M. Li	Effectiveness and residue levels of three methods of menthol application to honey bee colonies for the control of tracheal mites.
1992	M. Li D.L. Nelson P. Sporns	Determination of menthol in honey by gas chromatography.
1992	D.L. Nelson C. Waldal G.A. Grant	Special Report: fluvalinate determination trial for honey collected after colony treatment.

Date(s)	**Investigator(s)**	**Project**
1992	D.L. Nelson	Population and brood dynamics of indoor wintered colonies.

	G.A. Grant E. Zumwalt	
1992- 1994	G.A. Grant J. Befus-Nogel D.L. Nelson J.D. Bissett	Identification of microorganisms associated with the tracheal mite-infested honey bees.
1993	D.L. Nelson P. Mills P. Sporns S. Ooraikul D. Mole	Formic acid application methods for the control of honey bee tracheal mites.
1993	H.A. Higo D.L. Nelson M.L. Winston D. McKenna	Supplemental queen mandibular pheromone in honey bee colonies: Effects on foraging and brood rearing.
1993	D.L. Nelson J. Befus-Nogel	Evaluation of the Oxytetracycline extender patty for AFB control.
1993- 1995	G.A. Grant D.L. Nelson	Evaluation of a laboratory ELISA kit for tracheal mite detection.
1995	K. MacKenzie D.L. Nelson D. Rogers	To improve honey bee pollination of the lowbush blueberry in Nova Scotia.
1995	D.L. Nelson D. Rogers	Evaluation of antibiotic extender patties for European foulbrood control in colonies used for blueberry pollination.
1995- 1996	G.A. Grant D.L. Nelson	Development of a Tracheal Mite ELISA Diagnostic System (TMEDS) for tracheal mite detection.
1995- 1996	D.L. Nelson G.A. Grant	Seasonal determination of total nitrogen of wintered honey bees.
1992	S. Liu	Development of a colorimetric phenyloxidaze or uric acid test specific to tracheal mites

Fairview College, Fairview Alberta

1993	H. Gauvreau L. Sigler S. Abbott	Assessment of airborne molds as a biological hazard for commercial beekeepers

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

Date(s)	Investigator(s)	Project
1990-92	A.R. Davis B.E.S. Gunning	Microscopic and physiological studies of floral nectar secretion
1992-95	A.R. Davis J.D. Pylatuik J. Paradis N.H. Low	Floral nectaries of the Brassicaceae and composition of their nectar
1993	A.R. Davis D. Prabhuswamy	Uncapping of sealed brood cells of the honey bee, and implications for varroa mites
1992-95	A.R. Davis G.W. Haughn	Nectary presence and structure in floral mutants
1993-96	A.R. Davis D. Junor S. Mitchell	Bee pollination of borage (FSAM II Research Project)
1995-96	J. Pontoh N.H. Low A.R. Davis	Nectar and bee enzymes, and their influence on honey composition
1995-96	K. Klein N.H. Low A.R. Davis	Nectar composition of borage and other Western Canadian honey plants
1996	F. Razem A.R. Davis	Physiological aspects of floral nectar secretion

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

Date(s)	Investigator(s)	Project
1992-95	S. Pernal R. Currie	Nectar quality and quantity in hybrid canola cultivars
1988-90	R. Currie S.C. Jay D. Wright	Efficacy of honey bees and leafcutter bees in pollination of hybrid canola (seed production)
1992-94	R. Currie D. Wright R. Smith	Nectar secretion and pollination of non-dormant alfalfa
1992-94	R. Currie D. Wright R. Smith	Pollination efficiency of leafcutter bees in non-dormant alfalfa
1992-96	S. Pernal R. Currie	Importance of floral odour as an attractant to honey bees
1993	K. Naumann M. Isman R. Currie	Assessment of NEEM as a repellant to honey bees
1993	R. Currie P. McVetty M. Winston	Efficacy of synthetic queen mandibular pheromone in attracting honey bees to hybrid canola

Date(s)	Investigator(s)	Project

1992-96	D. Olafson R. Currie	Development of a biochemical method for sexing leafcutter bee larvae
1990-96	R. Currie	Regulation of reproduction in bees
1994-96	R. Currie	Regulation of queen replacement in honey bees
1993	R. Currie D. Dixon	Residues of fluvalinate in honey
1994	R. Currie	Impact of sublethal exposure to fluvalinate on honey bee queen performance
1995	P. Gatien R. Currie	Impact of formic acid application method on colony performance
1995	D. Dixon R. Currie D. Nelson	Assessment of the use of ELISA technology for routine detection of tracheal mites
1994	R. Currie D. Dixon C. Abrahams	Nutritional value of artificial pollen diets to honey bees
1994-95	S. Pernal R. Currie	Nutritional value of floral pollen sources to honey bees
1993-95	P. Gatien R. Currie	Impact of *Varroa* on honey production
1993-95	P. Gatien R. Currie	Impact of *Varroa* on outdoor wintering of honey bees
1993-95	P. Gatien R. Currie	Efficacy of acaracides for control of the *Varroa* mite in honey bee colonies
1993-95	P. Gatien R. Currie	Importance of method and timing of acaracide treatment on *Varroa* mite populations
1994-95	R. Currie	Efficacy of Apistan "queen tabs" in controlling the *Varroa* mite
1995-96	R. Currie	Impact of formic acid treatment in indoor wintering facilities on honey bee colony survival

University of Guelph, Guelph Ontario, OMAF: (C. Scott-Dupree, Gard Otis, M. Nasr and P. Kevan)

Date(s)	Investigator(s)	Project
1985-92	G.W. Otis C. Scott-Dupree	Effects of *Acarapis woodi* on overwintered colonies of honey bees in New York.
1988-91	Z.-Y. Huang G.W.Otis	Inspection and feeding of larvae by worker honey bees: Effect of starvation and food quality.
1988-91	Z.-Y. Huang G.W. Otis	Non-random visitation of brood cells by honey bees.
1988-92	B. Dawicke G.W. Otis C. Scott-Dupree M. Nasr	Host preference of the honey bee tracheal mite.
1989-92	C. Scott-Dupree	The efficacy of four miticides for the control of *Acarapis woodi* in a fall

	G.W. Otis	treatment program.
1989-90	S. Wongsiri G.W. Otis, et al.	Evidence that *A. andreniformis* is a valid species.
1990-95	M. Nasr G.W. Otis C.D. Scott-Dupree	Breeding honey bees resistant to tracheal mites.
1990-95	G. Otis C. Scott-Dupree M. Nasr	Comparison of tracheal mite infestations in British and Canadian honey bees.
1990-92	C. Scott-Dupree P. Kelly	A comparison of effective management systems for overwintering nucleus colonies and queens.
1990-91	C.P.Milne G.W. Otis	Tracheal mite resistance in Buckfast and California bee stocks.
1990-92	K.E. Romel C. Scott-Dupree	Qualitative and quantitative analyses of volatiles and pheromone gland extracts collected from *Galleria mellonella*, the greater wax moth
1991-94	J.H.Matis G.W.Otis T.E. Wehrly	Mathematical modelling of Africanized honey bee population growth.
1991-95	H. Lin G.W. Otis C.D. Scott-Dupree	Comparative resistance to tracheal mites of Buckfast and Canadian honey bees.
1991	D.L. Denby C. Scott-Dupree	The efficacy of queen and Nasanov pheromones in the capture of honey bee swarms in regulatory procedures
1991	P. Kelly	Utilizing the two queen management system as an effective requeening procedure.
1991-92	G.W. Otis J. Wearing-Wilde	Net reproductive rate of unmanaged honey bee colonies.
1992-93	C.E. Morin G.W. Otis	Morphology and biology of *Euvarroa wongsiri.*
1993-95	D. Van Englesdorp G.W. Otis	A field evaluation of nine genetic lines of honey bees for tracheal mite resistance and other economically important traits.
1993-95	C. Scott-Dupree B. Ball O. Welsh	The potential transmission of viruses by honey bee tracheal mites to honey bees.
1993-95	M.S.Damus G.W. Otis	Biogeography of cavity-nesting *Apis* in S.E. Asia inferred from DNA sequences and morphometric analyses.
Date(s)	**Investigator(s)**	**Project**
1993	G.W. Otis J. McCarthy	A comparison of worker longevity in Buckfast and Canadian bee stocks.
1993-96	S. Hadisoesilo G.W. Otis	Morphology, distribution, and reproductive isolation of *Apis cerana* and *A. nigrocincta* in Sulawesi, Indonesia
1994-96	C. Scott-Dupree O. Welsh	Honey bee virus profile in Canada; bee virus screening facility
1994-96	J. McCarthy C. Scott-Dupree	The impact of insect pollinators on the seed set and viability of American ginseng, *Panax quinquefolium.*

1994-96	H. Fraser C. Scott-Dupree	Behavioural analyses of volatile sex pheromone components released by the male greater wax moth and an evaluation of their use in trapping systems
1994	P.G. Kelly G.W. Otis	Design of an inexpensive incubator for bee brood or queen cells.
1994-95	D. van Engelsdorp G.W.Otis	Role of cuticular compounds in resistance of honey bees to tracheal mites.
1995	G.W. Otis K. Patton S.Tingek	Piping by queens of Asian hive bees.
1996	C. Scott-Dupree O. Welsh	The incidence of *Nosema apis* in mite-resistant Buckfast and Canadian bee stocks.
1996	C. Scott-Dupree O. Welsh	The incidence of Amoeba disease in Ontario bee stocks
1990-95	G.W.Otis	Distributions of recently recognized species of *Apis*.
1991-92	M. Nasr G. Otis D. McRory	Comparison of different method for surveying Varroa mites
1991-92	G. Otis M. Nasr	Dispersal of tracheal mites in honey bee colonies during winter
1992-93	M. Nasr G. Otis C. Scott-Dupree	Screening honey bees in Ontario for tracheal mite resistance
1994-96	M. Nasr D. McRory	Augmentation of tracheal mite resistant stocks in Ontario
1994-96	M. Nasr D. McRory	A field study to evaluate of tracheal mite resistant bee stocks in Ontario
1994-95	M. Nasr P. Kevan A. Skinner D. McRory	Queen mandibular pheromone effects on pollination and storage-ability of apples.
1989-94	P.Kevan M. Usui	Pollination in the boreal forest with particular reference to blueberries and their importance to wildlife.
1989-95	P. Kevan E. Tikhmenev	Pollination of grasses.

Date(s)	**Investigator(s)**	**Project**
1989-90	P. Kevan	Honeybees and the pollination of coconut in the Maldive Islands.
1989-91	P. Kevan S. Willis.	Biology of the hoary squash bee (Peponapis pruinosa) and its role in the pollination of squash and pumpkin.
1989-93	J. Mbaya P. Kevan	Biology and management of three races of African honeybees with special reference to management in Kenya.
1989-94	J. Kemp P. Kevan U. Posluszny	Pollination and reproductive biology of a rare and endangered plant, the Prairie Rose (Rosa setigera) of Carolinian Canada.

1989-94	P. Kevan D. Eisikowitch S. Chan J. Lupson	Pollination technology for hybrid seed production in Canola.
1989-92	P. Kevan H. Lee R. Shuel	Sugar ratios in the nectars of varieties of Canola with respect to honey granulation.
1989-92	P.Kevan W. Straver M. Offer T. Laverty	Pollination of greenhouse tomatoes by bumblebees.
1989-95	P. Gang P. Kevan J. Sutton G. Boland	Using honeybees to disseminate biocontrol agents against fungi pathogenic on small fruits and Canola.
1989-95	DiGiovanni P. Kevan A-M. Roussy	Pollen contamination and it mitigation in coniferous seedling seed orchards.
1989-92	P. Kevan	Fonofos and the hazard to honeybees working sweet corn for pollen.
1989-95	P. Kevan	Apiculture and biology of the Asiatic hive bee and its role in sustainable development in tropical and subtropical Asia.
1989-95	P. Kevan D. Eisikowitch A. LaChance S. McLernon	The role of nectar and nectar-inhabiting yeasts in the pollination and pollinator biology of common milkweed.
1993-95	P. Kevan R. Menzel M. Giurfa M. Vorobyev W. Backhaus	Colour vision and object perception by honeybees.
1992-95	P. Kevan A. Dafni G. Ni'iman	Form perception and floral recognition by honeybees.

Date(s)	**Investigator(s)**	**Project**
1993-95	P. Kevan M. Nasr A. Skinner E. Southwick	Impact of tracheal mite infestations in the thermoregulatory and flight stamina in honeybees.
1994-95	P. Kevan and others	Novel means towards mitigating the impact of tracheal mites to honeybee colonies.
1995	P. Kevan C. Greco	Apiary sizes and honey yields: theoretical models based on foraging ranges and carrying capacity of nectariferous plants.
1994-95	P. Kevan C. Greco	The relative importance of wild and honey bees in the pollination of blueberries on commercial fields in Nova Scotia.
1994-95	P. Kevan C. Greco	The use of the assemblages of wild bees for monitoring ecosystemic health.
1993-95	P. Kevan C. Greco	Foraging behaviour and pollinating efficiency of honeybees on dioecious wild and crop plants.

	P. Banks D. Holland	
1989-95	P. Kevan	Pollinator conservation.

M.A.P.A.Q. Deschambeault, Quebec (J. Marceau)

Year (s)	Investigator (s)	Project Title
1990	J. Marceau	Sélection des reines
1989-91	J. Marceau J.M. Perron R. Boily	Mise au point d'un système de mesure de performance des colonies d'abeilles
1989-92	J. Marceau	Optimisation de la récolte simultanée de miel et de pollen au Québec
1992	J. Marceau J. Dumont	Mise au point d'un appareil combiné servant à extraire la cire d'opercules et à mélanger le miel crémeux
1992-94	P. Giovenazzo J. Marceau J.M. Perron	Hivernage de reine en micro-colonies
1993-94	J. Marceau	Effet du taux de recirculation de l'air et de la disposition des ruches dans une chambre d'hivernage réfrigérée
1994-96	J. Marceau M. Winston	Effet des phéromones synthétiques de la glande mandibulaire de la reine sur l'introduction des reines
1994-95	J. Marceau	Développement d'un activimètre à deux registres pouvant distinguer les entrées et les sorties des abeilles d'une ruche
1992-96	J. Marceau J. Dumont J. Noreau	La mise en valeur des miels québécois par le conditionnement minimal

Year (s)	Investigator (s)	Project Title
1994-96	J. Marceau M.E. Colin J. Simard	Tolérance à divers traitements acaricides contre *varroa jacobsoni* appliqués sur des colonies non parasitées en chambre d'hivernage
1994-95	J. Marceau M.E. Colin J. Simard L. Deroth	Effets de différents traitements acaricides contre *varroa jacobsoni* sur la productivité des colonies d'abeilles
1994-1996	J. Marceau D. De Oliveira S. Mantha	Détermination du nombre de colonies d'abeilles pour la pollinisation dans les vergers de pommiers du Québec
1992 - 1995	J. Marceau D. De Oliveira	Effet du temps d'exposition des fleurs aux insectes pour la pollinisation du pommier McIntosh
1995-96	J. Marceau D. De Oliveira S. Mantha	Influence du taux de pollinisation sur la conservation des pommes Lobo et McIntosh en chambre réfrigérée sans contrôle d'atmosphère

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

Date(s)	Investigator(s)	Project
1990-92	K.E. MacKenzie A.L. Averill	Pollination of highbush blueberry and cranberry

1990-96	S.K. Javorek R.E. Rogers K.E. MacKenzie	Alfalfa leafcutter bees as a managed pollinator of lowbush blueberry
1994-95	K.E. MacKenzie S.K. Javorek	The potential of leafcutter bees as pollinators of cranberry and highbush blueberry
1994-95	K.E. MacKenzie M. Partridge R.E. Rogers S.K. Javorek	Queen mandibular pheromone as a yield enhancer in lowbush blueberry
1995	K.E. MacKenzie R.E. Rogers D.L. Nelson	Ways of improving honey bee pollination of lowbush blueberry
1994-96	K.E. MacKenzie S.K. Javorek R.E. Rogers J. Argall	The role of native bees in lowbush blueberry and apple pollination
1996	K.E. MacKenzie S.K. Javorek R.E. Rogers Y. Papadopoulos	Forage seed production in the Martimes

3.5 Needs of industry (B. Termeer)

Canadian Honey Council -- Research Priorities 1996

The following proposals were developed by the Alberta Beekeepers Association and forwarded to delegates across Canada for their comments and suggestions:

1) Varroa treatments - new and applied

Continue work on evaluating existing registered treatments and testing combinations of these treatments and optimum timing; do research that might consider label changes for overwinter treatment (example - one or two strips placed in brood nest in September, followed by label recommendation for one or two new strips placed in brood nest early in the next spring to prevent tolerance or resistance build-up in varroa mites).

Manitoba - agree
- develop a general winter treatment
- develop alternate treatments

Other delegates - no specific comments

2) Tracheal mite treatments - new and applied

Similar to varroa program. Continue to evaluate different methods and timing for applying menthol and formic acid. Test correlation of nosema treatments and nosema spore levels to mite levels and hive mortality.

Manitoba - agree
- develop mite resistant bees

Other delegates - no specific comments

3) Neem research - goal to register Neem for either control of chalkbrood, nosema, tracheal mites, or varroa mites.

Conduct efficacy tests, but equally important, determine whether residues in honey or wax can occur, and describe specific formulation of neem (perhaps Margosan-O) that has a short life, as active ingredient breaks down rapidly. In the U.S. treatments can be registered without efficacy guarantees as long as residues are below acceptable levels. The market determines value of efficacy. Under minor-use registration, the bee industry may want to pursue this. Determine whether higher concentrations of neem are required for mite control, without harming the honeybee. W.R. Grace and Company would be interested in adding a hive treatment to their label for Margosan-O. They are currently pursuing registration of Margosan-O in Canada for other uses.

Other delegates - no specific comments

4) Pheromones

Follow-up pheromone work that has been used to develop artificial pheromone sprays to optimize pollination. Perhaps pheromones could be used to further control swarming, aid in requeening, and may-be used in mite control, if fore example, pheromones could trigger earlier capping behaviour, disrupt reproductive biology of the mites or be used in mite traps.

Other delegates - no specific comments.

5) Nosema and chalkbrood control

Develop cheaper treatments than fumagillin.

Manitoba

- develop chalkbrood controls
-develop cheaper treatments for nosema

Other delegates -no specific comments.

6) Africanized honey bee certification

Work with the U.S. to develop simple techniques to identify AHB to aid in importation of queens and packages from the U.S.

Saskatchewan-Unanimously opposed to this work

-Viewed as aiding a competitor in regards to sales of queens and nucs.

Other delegates-no specific comments

7) Genetic engineering in bees

Develop techniques to transfer genes from *Apis cerana*, for example, into *Apis mellifera* to speed up breeding programs for varroa mite tolerance.

Other delegates - no specific comments.

8) Gene transfer

Work with other areas such as New Zealand, Australia, Hawaii and U.S. to move Canadian bee genetics to their breeder stock.

Other delegates - no specific comments.

9) Mite tolerance

Continue breeding programs in Canada given establishment of #8 (Gene transfer).

Manitoba-supports development of mite resistant bees.

Other delegates-no specific comments.

10) Product development

Continue to develop new uses for honey. Expand this to include new uses for pollen, bee venom, wax, and perhaps bee extracts.

Other delegates-no specific comments.

11) Honey certification

Improve techniques to identify honey purity, and sources.

Saskatchewan - Could better market specialty honeys or floral mixes if they could be better identified. Pollen sampling is extremely costly and requires a lab in order to have the test done.

Other delegates-no specific comments.

*footnote

-Quality assurance programs are starting to gain attention and support in the U.S.

Other comments or subject areas raised:

Manitoba-Wintering

Study how pesticide residues affect overwintering.

Report presented by :
B. Termeer, President Canadian Honey Council

3.6 **Funding for research** (M. Winston)

Research Grants: Canada

Year	Currie Manitoba	Winston SFU	Davis Sask.	Clay N.B.	Scott-Dupree Guelph	* Otis Guelph	Nelson Ag-Can	Clark BCMAF	**Mackenzie Kentville, N.S.	***Other	Total Funding
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	377,500
93-94	54,000	145,000	---	7,000	29,000	101,000	45,000	21,500	0	30,000	432,500,
94-95	54,000	130,000	4,000	7,000	29,000	19,000	24,000	6,500	37,850	30,000	341,350
95-96	23,000	140,000	4,000	7,000	29,000	17,000	6,000	3,500	63,900	0	272,700
Projected											169,500
96-97	6,000	110,000	0	0	0	0	10,000	3,500	40,000	0	169,500
97-98	6,000	110,000	0	0	0	0	5,000	0	30,000	0	151,000

* Joint Otis-Scott-Dupree grants attributed to Otis column.
** Pollination research, mostly alfalfa leafcutter bees
*** 7 additional researchers funded by FSAMII program.

Program Funding

University of Guelph: $250,000/yr. 91-96 — For salaries of Otis, Scott-Dupree, Szabo and 3 Technicians, Truck maintenance and Townsend Bee Lab.
80,000/yr. 96-98 — Projected reduction due to elimination of Szabo position and probable resignation of Otis, as well as loss of two technicians.

Agriculture Canada: 3 Research scientists+3 Technicians, 91-96
1 Research Scientist+ 1 Technician, 96-98

3.6 Funding for research (continued) (M. Winston)

Proposal: CHC/CAPA RESEARCH FUND

The objective of this proposal is to provide ongoing funding for Canadian bee research, so that research work can continue in spite of significant government funding cutbacks. The funding environment has changed dramatically over the last year, and contemporary applications for research dollars now require that commodity groups and industry provide matching funds to obtain government grants. Simply put, the beekeeping community needs to provide dollars rather than just letters of support if Canadian bee research is to continue contributing to our industry.

I propose to develop the Canadian Bee Research Fund to provide money that can be used to match government grants. This model is based on the Australian and New Zealand industries which provide approximately $150,000 a year towards research in each country. Their research allocations are governed by a joint beekeeper/researcher committee, and funds are generated by voluntary or mandatory levies. Below I describe a model for a Canadian Bee Research Fund (CBRF) that will provide considerable benefits to our beekeeping community by allowing for stability and ongoing dollars to fund needed research.

Funding

Option I: The Promotion Fund will be changed to a Promotion and Research Fund, with levies collected through voluntary beekeeper and packer assessments, as currently managed. The Canadian Honey Council will decide the proportion of funds to go towards promotion and research each year at their annual meeting, but a minimum of 20% of the Promotion and Research Fund will be assigned to research. Initially, 20% of funds collected for the Promotion and Research Fund will be used for Research, and 80% for Promotion. In addition, the CBRF will accept other donations from individuals or organizations.

Option II: An independent CBRF would be set up, to be funded through levies on honey, colonies, provincial associations, etc. The issue, or course, would be to determine whether levies would be voluntary or mandatory, how to administer the levies, and if mandatory how to enforce it.

Option III: The CBRF would be funded purely by donations, to be solicited at provincial and federal meetings. Associations could be encouraged to donate proceeds from auctions, etc. to this fund, and to explore other options to solicit funds from individual beekeepers, packers, and other groups involved in the beekeeping industry. This option would be the least controversial, and also would generate the least money.

Governance: The Canadian Bee Research Fund will be set up as a registered charity that can issue tax receipts for donations. The Fund will be administered by a joint CHC/CAPA committee composed of four directors: the President's of CAPA and CHC and the Chairs of the CAPA and CHC Research Committees, or their designates. The CBRF will be administered by

the CHC Treasurer, who will serve as a non-voting member of the Directors Committee. The Directors will meet during the annual CAPA/CHC meetings to allocate funds and conduct any other business of the Research Fund.

Short and Long-term Research Funds: Two separate accounts will be administered by the Directors:

Short-term: 75% of funds donated to the CBRF will be allocated on an annual basis for research purposes by the Directors.

Long-term: 25% of funds donated to the CBRF, as well as any unusual contributions, bequests, etc., will be deposited in a Canadian Bee Research Endowment Fund. No allocations will be made from this fund until it reached a minimum balance of $100,000. At that time, the Directors may allocate up to 80% of the income from the Endowment each year towards research, at their discretion. The Research Endowment will be administered by the Directors, who will maintain the Endowment in a long-term savings account or certificate of deposit.

Application Procedures and Criteria: The following describes annual application procedures and priorities for grants:

The Canadian Bee Research Fund (CBRF), jointly administered by the Canadian Honey Council and Canadian Association of Professional Apiculturalists, is calling for research proposals to conduct projects with potential to benefit the Canadian Beekeeping and pollination industries. This competition is open to all qualified individuals and institutions. Projects of one, two and 3 years duration will be considered, with a maximum of $20,000 per year to any one project. Application deadline is 012 October each year. Applications should have the following format:

Cover Page
Principal Investigator: Name, address, phone, FAX, e-mail, signature

Collaborating Individuals/Institutions: Names, addresses, phones, FAXes, e-mail addresses, signatures

Title of Project

Total of proposed budget for each year

Names and signatures of relevant administrative personnel, if any
Summary

Provide a brief summary of the objectives and potential benefits of the proposed research.

Project Description

Describe the proposed research, in no more than 4 pages. The proposal should describe clearly the objectives of the project, the methods used to meet the objectives, and the economic or other benefits that will result. Also discuss where the results might be published, and how transfer of new technology to the beekeeping industry will be accomplished.

Budget

A) List the proposed annual budget for each of the following categories for each year requested:

Salaries and benefits
Equipment (non-expendables)
Supplies (expendables)
Travel
Other (specify)

(B) Describe and justify the requested expenses. Present quarterly cash flow needs for each budget category.

Note that overhead costs, institutional overhead, administrative costs, and the purchase of long-term capital assets such as vehicles normally are not eligible for funding.

Timetable

Describe the timetable for the project, giving a detailed work plan and specific milestones to meet the objective of the project. Also discuss the resources and personnel available for the project. For collaborative projects, discuss the responsibilities of each collaborator, location of work, etc.

Matching Funding

Projects with additional or matching funding will be preferred. Describe here the funding that you or your institution will contribute to the project, and list other funding for which you have applied or will receive towards this project.

Attachments

Attach curriculum vitae for the principal and collaborating applicants, and other information relevant to the proposed research (i.e., reprints of completed relevant research, other grant applications, supporting letters, etc.).

Mail 5 copies of the completed applications by 01 October to:

Canadian Bee Research Fund
Canadian Honey Council

P.O. Box 1556
Nipawin, Sask. SOE 1E0

Reporting of Results: The Directors will ensure that results from research funded by the CBRF will be disseminated to beekeepers through symposium talks and written submissions.

Research Priorities: The CHC and CAPA will advise the CBRF of research areas that in their estimation should receive priorities for funding. However, interpretation of how applications meet these priorities, and funding decisions, remain the responsibility of the Directors of the CBRF.

Registering of Charity: If this proposal is adopted, the proposed Directors of the CBRF will draft and submit the required documents to Revenue Canada to initiate and manage the fund, no later than 6 months after adoption of this proposal.

Report Prepared by:

Mark L. Winston
Department of Biological Sciences
Simon Fraser University
Burnaby, B.C. V5A 1S6

3.7 List of participants

Heather Clay

Anita Collins

Rob Currie

Don Dixon

Linda Gain

John Gates

John Gruszka

Gary Hergert

Doug McCrory

Kenna McKenzie

Medhat Nasr

Don Nelson

Gard Otis

Chris Prouse

Cynthia Scott-Dupree

Barrie Termeer

Kenn Tuckey

Paul van Westendorp

Mark Winston