Don Ecrom
10/June/82

CANADIAN ASSOCIATION OF PROFESSIONAL APICULTURISTS

RESEARCH WORKSHOP REPORT — 1981

Prepared and distributed by
Agriculture Canada, Research Branch

Toronto, Ontario
November 22, 1981

C O N T E N T S

F O R E W O R D

A Research Workshop was held by the Canadian Association of Professional Apiculturists in Toronto, Ontario on November 22, 1981. The 1977 Research Workshop was used as the focus for discussion. The purpose of the Workshop was to prepare a current list of research priorities and recommendations.

The greatest concern of the Canadian Honey industry is the possible threat of the introduction of exotic mites or Africanized bees into Canada or into the U.S.A. Canada annually imports more than 350,000 packages of bees each year from the U.S.A. and thousands of extra queens. The loss of this supply would be very serious for the Canadian honey industry. The Acarine mite has already been identified in Mexico and the Varroa mite and the Africanized bee are in South America.

A second concern is the use of pesticides in Canada that have been developed primarily in the U.S.A. under their conditions. There are instances that indicate the breakdown rate is often much slower under some Canadian conditions, however the recommendations used are those on the label. The uses of chemicals in the beekeeping industry are few but evaluation of existing or new methods of application must be ongoing to ensure user safety and to maintain a pure food product.

The well-being of the honey industry's future will depend on the extension and inspection services of each province, the education and training of professional people, and on continued research in the areas outlined in this report.

The following recommendations should be used as guidelines by agencies that are now or may be involved in research programs aimed at helping Canada's honey industry achieve its full potential.

Don Nelson
Research Workshop Report Coordinator
February, 1982

A C K N O W L E D G E M E N T S

Sincere appreciation is expressed to the Canadian Association of Professional Apiculturists for sponsoring the Research Workshop, to the participants, and to the following members for preparing portions of the report; L. Crozier, D. Dixon, D.L. Nelson, S.C. Jay and J. Corner.

RESEARCH PRIORITIES AND RECOMMENDATIONS

1. PRODUCTION

a) Stock Selection and Breeding

There is a need to continue breeding programs designed to improve regionally desirable characteristics of honey bee stock, such as honey production, longevity, docility, wintering ability, disease resistance and pollination behaviour.

Recommendation

Continue to provide sufficient funds to maintain a meaningful program of stock selection and breeding. Make available one position for an apicultural geneticist.

b) Diseases and Pests

It is recognized that diseases are still a major problem for the beekeeping industry. In addition a new threat in the form of exotic bee mites are nearing the continental area in which Canadian beekeepers operate.

Beekeepers in Western Canada have noted the presence of persistent sacbrood and sacbrood-like infections. There is a need to improve detection and diagnosis in order to separate viral causes from those that are genetic or physiological.

Recommendations

Maintain close contact with present research on biology and control studies on bee mites conducted in Europe and South America.

Support transfer of work by qualified pathologist to one of these countries to study the biology and effects of new acaracides on bee mites and on bees.

Establish electronmicroscope and serological characteristics of sacbrood-like infections which are prevalent in Western Canada.

Develop alternative methods for control of infectious bee diseases to replace terramycin, should this control agent become unavailable to the industry.

c) Improved Colony Management Methods

There is a continued need in both applied and basic colony management research with an aim to improved production efficiency.

Recommendation

Expand existing research by making available additional funds for cooperative programs among federal, provincial and university agencies, moreover encourage and support producer initiated projects.

2. REGULATIONS

a) Chemicals used in the Beekeeping Industry

There is a continued need to evaluate the use of chemicals in the beekeeping industry.

Recommendation

Expand and coordinate existing programs aimed both at evaluating substances used in the industry and at incorporating or modifying existing and new methods of application to ensure the safety of beekeepers and the production of a pure food product.

b) Evaluation of Pesticides under Canadian Conditions

Beekeepers recognize the need for the use of pesticides in pest control programs. However, the beekeeping industry is concerned about the adverse effects of pesticides on honey bees and other beneficial insects. There are little or no data available on the effect of pesticides on honey bees and other beneficial insects under conditions that are unique to Canada.

Recommendation

Develop a program for the continued accumulation of data on the toxic and economic consequences of pesticides to honey bees and other beneficial insects under Canadian field conditions.

Following a recommendation made by the NRC Associate Committee on Scientific Criteria for Environmental Quality, in the publication Pesticide - Pollinator Interactions (NRC No. 18471) a survey of Canadian beekeepers is to be undertaken to accumulate systematic documentation on the suspected poisoning of honey bees and alfalfa leafcutter bees.

3. UTILIZATION

a) Nectar Production and Pollination of Specific Crops

Crops such as rapeseed, canola, trefoil, alfalfa, the clovers, soybean, sunflower and buckwheat are important crops in Canada. Little is known about the possible value of these crops to the honey-producing industry as nectar resources under Canadian conditions, or about the impact of pollination by honey bees on these crops in terms of increased seed production, seed quality, and early maturity.

Recommendation

Expand and coordinate existing programs in pollination, nectar secretion and breeding related to the above crops. Encourage plant breeders to include nectar secretion as a valuable characteristic in their breeding programs.

b) New Nectar and Pollen Sources

It is recognized that nectar and pollen-producing plants are diminishing throughout Canada because of changing farming practices, such as expansion of the corn acreage in Ontario. There is also a need in ecological repair programs (e.g. roadsides, powerlines, right of ways etc.) to grow nectar-producing plants.

Recommendation

Establish and maintain programs aimed at determining the feasibility of planting waste areas and submarginal lands with nectar-producing plants.

4. EDUCATION

a) Training Apiculturists

Based on current and future priorities for apicultural research and extension in Canada, decisions about the number and type of professional positions required should be made immediately. It will be necessary to train personnel for the positions in apiculture that will be available over the next 5 years.

Recommendation

Educational agencies should be prepared to train 7 apiculturists for research and extension positions in Canada. These apiculturiest should be highly versatile, that is, trained in biology, ecology, entomology, apiculture and other fields. Attempts should be made to find Federal government and other funding for the training of these apiculturists, with the following timetable in mind:

	Research	Extension	Technicians
1982	0	1	3
1983	0	2	0
1984	2	1	1
1985	0	1	0
1986	0	0	0

Consideration should continue to be given to training programs for foreign students, honey producers, the general public and school children.

5. MARKETING

The Canadian Association of Professional Apiculturists suggests that the Canadian Honey Council identify and assign priorities to the industry's marketing problems; that these concerns be forwarded to Agriculture Canada, Economic Research Division, for possible consideration.

PARTICIPANTS

Name	Title	Address	Telephone
Abrahamson, M.	Research Committee Canadian Honey Council	Box 479, Pelly Saskatchewan S0A 2Z0	(306)595-4624
Boch, R.	Research Scientist	Ottawa Research Station Ottawa, Ontario K1A 0C6	(613)996-7676
Bryans, H.D.	President Canadian Honey Council	387 Rioba Street Alvinston, Ontario	(519)898-2137
Burke, P.W.	Provincial Apiarist	Dept. of Environmental Biology, Graham Hall University of Guelph Guelph, Ont. N1H 6H8	(519)824-4120 Ext. 2477-78
Clark, E.	Horticulturist and Apiarist	P.E.I. Department of Agriculture & Forestry Box 1600 Charlottetown, P.E.I.	(902)892-5465
Colter, D.	Chief Apiculture Inspector	Box 415, Falher Alberta, T0H 1M0	(403)837-2252
Crozier, L.	Provincial Apiarist	N.S. Dept.of Agriculture P.O. Box 550 Truro, N.S. B2N 5E3	(902)895-1571
Dixon, D.	Provincial Apiarist	911 Norquay Bld. Winnipeg, Manitoba R3C 0P8	(204)944-3861
Gochnauer, T.	Research Scientist	Ottawa Research Station Ottawa, Ontario K1A 0C6	(613)996-7676
Gruszka, J.M.	Provincial Apiarist President, C.A.P.A.	4th Floor,MacIntosh Mall 800 Central Avenue Prince Albert, Saskatchewan S6V 6Z2	(306)922-9790
Jay, S.C.	Head Entomology Department	University of Manitoba Winnipeg, Manitoba R3T 2N2	(204)474-9257
Levac, B.	Responsable du Centre Apicolede St. Hyacinthe	Centre Apicole 3230 Sicotte St. Hyacinthe, Quebec J2S 2M2	(514)773-7401

MacDonald, D.N.	Supervisor Apiculture	Alberta Agriculture Box 415, Falher Alberta T0H 1M0	(403)837-2252
McCutcheon, D.	Apiary Specialist	B.C. Ministry of Agriculture 17720-57 Ave. Surrey, B.C. V3S 4P9	(604)576-2911
McKenna, D.W.	Apiculture Instructor	Fairview College Fairview, Alberta T0H 1L0	(403)835-2213
Murrell, D.	Apiculturist	c/o Alberta Agriculture Apiculture Box 415 Falher, Alberta T9H 1M0	(403)837-2252
Nash, W.T.	Research Technician	Agriculture Canada Research Station Beaverlodge, Alberta T0H 0C0	(403)354-2212
Nelson, D.L.	Research Scientist	Agriculture Canada Box 29 Beaverlodge, Alberta T0H 0C0	(403)354-2212
Prentice R.M.	Research Coordinator	Research Branch Agriculture Canada Ottawa, Ontario K1A 0C5	(613)995-7084
Shimanuki, H.	Chief Environmental Bee Lab.	U.S.D.A. Environmental Bee Lab. Beltsville, MD 20705	(301)344-2205
Shuel, R.W.	Environmental Biology	University of Guelph Guelph, Ontario N1G 2W1	(519)824-4120 Ext. 2478
Smith, M.V.	Associate Professor	Dept. of Environmental Biology University of Guelph Guelph, Ontario N1G 2W1	(519)824-4120
Szabo, T.I.	Research Scientist	Agriculture Canada Research Station Box 29 Beaverlodge, Alberta T0H 0C0	(403)354-2212

THE CANADIAN HONEY INDUSTRY

During the last decade, the Canadian beekeeping industry has shown a steady growth from an estimated 401,420 producing honey bee colonies in 1971 to approximately 633,500 colonies in 1981 (see Table 1). This growth has resulted in a coincidental increase in the amount of honey harvested by Canadian beekeepers so that in 1981 the total Canadian honey production amounted to approximately 34,769,000 kg -- the largest Canadian honey crop on record.

The value of the industry, at the producer level, has also showed an important increase. In 1971 the estimated value of the honey and beeswax produced was $11,291,000.00 and by 1981 this had increased to $61,360,000.00. The beekeeping industry also contributes to the agricultural economy through the provision of insect pollination resulting in increased seed and fruit production of several crops. The monetary result of this pollination is difficult to estimate, but is usually considered to be valued at several times the value of the honey and beeswax produced.

Inputs into the honey bee industry originate from labor, utility services, feed, construction, credit, pharmaceutical, petroleum, machinery and equipment industries. As the honey is prepared for domestic and export markets it supports a number of secondary industries including those involved in processing, packing and marketing.

Alberta, Saskatchewan and Manitoba continue to be the centers of growth and production in the Canadian beekeeping industry. In 1981 the three prairie provinces accounted for approximately 70% of the total Canadian honey crop (see Table 2).

Of the 34,769,000 kg of honey produced in Canada in 1981, approximately 8,200,000 kg were exported with approximately 60% going to the United States (see Table 3). In the international market Canadian honey competes primarily with honey from Mexico, Argentina and China (mainland).

Beekeepers have several potential markets for the honey they harvest;

1) Direct sales to consumers -- Beekeepers pack honey in consumer containers and sell it directly from their honey house to the public. This market is particularly important to beekeepers that are located close to large population areas and to beekeepers that harvest relatively small amounts of honey.

2) Direct sales to retail outlets -- Some beekeepers pack honey in approved containers and sell their product directly to food stores.

3) Sales to honey co-operatives -- Some beekeepers have chosen to join and ship their honey to co-operatives that have been established for the purposes of processing, packing and marketing the honey of their members. This market is particularly important for many beekeepers in the three prairie provinces where approximately 40% - 50% of the honey harvested is marketed through the Manitoba Co-Operative Honey Producers Ltd. and the Alberta Honey Producers Co-Operative Ltd.

4) Sales to other buyers -- There are several independent packers, wholesalers and brokers in Canada, the United States and overseas that purchase honey from beekeepers. This honey is usually packed in 45 gallon drums and shipped in container or semi-trailor lots (approximately 18,000 kg per load).

Regulations pertaining to the packing and grading of honey are set forth in the Canada Agricultural Products Standards Act and the Honey Regulations of this Act. These regulations are administered by the Food, Production and Inspection Branch of Agriculture Canada. The Honey Regulations are effective only in those provinces that have adopted the federal regulations and have authorized the federal government to administer them within that particular province. Honey may move in bulk containers between provinces without being classified and graded provided it is to be repacked or reprocessed in Canada. Honey being exported, however, is subject to the federal regulations and can only be marketed internationally by an individual or firm licenced by Agriculture Canada as a Producer-Grader, Packing or Pasteurizing Plant. Currently there are 316 Producer-Graders, 40 honey packing plants and 14 pasteurizing plants registered in Canada.

TABLE 1

BEEKEEPING STATISTICS FOR CANADA[1]

YEAR	NO. OF BEEKEEPERS	NO. OF COLONIES	PRODUCTION PER COLONY (kg)	TOTAL PRODUCTION '000 kg	VALUE OF HONEY & WAX $'000
1971	8,630	401,420	59	23,684	11,291
1972	8,340	417,300	55	22,952	16,093
1973	8,880	437,910	57	24,961	25,835
1974	11,350	473,570	44	20,837	21,920
1975	13,110	508,450	41	20,847	23,905
1976	15,300	530,930	48	25,444	25,927
1977	15,510	541,470	51	27,747	32,070
1978	17,470	566,900	54	30,585	39,803
1979	18,550	581,200	57	32,996	47,603
1980	19,500	607,800	48	29,235	44,276
1981	19,980	633,500	55	34,769	61,360

[1] Source - Statistics Canada

TABLE 2 BEEKEEPING STATISTICS BY PROVINCE

BRITISH COLUMBIA

YEAR	NO. OF BEEKEEPERS	NO. OF COLONIES	PRODUCTION PER COLONY (kg)	TOTAL PRODUCTION ('000 kg)
1971	1,900	31,650	54	1,709
1972	1,900	32,500	50	1,625
1973	1,700	33,030	47	1,552
1974	2,800	41,000	36	1,476
1975	3,400	45,000	36	1,620
1976	4,500	50,000	24	1,202
1977	4,500	47,000	54	2,516
1978	5,200	50,000	38	1,882
1979	5,250	51,000	46	2,336
1980	5,400	49,000	36	1,756
1981	5,600	50,500	42	2,107

ALBERTA

YEAR	NO. OF BEEKEEPERS	NO. OF COLONIES	PRODUCTION PER COLONY (kg)	TOTAL PRODUCTION ('000 kg)
1971	1,200	115,000	89	10,235
1972	1,200	130,000	71	9,230
1973	1,300	145,000	68	9,860
1974	1,800	156,000	53	8,268
1975	2,000	158,000	40	6,320
1976	2,000	160,000	58	9,290
1977	1,800	165,000	59	9,730
1978	1,800	160,000	57	9,072
1979	1,700	150,000	68	10,251
1980	1,800	160,000	64	10,306
1981	1,700	170,000	62	10,478

SASKATCHEWAN

YEAR	NO. OF BEEKEEPERS	NO. OF COLONIES	PRODUCTION PER COLONY (kg)	TOTAL PRODUCTION ('000 kg)
1971	800	43,000	85	3,655
1972	720	47,000	83	3,901
1973	760	51,600	58	2,993
1974	830	54,000	60	3,240
1975	930	58,000	51	2,958
1976	950	60,000	67	4,028
1977	900	60,300	63	3,774
1978	950	68,000	76	5,182
1979	1,550	74,000	73	5,371
1980	1,700	80,000	71	5,697
1981	1,700	83,000	72	5,948

MANITOBA

YEAR	NO. OF BEEKEEPERS	NO. OF COLONIES	PRODUCTION PER COLONY (kg)	TOTAL PRODUCTION ('000 kg)
1971	500	50,000	68	3,400
1972	470	51,500	84	4,326
1973	510	52,000	73	3,796
1974	810	60,000	65	3,900
1975	900	76,000	48	3,648
1976	1,100	80,000	68	5,479
1977	1,050	81,000	64	5,180
1978	1,200	85,000	81	6,863
1979	1,300	93,000	76	7,087
1980	1,400	99,000	70	6,960
1981	1,550	103,000	73	7,569

ONTARIO

YEAR	NO. OF BEEKEEPERS	NO. OF COLONIES	PRODUCTION PER COLONY (kg)	TOTAL PRODUCTION ('000 kg)
1971	2,160	115,000	29	3,335
1972	2,100	103,200	30	3,096
1973	2,200	97,700	43	4,201
1974	2,400	99,900	25	2,498
1975	2,800	104,000	38	3,952
1976	3,200	106,000	31	3,269
1977	3,500	106,000	34	3,606
1978	4,300	112,000	35	3,963
1979	4,300	112,000	33	3,709
1980	4,300	110,000	23	2,495
1981	4,300	110,000	30	3,343

QUEBEC

YEAR	NO. OF BEEKEEPERS	NO. OF COLONIES	PRODUCTION PER COLONY (kg)	TOTAL PRODUCTION ('000 kg)
1971	1,460	40,970	28	1,147
1972	1,430	46,750	16	748
1973	1,830	52,000	42	2,184
1974	1,990	55,870	25	1,397
1975	2,200	59,650	39	2,326
1976	2,400	67,000	28	1,884
1977	2,600	73,700	36	2,634
1978	2,750	82,000	40	3,289
1979	3,050	90,000	43	3,878
1980	3,420	98,000	17	1,647
1981	3,600	105,000	46	4,792

NEW BRUNSWICK

YEAR	BEEKEEPERS	COLONIES	PRODUCTION PER COLONY (kg)	TOTAL PRODUCTION ('000 kg)
1971	280	1,900	46	87
1972	210	1,950	35	68
1973	200	1,850	48	89
1974	240	2,300	24	55
1975	310	2,300	38	87
1976	470	2,700	36	98
1977	440	2,940	31	91
1978	500	3,200	30	97
1979	600	3,800	35	134
1980	650	3,900	29	115
1981	680	4,000	44	178

NOVA SCOTIA

YEAR	NO. OF BEEKEEPERS	NO. OF COLONIES	PRODUCTION PER COLONY (kg)	TOTAL PRODUCTION ('000 kg)
1971	290	3,400	31	105
1972	270	3,800	41	156
1973	320	3,900	41	160
1974	380	3,800	34	129
1975	440	4,800	36	173
1976	520	4,350	37	160
1977	520	4,580	37	171
1978	550	5,500	33	180
1979	590	6,100	29	174
1980	630	6,600	32	210
1981	650	6,700	43	288

PRINCE EDWARD ISLAND

YEAR	NO. OF BEEKEEPERS	NO. OF COLONIES	PRODUCTION PER COLONY (kg)	TOTAL PRODUCTION ('000 kg)
1971	40	500	30	15
1972	40	600	42	25
1973	60	630	46	29
1974	100	700	16	11
1975	130	700	45	32
1976	160	880	39	34
1977	200	950	48	45
1978	220	1,200	48	57
1979	210	1,300	43	56
1980	200	1,300	37	49
1981	200	1,300	51	66

*****

TABLE 3 HONEY IMPORTS

	FROM U.S.	TOTAL
1979	154,000 kg	235,000 kg
1980	181,000 kg	276,000 kg
1981	317,000 kg	446,000 kg

TABLE 4 HONEY EXPORTS

	TO U.S.	TOTAL
1979	4,132,000 kg	8,163,000 kg
1980	7,477,000 kg	10,838,000 kg
1981	4,902,000 kg	8,200,000 kg

THE PRESENT STATUS OF RESEARCH, EXTENSION AND EDUCATION

At Present there are twenty three (23) professional positions directly associated with teaching, extension or research in apiculture; seven (7) at universities, five (5) at federal research stations and eleven (11) as either apiarists, assistants or specialists.

Research areas under study include breeding, bee behavior, diseases, production, nutrition and feeding, wintering and pollination. The present strengths are in breeding, behavior, diseases and production.

There is a need for research in honey chemistry, pesticides in relation to foraging bees under Canadian environmental conditions and continued monitoring of chemicals used in the beekeeping industry to maintain product purity.

New requirement - The potential threat of exotic mites to the Canadian Beekeeping industry is very real. With this in mind, it is very desirable to have someone in Canada obtain first hand knowledge and experience with Acarine and Varroa mites.

Extension - Extension at the provincial level is the mainstay of a strong and viable industry. Several provinces have been successful in obtaining additional staff to better serve beekeepers with technical information and to intensify inspection services. Extension cannot be underestimated and its strengthening should be encouraged by the industry at every possible opportunity.

Education - Over the next 5 years it is anticipated that seven (7) professional positions will be required in order to fill upcoming vacancies and/or new positions. It is important that these opportunities be made known to potential students particularly those interested in studying at the M.Sc. level.

RESEARCH, EXTENSION AND EDUCATION SINCE THE 1977 WORKSHOP

Since this topic was last reviewed in 1977 several notable changes have occurred which follow:

Research 1) The addition of a bee pathologist position at Beaverlodge.

2) Bee breeding programs have been initiated and/or strengthened by:

   a) B.C. Ministry of Agriculture
   b) Beaverlodge Research Station
   c) University of Guelph

Education and Extension

1) The addition of one (1) position (total of two (2)) to the C.I.D.A. program at the University of Guelph; primarily responsible for overseas programs in apiculture.

2) An entomologist position at Simon Fraser University has been filled with an apiculturist.

3) Alberta relocated the office of the supervisor of apiculture to Falher in the Peace and added a disease inspector for the North.

4) Saskatchewan obtained an assistant apiarist position.

5) Manitoba obtained a full time assistant apiarist.

6) With two retirements upcoming in apiculture at Guelph it is unlikely that both positions will be refilled with apiculture personnel.

RESEARCH PROJECTS

The following is a listing of beekeeping related projects in Canada from about 1977 to the present. A previous Research Workshop Report (Victoria, B.C., Nov. 1977) lists earlier projects. The projects are arbitrarily listed under the headings of, Agriculture Canada, Universities and Provinces. This is not necessarily complete as submissions were not received from all participants.

Year	Name	Title
Agriculture Canada		
(a) Ottawa Research Station		
1977	R. Boch	Wintering hives in plastic boxes.
1977	G.E. Timbers G.D. Robertson T.A. Gochnauer	Thermal properties of beeswax and beeswax-paraffin mixtures.
1977	T.A. Gochnauer V.J. Margetts	Properties of honey bee larvae killed by chalkbrood disease.
1977	R. Boch R.A. Morse	Individual recognition of queens by honey bee swarms.
1979	R. Boch A. Avitabile	Requeening honey bee colonies without dequeening.
1979	R. Boch	Queen substance pheromone produced by immature queen honey bees.
1979	T.A. Gochnauer R. Boch V.J. Margetts	Inhibition of *Ascosphaera apis* by citral and geraniol.
1979	T.A. Gochnauer P.W. Burke J. Benazet	Large-scale fumigation with ethylene oxide of honey bee combs contaminated with *Bacillus larvae*.
1979	J.T. Ambrose R.A. Morse R. Boch	Queen discrimination by honey bee swarms.

Year	Name	Title
1979	R. Boch D.A. Shearer R.W. Shuel	Octanoic and other volatile acids in the mandibular glands of the honey bee and in royal jelly.
1980	T.A. Gochnauer V.J. Margetts	A rapid method for concentrating Nosema apis spores.
1980	T.A. Gochnauer V.J. Margetts	Decontaminating effect of ethylene oxide on honey bee larvae previously killed by chalkbrood disease.
1981	R. Boch S. Neilson	Some recent tests of pollen traps.
1981	T.A. Gochnauer V.J. Margetts	Recovery from a heavy outbreak of American foulbrood by removal of contaminated brood comb and treatment with antibiotic.
1981	R. Boch R.A. Morse	Effects of artificial odors and pheromones on queen discrimination by honey bees.
1981	T.A. Gochnauer D.A. Shearer	Volatile acids from honey bee larvae infected with Bacillus larvae and from a culture of the organism.
1981	R. Boch	Relative attractiveness to honey bees of different pollens.
1981	T.A. Gochnauer V.J. Margetts	Emission of volatile sulphide from residues of diseased honey bee larvae.
1981	T.A. Gochnauer	Distribution of Bacillus larvae spores in the environs of colonies infected with American foulbrood disease.
1981	R. Boch D.A. Shearer	Fatty acids in the mandibular glands of worker honey bees of various ages.
1981	D.L. Nelson T.A. Gochnauer	Field and laboratory studies on chalkbrood disease of honey bees.
1981	G.E. Timbers T.A. Gochnauer	Thermal conductivity of beeswax.

Year	Name	Title
1981	T.A. Gochnauer V.J. Margetts	Production of hydrogen sulphide by cultures of Bacillus larvae in vitro.
1981	T.A. Gochnauer V.J. Margetts	Experimental infections with Ascosphaera apis.

(b) Beaverlodge Research Station

1977	T.I. Szabo	Sulfur as a substitute for HCN.
1977-1979	T.I. Szabo	Comb building after the honey-flow: Comb building and honey production with various combs.
1977-1979	T.I. Szabo	Bee breeding.
1977-1979	T.I. Szabo	Outdoor and controlled environmental wintering.
1977-1980	T.I. Szabo	Effect of weather factors on honey bee flight activity and colony weight gain.
1977-1981	D.C. Murrell T.I. Szabo	Pollen collection by honey bees.
1977-1980	T.I. Szabo	Requeening with queen cells in queenright colonies.
1979-1980	T.I. Szabo L. Harris	Longevity of honey bees.
1979-1980	T.I. Szabo	Outdoor wintering: comparison of various entrances.
1977-present	T.I. Szabo	Honey bee activity studies and nectar secretion on rapeseed, Phacelia and some important cultivated and weed plants.
1979-present	T.I. Szabo	Studies on queen rearing, mating and the development of the Alberta nucleus hive.
1979-present	T.I. Szabo	Alberta bee breeding program.

Year	Name	Title
1979-present	B.G. Fingler W.T. Nash T.I. Szabo	Comparison of two techniques for the measurement of nosema disease.
1980-present	R.E. Salmon T.I. Szabo	Dried bee meal as a feedstuff for growing turkeys.
1981-present	J.R. Harbo T.I. Szabo	Effect of A.I. on survival of queens and colony traits.
1976-1979	D.L. Nelson	Indoor wintering.
1977	D.L. Nelson C.B. Smirl	Effect of queen-related and swarming problems on brood and honey production.
1977	G.D. Henn D.L. Nelson	Analysis of nectar flow records at Beaverlodge.
1977-1979	D.L. Nelson T.A. Gochnauer	Field and laboratory studies of chalkbrood disease.
1977-1980	M. Ihnat D.L. Nelson P.S. Barker	Cyanide residue levels in extracted honey; knockdown and recovery times with possible alternatives to HCN.
1978-1981	D.L. Nelson S.C. Jay	Drift and loss studies of honey bees subsequent to moving colonies at least 8 km.
1981-1984	D.L. Nelson S.C. Jay R.S. Sadasivaiah	Evaluation of rapeseed and Canola varieties for nectar production and honey bee preferences.
1980-1982	W. Chalmers	Evaluation of Herring meal as a pollen substitute (contract research).

Year	Name	Title
Universities		
(a) University of Guelph		
1976- still in progress	C.P. Milne M.V. Smith	Honey bee breeding and selection.

Year	Name	Title
1976-1979	S.M. Shehata G.F. Townsend R.W. Shuel	Anatomical and physiological response to seasonal changes and to solitary confinement in queen honey bees. (Ph.D. thesis by S.M. Shehata).
1975-1978	R.W. Shuel S.E. Dixon G.B. Kinoshita	Laboratory rearing of honey bees on altered natural diets.
1979	M.V. Smith C.P. Milne	Increasing the efficiency of queen mating nuclei.
1977-1980	D.C. Murrell R.W. Shuel D.T. Tomes	Nectar secretion and floral attractiveness to honey bees in birdsfoot trefoil. (M.Sc. thesis by D.C. Murrell).
1977-1981	R.W. Shuel S.E. Dixon	10-hydroxydecenoic acid and sterol nutrition of larval honey bees.
1981	D.V.N. Kihwele M.V. Smith	Nest site selection by swarming honey bees, Apis mellifera. (M.Sc. thesis by D.V.N. Kihwele).
1980	M.V. Smith	Pesticide poisoning on sweet corn in Ontario as a hazard to honey bees.
1979-1981	D.G. Dietlein R.W. Shuel	Remote monitoring of honey bee colonies. (M.Sc. thesis by D.G. Dietlein).
1962-1981	R.W. Shuel S.E. Dixon	Development of an artificial diet for laboratory rearing of bees.
1981	M.V. Smith	Possible interference of corn rootworm adults with honey bee foraging.
1981	M.V. Smith	Possible interference of European skipper adults with honey bee foraging.

Year	Name	Title
(b) University of Manitoba		
1981	R. Currie S.C. Jay	Drifting of drones.
1981	S.C. Jay	Requeening honey bee colonies.
1981	S.C. Jay	Pollination studies - Canola and Buckwheat.
1980	S.C. Jay	Hiving studies.
1979	S.C. Jay	Larval rearing by worker bees lacking their mandibular glands.
1979	S.C. Jay L. Harris	Loss and drifting from wintered hives.
1979-1981	B. Fingler S.C. Jay	Wintering studies (indoors).
1979-1981	D.L. Nelson S.C. Jay	Loss and drifting when apiaries are moved.
1979-1981	S.C. Jay D. Dixon	Nosema survey of imported queens and attendants.
(c) Simon Fraser University		
1978	D.N. MacDonald	Diseases of the honey bee in British Columbia with special emphasis on Nosema Disease. (Masters in Pest Management).
1981-1984	P. Lee M. Winston	Swarming rates and fitness of swarms in unmanaged colonies.
1981	E. Neilson M. Winston	Factors controlling temporal division of labor.
1981	P. Lee W. Chalmers M. Winston	The effects of pollen supplement feeding on worker quality.
1981-1982	C. Scott C. Martin K. Slessor G. Grant M. Winston	Biology and sex pheromones of the bumblebee wax moth Vitula edmandsae and the lesser wax moth Achroia grisella.

Year	Name	Title
1981-1982	J. Ramsay D. McCutcheon	Honey plants of B.C.
1981	M. Winston M. Smirle K. Slessor A. Kandil	The role of 9-Hydroxy-decenoic acid in swarming.
1981-1984	M. Winston K. Slessor	Honey bee pheromones.
1981-1982	M. Smirle M. Winston	Honey bee detoxification enzymes and pesticides.
1982-1985	E. Neilson M. Winston	Development of a package bee and queen industry in B.C.
1982-1985	C. Scott M. Winston	Biology and management of Fireweed.
1981-1984	L. Graf M. Winston K. McKenzie	Native pollinators of B.C. berry and fruit crops.

(d) University of British Columbia (undergraduate theses)

1980	P.Van Westendorp	Influence of pH Glucose and Senigrin Monohydrate on Bacillus larvae.
1980	A. Inglis	Queen Rearing and Queen Cell acceptance in honey bees.
1981	R. Winter	Apiculture, another source of income off forest lands on Vancouver Island.

Year	Name	Title
Provinces		
(a) British Columbia Ministry of Agriculture and Food		
1976-1981	J. Corner	Honey production from fireweed Epitabium augustifolium in the interior of British Columbia.
1978-1980	J. Corner*	D.A.T.E. Project #64 -- Honey bee stock improvement project.
1981-1983	J. Corner*	A.R.D.S.A. Honey stock selection using closed population technique.
1980	W. Majak P. Neufeld J. Corner	Toxicity of Astragalus miser V seratinus to the honey bee.
1981	J. Corner	The use of bouquets and pollen inserts to pollinate a block of Spartan apples.
1975-1981	D. McCutcheon	Monitoring disease in Ethylene Oxide fumigated combs. Establishing a fumigator. Testing combs for E.T.O. methabolites.
1975-1981	D. McCutcheon	Controlled environment overwintering of single brood chamber hives established in late summer. Overwintering 4 frame nucs. Measuring brood in February.
1975-1976	D. McCutcheon D. Colter D. Murrell	Acacia seedling establishment tests.

* D.M. McCutcheon, F. Calvert, J. Gates, C. Van Eaton, J. Macdonald, S. Harvey.

NOTE: D.A.T.E. - Demonstration of Agricultural Technology and Economics.

Year	Name	Title
1976-1978	D. McCutcheon P. Van Westendorp H. Barten	Antibiotic Extender Pattie tests.
1977	D. McCutcheon J. Corner	Transporting queen cells by airplane.
		Requeening nuclei with queen cells.
1977	D. McCutcheon	February requeening nucleus hives in controlled environment quarters and establishment of new nuclei outside on same date.
1978	D. McCutcheon	Comparison of brood, hive populations and honey production of controlled environment wintered 4 frame nuclei, 2 lb. package established hives, regular over-wintered hives and 2-queen hives.
1978	D. McCutcheon D. McDonald	Sampling of Nosema disease, Fraser Valley.
1978	D. McCutcheon	A study concerning attractiveness to honey bees of two blooming blueberry varieties.
1978-1981	D. McCutcheon	Rate of consumption of stores by outside overwintered hives.
1979	D. McCutcheon P. Van Westendorp	Honey bee activity in blooming strawberry fields.
1979	D. McCutcheon P. Van Westendorp	The effects of location in reference to pollination on yield performance in Stanley and Pemberton Blueberry varieties.
1980	D. McCutcheon P. Van Westendorp	Ambush (permethrin) as a bee repellent.
1981	D. McCutcheon D. Bates	Studies in overwintering queens on a commercial basis.

Year	Name	Title
(b) Saskatchewan		
1979-1981	J. Gruszka	Nosema survey.
(c) Nova Scotia		
1980	L. Crozier	Pollinator counts in lowbush blueberries.
1981	L. Crozier	Pollination of lowbush blueberries in Cape Breton.
1981	L. Crozier	Honey production potential of wild raspberry.
1981	L. Crozier	Outdoor wintering queen nuclei.
1981	L. Crozier G. Smeltzer	Production of alfalfa leafcutter bees in Nova Scotia.

CONTINGENCY PLANS

With the identification of the Acarine mite in Mexico and the Varroa mite in South America, the Canadian Association of Professional Apiculturists feels that a plan of action should be made in advance to any known introduction to North America. The following contingency plan outlines actions to be implemented under three circumstances: (1) in advance of known introductions into Canada; (2) at the time of identification of exotic mites into Canada; and (3) at the time of identification of exotic mites in the U.S.A.

Plan Number 1

Action to be taken in advance of any possible introduction of exotic mites or any other disease or pest of the honey bee not presently found in Canada.

By the spring of 1982 or sooner:

1. (a) Train one or more staff in each province to identify Varroa and Acarine mites, as well as other honey bee pests and diseases.

   (b) Prepare a leaflet outlining life history and known treatments for irradication and control.

2. (a) Outline quarantining procedures (see Plan #2)

   (b) Review all Federal and Provincial Bee Acts and Regulations to ensure that authorizing legislation is in place.

   (c) Arrange plans for nation-wide agreement between provinces, including northern states adjoining the Canadian border, concerning concerted and cooperative liaison between specialists. These specialists should include Health of Animals Branch, Ottawa; Federal Apiarists; Provincial Apiarists; State Apiarists; University Apiary Specialists; and key members of the Canadian Honey Council.

   (d) Maintain up-dated lists of names, addresses, and phone numbers of "key" Canadian and U.S.A. contact and resource personnel. Also establish a clean chain of contact and authority.

3. (a) Store chemicals for mite control at strategic locations. Assign some person(s) to continually up-date information about mite control and replace stocks of chemicals.

4. (a) Think out policies, plans and procedures for overwintering hives as they relate to mites which have the capability of overwintering in hives.

(b) At every opportunity and using whatever media is available, continue to emphasize to beekeepers the danger of illegal introductions of honey bees.

Plan Number 2

Action to be taken if an exotic mite or any other disease or pest of the honey bee not presently found in Canada is introduced.

1. (a) When mite or disease identification is confirmed, alert Canadian and U.S.A. Federal and Provincial authorities and neighboring provinces or states and any other agencies or persons deemed necessary.

2. (a) Based on the conditions and distribution of the problem, immediately establish a quarantine area around the problem site.

(b) No movement of bees, equipment or bee products, in or out of the isolation area, should occur without authorization.

(c) Immediately destroy all bees in all colonies within the quarantined area.

(d) Fumigate all frames and equipment within the quarantined area.

3. (a) Continually monitor the situation and maintain liaison between all Federa, Provincial and local personnel concerned.

Plan Number 3

Action to be taken if an exotic mite or any other disease or pest of the honey bee is identified as being present in the United States.

1. (a) Prepare a list of Canadian Federal and Provincial authorities to be contacted by U.S.A. authorities in the event of a problem.

   (b) When a problem is identified in the U.S.A., immediately contact the Canadian Federal and Provincial authorities.