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HiveLights

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Canadian Honey Council

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Canadian Honey Council

The Canadian Honey Council (CHC) is the national organization of the Canadian beekeeping industry and Hivelights is the industry's magazine. Our association is an "organization of organizations". One of the benefits of belonging to our member organizations is that all members receive a copy of Hivelights magazine. In order to receive Hivelights you must be a current member of your provincial association. International subscribers can receive our high quality magazine for a fee of $50 Canadian per year.

Schools, libraries, non beekeepers, university or government personnel can receive Hivelights magazine through special membership as "Friends of Canadian Apiculture".

Please contact the CHC office for more information.

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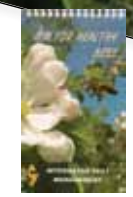
Healthy Honey Bee aproaches Goodland Apple Blossom, Stonewall, Manitoba
Photo: Jim Campbell, MB



This cover picture was used for the cover of the "IPM for Healthy Bees" Booklet covering Integrated Pest Management, which is available from the Canadian Honey Council.

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Rod Scarlett, Executive Director, CHC

Since the last edition of Hivelight's a lot has happened. As I mentioned at the Manitoba Beekeepers Annual General Meeting, I have gone from taking minutes about Seabiscuit to understanding it is C-BISQT . In listening to beekeepers terminology is not only important, it is what makes this industry unique. To the novice, it takes a while to understand brood is not something you do when you feel down and out, that bees are imported in packages, that comb doesn't refer to hair and that the virgin Queen doesn't refer to Elizabeth. Moreover, if you were a carpenter would you understand words such as frame, bottom boards, doubles, uncapping planes, and rabbits? Usually, I would understand refuse and garbage, but slumgum? And then you have oxylic acid, formic acid, acylic acid, nosema, small hive beetle and varroa mites. If you are not in the industry it is quite an imposing vernacular. I do remember not so long ago when the industry was experiencing some pretty severe winter losses someone questioning me why mice were killing off bees.

Notwithstanding the technical terms, the last three months have been very active, from attending the Alberta beekeepers IMP to the aforementioned Manitoba AGM and a series of meetings in Ottawa. Of course, there was a lot of time dedicated to Health Canada's honey botulism campaign. There has been work done by the labour committee, the hive health and stock replacement committees. The Board of Directors have instituted monthly conference calls and communication with members remains very important. On March 15, 2011 Quebec beekeepers officially joined the CHC with Scott Plante elected to the Board of Directors. Also in March, Paul Vautour was elected as the CHC delegate representing Atlantic Canada's beekeepers. I have had discussions with some of the provincial administrators and look forward to making some significant changes to Hivelight's and our communications with member organizations and the public.

The most important thing I have learned in the first months of working for the CHC is that the people on the Board and those I have met who are involved in the industry are working tirelessly to promote and expand the industry. As you go into the bee season, work safely and if you have the time, please give me a call.

Notice Of Quarantine Area For Bees

Preventing The Spread Of Small Hive Beetle In Essex County And Chatham-Kent

Susan Murray, Ministry of Agriculture, Food and Rural Affairs, March 7, 2011

A quarantine area has been established for bees in Essex County and part of the Municipality of Chatham-Kent to prevent the spread of small hive beetle to other areas of the province and to protect the integrity of Ontario's beekeeping industry.

On March 7, 2011, the Chief Veterinarian for Ontario issued a declaration under the Bees Act establishing the quarantine area and outlining responsibilities for all beekeepers or persons with beekeeping equipment within the quarantine area. As a result of the declaration, these persons must:

- not move their bee colonies or equipment within or out of the quarantine area without the prior written approval of the Provincial Apiarist
- report any previously unreported findings of small hive beetle to the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)
- participate in surveillance and treatment as directed by the Provincial Apiarist
- follow specific biosecurity measures listed in the declaration (e.g., cleansing of footwear and disinfection of utensils)

In September 2010, small hive beetle, Aethina tumida, was confirmed in Essex County beekeeping operations and OMAFRA responded immediately with quarantines on individual yards where small hive beetle was observed. OMAFRA continues to work with the beekeeping industry and other stakeholders to manage this new pest of honey bee colonies.

Establishing a quarantine area at this time, prior to the start of the beekeeping season provides the best opportunity to control movement of bees and prevent the inadvertent spread of small hive beetle from any yard where it might be present but not yet detected.

Background

- Small hive beetle does not affect food safety or human health.
- Small hive beetle is an emerging and invasive pest of the European honey bee that has established in most regions of the United States. There have been confirmed findings in southern Quebec and western Canada. However, to date, it is not known whether small hive beetle has established a resident population anywhere in Ontario beyond the quarantine area.
- Small hive beetle is a significant risk to honey bee colony health and can damage beekeeping equipment and spoil honey. It can be spread through the movement of honey bee colonies and equipment, and beekeeper activities.
- In the fall of 2010, quarantines were

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placed on 16 beekeeping yards and one processing facility in Essex County under the Animal Health Act, 2009. In January 2011, small hive beetle was added under the regulations of the Ontario Bees Act as a named pest. The establishment of a quarantine area under the Bees Act complements these measures to further control the risk of spread to other areas of the province.

- The specific boundaries of the quarantine are all of Essex County and the part of the Municipality of Chatham-Kent lying south-westward of a line made up of a Town Line Road, Pump Road and Merlin Road (also known as County Road 7), as if these roadways extended continuously from points of intersection with the shorelines of Lake St. Clair and Lake Erie.

Press Release

Honey Crook Indicted, Finally

Reprinted from Catch The Buzz with permission

The business agent for several honey importers has been arrested on federal charges lodged in Chicago, alleging she conspired to illegally import Chinese honey, prosecutors said today.

Shu Bei "Kathy" Yuan, a Chinese national, was arrested Tuesday in Los Angeles and appeared in federal court in Los Angeles late Wednesday, prosecutors said in a news release.

Prosecutors allege that Yuan claimed the honey came from South Korea, Thailand and Taiwan rather than China to avoid paying higher import taxes.

Yuan's indictment on charges of evading about $500,000 in import taxes on about $200,000 worth of honey is part of a larger probe into German-based Alfred L. Wolff, Inc., and related companies that began to result in indictments in 2009. A federal grand jury indicted 10 Wolff executives and five companies in an $80 million honey-import fraud scheme. So far, 20 people and companies have been charged in honey-related investigations, according to the release.

Yuan worked for Blue Action Enterprise, Inc., a California honey importer, and related companies, including the now-defunct 7 Tiger Enterprises, Inc., and Honey World Enterprises, Inc.

She worked with a man named Hung Ta "Michael" Fan, who owned the three companies, to bring the honey into the Unites States between March 2005 and June 2006. Fan pleaded guilty last year to conspiring to import Chinese honey illegally to skirt about $5 million in import duties. He was sentenced to 30 months in prison.

Yuan is alleged to have falsely declared that six shipments of Chinese honey came from South Korea, Taiwan and Thailand. Honey from those countries was not subject to "anti-dumping" duties at the time of the scheme, prosecutors said.

If convicted, Yuan could face up to 20 years in prison and a $250,000 fine for the most serious charge against her.

2011 Directors
Canadian Honey Council
Conseil Canadien de Miel

Membership in CHC

National organizations with a vested interest in honey bees, in addition to the existing provincial beekeeper organizations, are eligible for membership in the Canadian Honey Council. Applications are subject to review by the CHC Membership Committee. Those associations that meet established criteria are then considered for approval by the Board of Directors. Application form available from CHC office.

RegionalReports

Maritimes

No report available.

Québec

Hello from Québec. After a fantastic year for honey production and hive increase in 2010. A fair amount of beekeepers were surprised by the amount of varroa they found in their hives in the fall. So as I am writing this, we are about one week away from taking out and/or checking our hives and I know of a lot of nervous beekeeper. Some major issues we are currently working on are honey bee poisonings with the new systemic insecticides, working out new regulations which would oversee hives coming in to Québec for crop pollination, and installing a buffer zone for small hive beetles along the extreme south western part of our province. Have a great beekeeping season.

Scott Plante

Ontario

Most are already aware that in September 2010 it was confirmed that small hive beetle was found in Essex County in southwestern Ontario. The Chief Veterinarian for Ontario under the Ontario Bees Act has established a Quarantine Area in order to contain the small hive beetle and protect areas of the province that are believed to be free of the pest.

Tim Greer

The quarantine area covers the entire Country of Essex and the part of the Municipality of Chatham-Kent lying south-westwards of a line made up of a Town Line Road and Merlin Road (also known as County Road 7) therein, as if these roadways extended continuously from points of intersection with the shorelines of Lake St. Clair and Lake Erie.

The Quarantine Area comes with a number of restrictions and requirements that affect all beekeepers within the area and some that affect beekeepers that may wish to move bees into the area. Briefly, it restricts all movement of bees within the Quarantine area without a certificate issued by the provincial apiarist. No bees, bee equipment, bee products or by products will be allowed to move out of the Quarantine Area without prior approval. Within the Quarantine Area an individual beeyard or establishment may be put under quarantine should small hive beetle be found or suspected. This type of individual quarantine comes with it's own set of restrictions and requirements. For details and recommendations surrounding everything small hive beetle related please visit www.omafra.gov.on.ca

The Ontario Ministry of Agriculture Food and Rural Affairs has put a tremendous amount of work into the issue of small hive beetle. Working closely with the Ontario Beekeepers Association, and the Provincial Apiarist they continue to address the concerns of our industry and seek to support the control of this pest. OMAFRA, M.P.P. Minister Carol Mitchell along with her staff have personally addressed the issue. OMAFRA will be providing financial support to address the pollination requirements within the quarantine area, provide increased monitoring and surveillance throughout the province, and to conduct further research into dealing with small hive beetle in Ontario.

A submission has been sent from OMAFRA for an Emergency Use Registration for Miteaway Quick Strips (MAQS). We are optimistic that this varroa control product will be available to beekeepers for the upcoming season. Thank you to Provincial Apiarist, Paul Kozak and Provincial Minor Use Coordinator Jim Chaput for working expeditiously with industry on this issue.

The Ontario Bee Breeders Association will be holding their Spring Meeting on Friday March 25th and the Ontario Beekeepers' Association Spring Meeting on Saturday, March 26th at the Markham Fairgrounds. Tim Wendell, Wendell Honey Farm, Saskatchewan will be speaking at both events.

Manitoba

Manitoba held their 105th Convention and Symposium in Winnipeg on March 4th and 5th. There was a full agenda, yet ample time for producers to mull over the talks during break times. Presenters from across Canada and USA brought technical and practical information from their respective projects. Randy Oliver continued with his theme of self-sufficiency, and emphasized development and production of local queens portraying strengths for pest resistance and bee health. Other speakers from Ontario and Quebec echoed this theme.

With the demand for imports of queens being quite high in Manitoba, there is lots of concern with what is happening in Hawaii and Australia. Producers are watching e-mails closely for updates on this issue, as well as updates on the Small Hive Beetle situation here in Canada.

Despite the queen concern, producers at the Convention expressed general optimism for the coming year. Although honey prices are in the $1.50-$1.60 range, not much honey is moving. It is not clear whether or not some are holding back awaiting higher prices, or the demand remains soft.

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We are also watching treatment options for Varroa, as we plan ahead for springtime. Manitoba continues to seek alternative treatments, yet want to ensure they are available in a timely manner, plus meet the efficacy requirement of our regulator. Even more importantly, will they work in our climate?


Bryan Ash

Early reports indicate some winter losses are already evident, yet at fairly low levels, and vary from place to place. The past few days have given an opportunity for brief cleansing flights for colonies wintered outdoors. The plus 5 degrees are hardly suitable, yet bee flights are good signs. The snow cover is quite heavy in most areas of Manitoba, with the Southwest area getting the brunt of the last few storms. And yet, areas in Central Manitoba have signs of fields showing through already.

The Manitoba Agricultural Services Corporation (MASC) confirmed availability of Honey Bee Winter Mortality Insurance for 2011-2012. This is good news as MBA board has been seeking this for the last few years. The program should be introduced in April, with application deadline in mid August. Although all the details are still being developed, we know the initial insurance will have a 30% loss deductible. There will also be options for 60, 70 or 80% coverage.

Manitoba has been fortunate to have coverage for Wildlife Damage Compensation Program when Bears destroy honey bee products. This program, operating since 1982, is also administered by MASC. It seems the damage coverage will increase to 90% in 2011, and to 100% in 2012.

For another wildlife concern, producers report an increase in skunk damage. For this issue, in responding to a request for help, the Minister of Conservation directed MBA board to work with the Manitoba Trapper's Association to assist in humane control or possibly guide local beekeepers in other forms of preventative techniques.

On a more positive note, MBA is planning the Second "Day of The Honey Bee" for Sunday May 29 at the Forks Market, in Winnipeg. Once again the Manitoba Agriculture, Food and Rural Initiatives Minister is being requested to sign a proclamation for the day.

MBA board signed a $140,000 Varroa Control Screening Research Project. For the first year of the three year project, producers are being asked for about 40 colonies. Dr. Rob Currie, at University of Manitoba, will oversee and direct the testing of several products.

Saskatchewan

When will it end? Winter that is. Winter has been long and harsh in Saskatchewan, especially since early January. As we sit mid-March the temperatures continue to hover well below normal. Better temperatures are always a week away with more snow in the forecast. Snowfall has been plentiful. After last years wet conditions, which saw many acres flooded and unheeded. We are expecting an extremely wet spring across the entire province with flooding sure to affect many areas.

All members of the Saskatchewan Beekeeper Association (SBA) have the opportunity to participate in the Advance Payment Program through the association. The last two years we also offered the spring advance as an option along with the fall advance. The spring program has proven extremely popular with producers who only need to participate in AgriStabilty (and or crop insurance effective this spring) to secure their loan. Any producer that falls short of the $100,000 interest free portion in the spring program can get topped up in the fall program with honey inventory. Money is advanced in early April and if producers have not sold their honey by the following April they are still eligible to participate in the following years program and potentially have $200,000 interest free loan outstanding. This program is a significant benefit to producers.


Corey Bacon

The SBA will be finalizing details of the new bear fence program with Saskatchewan Crop Insurance who last spring picked up the program after Saskatchewan Environment dropped it. We expect the program to be much enhanced from the old program with an increase in the portion of crop share to the government increasing from the current 60% level and cap of $1,000 per producer. We expect the program budget to also be greatly increased from the old cap of $15,000 for the entire program.

While dialogue has been slow, the SBA plans to continue to work with Saskatchewan Crop Insurance to adjust the Honey Production loss insurance that became available last spring. Intake was extremely low and without meaningful changes, it is not expected producers will see value in participating in the program as a viable risk management tool. Work will also continue on the overwinter mortality insurance program through Saskatchewan Crop Insurance. We expect the program details to be finalized and the program operational by fall 2011. Producers are far more likely to see value in a winter mortality program as a risk management tool.

The SBA Technical Adaptation Team (TAT) will continue into its second year of operation despite not yet having a lead for the program. Thank you to the volunteers that oversee the program and donate colonies and for experimentation. This year the focus will expand from miticide testing and include increased nosema work and also include fall management and overwintering techniques.

The SBA along with the

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Saskatchewan Beekeepers Development Commission (SBDC) have decided to revamp the website to make it a meaningful, informative and useful tool for beekeepers and the general public. The foreign worker programs in SK continue to face challenges at the provincial level. Hopefully these issues will be worked out for the 2012 season. The SBA has for some time recognized the potential for growth of the bee industry in SK. The land mass and availability of forage for honey production is significant. While some areas of the province are at the maximum threshold for bee colonies, many areas sit vacant of bee colonies. Colony numbers could easily increase in SK to 250,000+ colony range, not to mention the pollination potential. Succession, growth and new entrants into the industry will need to be a focus for the SBA and SBDC boards going forward.

The SBDC continues to fund and/or work on several projects. Progress has started on a series of pamphlets (10) to inform and educate farmers, landowners, honey consumers and the general public. Work also continues on an educational calendar for beekeepers to share with their farmer friends as an educational tool. The SBDC has also funded work by Dr. Rob Currie into breeding and stock selection. This is a five-year project and the SBDC has committed funds on an annual basis. The SBDC also continues to fund the Regina Bee Clubs efforts at the Agri-expo in Regina at Agribition. The bee club does an excellent job at the agri-expo exposing children to the industry and pollination. Significant financial support for the SBA TAT will also continue this year. The SBDC has also sponsored the Saskatchewan Eco Network for a film and educational festival hosted across the province. One of the focuses will be on the honeybee this year. The board has also earmarked another $30,000+ for other potential projects and looks forward to reviewing future applications for funds.

With the late winter there have been virtually no reports of hive loses. There were concerns in the fall in some operations with the mite loads following treatment. However, those that winter indoors are indicating the bees are looking good going into spring. Honey prices in Saskatchewan remain stagnant in the $1.60/lb range. In spite of constant conversation revolving around a shortage of white honey around the world, honey prices have not moved upwards as many expect. With a below average Argentine crop and low volume of white honey produced, only time will tell where the price goes. A weakening of the Canadian dollar would certainly assist an upward movement. The SBA annual field day will be hosted in the "golden triangle" in the SE corner of the province at Brian Strong's operation on June 24th. Check the CHC and/or SBA websites for details.

Also, a welcome to our new CHC Directors and also to the Quebec provincial organization, which returned to the national industry body as a partner, giving CHC true national participation. Wishing everyone a successful overwintering and a spring season!

Alberta

Lee Townsend

Spring is around the corner and I'm sure that everyone is looking forward to getting back into their bees after a long winter across Canada. Alberta is facing a later start than usual as we've had something called snow this winter, which is never a bad thing. Initial from beekeepers that are now in their bees are varying, but overall it appears that the vast majority of beekeepers have nice looking colonies coming out of winter. That being said now is the time when losses can mount so only time will tell.

The Alberta Beekeepers held their annual IPM meetings in early February, and it was well attended once again. It is events such as this that will assist all beekeepers in the success of their businesses going forward. We have realized that being reactive will cause us to go backwards, and it has taken time but I feel as an industry we are very proactive and the results of this are very evident.

I'm very happy to report that CBISQT is being worked on once again by the CHC Food Safety Committee. We are currently reviewing a solid proposal from an individual outside of our industry that has the vital OFFS and HACCP knowledge to assist us in completing the manual. We also have funding available from the federal government in order to complete this stage of the manual. It has been a long process for us to complete this, but in comparison to other commodities that have completed their manual it is similar to the timeline they faced. I must thank individuals from within CFIA who have been a great resource in assisting us in getting back on track with this.

CHC has been working with both HRDC and CIC regarding labour issues our industry has been facing recently. As you are aware, we were able to successfully obtain wage rollbacks for the Prairie Provinces for 2011. This has caused a great deal of dialogue regarding how to prevent this in the future, and I strongly believe we are on the right path. CHC has sent draft job descriptions in to HRSDC for their review and comment, and once these are accepted by both parties we will be able to create an industry specific wage survey. In the past our wages were set by what other industries in agriculture were paying, and by having an industry specific survey we will not face the prospect of 15%-37% wage increases from one year to the next. We are aware that some producers have had issues with the regional HRSDC offices with the recent changes, and please feel free to contact the CHC office with those concerns so that the Labour committee can deal with them on your behalf.

Finally, I would like to offer our thoughts to those that are currently suffering in

Japan following the natural disasters that recently occurred. The Canadian honeybee industry has built a very strong relationship with producers and the general public there over the past few years.


Jerry Poelman

It was a long winter in Alberta and one of the colder ones in the last 25 years. Beekeepers will be getting into them slower than usual, since it seems that spring will be waiting for April till she shows up across the province.

As of March 20 not to many producers have been in there hives. The few that have been out are saying average losses which is good for this year. We have heard of some beekeepers having high losses to. It seems that if you give the mites half a chance they will find a way to kill your colony. We have also heard of instances where hives have died , but had very low mite levels, this is alarming. It is extremely difficult to diagnose these hives and come up with a reason for their death.

Honey prices were stable this year in Alberta and inventories appear to be low. There have been reports of prices rising in the U.S.A., but since there is not much honey left not many will be taking advantage of this. It did not seem as much honey was exported to Japan this year from Alberta. There is optimism for a good crop though with the spring moisture and stable prices.

Canola pollination also looks good with the potential of approximately 85,000 acres of hybrid canola seed production in southern Alberta and the potential for 18 to 20 million acres of commercial canola in the 3 prairie provinces. Canola seems to be the main crop for a lot of our honey production now.

British Columbia

It is March 14th and we have just gained another hour of daylight to work in the bee yards as we spring forward according to the clock. Mother Nature is so slow to respond with decent weather.

Overwintering survival of bees is still too early to determine although this winter appears normal. Heavy losses have occurred in the eastern region of the Fraser Valley but not the central nor western regions. Although majority of samples of the eastern FV region were positive with N. ceranae and various viruses, the management of the colonies had not been different last year. Winter conditions had not been particularly harsh and Varroa mites were well under control. Possibly some biotic agent or the combination of various viruses could be the problem.

A commercial operator has observed that hives in the central FV have about 20 to 25% grapefruit sized clusters with the rest being better. Colonies brought from Alberta canola pollination have a 50 % loss,, but those from alfalfa are less at an 8 % loss.

According to our PA, Paul van Westendorp, the Small Hive Beetle is mainly a threat to B.C. from Washington State. Beetle populations have not been established in Washington State nor Western Canada at this time. The Ministry will have ongoing contact with Washington State beekeepers and experts. Monitoring of B.C. colonies will be encouraged by beekeepers near the border in the Fraser Valley and Okanagan Valley. In case of confirmation, a delimiting survey and colony movement restriction will be put in place. A summary of 2010 information on the provincial disease and pest profile will be listed on the B.C. Ministry of Agriculture website.


Gerry McKee

At the recent BC Honey Producer's Semi-Annual meeting, the membership supported the EUR for NOD's MAQS formic product but there is some issue with the access to technical data.

The five IPM workshops, last year, were well attended, including the two queen rearing courses. Plans are underway to offer additional IPM and Queen rearing workshops this year.

Our First Vice-President, Wayne Neidig, reported that our AGM will be held October 20 to 23rd, at the Delta Airport Hotel by the Fraser River. Two education days are included with over confirmed 12 speakers, to date. A Honey judging competition is planned and members are encouraged to study up on how to prepare submissions.

Our BeesCene editor, Diane Dunaway has retired from her position and the Board is looking for a replacement. Contact is Barry Denluck, < 2ndVicePresident@BCBeeKeepers.com > .

Beekeepers are dismayed with the thoughtless, negative advertising of Health Canada's recent Botulism scare tactics to draw attention to their website. There is cautious optimism the CHC's visit to Ottawa will halt Health Canada's future anti-honey advertising.

The Western Apicultural Society (WAS) will be holding its Convention in September 12-15th at Kona on the Big Island of Hawaii. Issues of bee health will be the focus and two tours will be offered. Book the Hapuna Beach Prince Hotel by March 31st to get the lower rate. There is a direct flight out of Bellingham, WA via Hawaiian Airlines; cost is $ 438. Check WAS website.

The Bee World Project's first assignment is nearing completion at Pursat, Cambodia. There have been many challenges including cultural conditions as well as bee management adjustments to control the

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infamous Varroa mites. Both European and Apis ceranae stock were used. Five other countries are under consideration.

CO-OP Honey Packer

Bee Maid Honey is very proud of our management and staff and recognizes the importance that they all play in the success of the entire organization. We are very fortunate to have staff that have been with the organization for many years and one of these persons is retiring at the end of a 46 year career. Wayne Styan, the Bee Supply Sales Manager for the Manitoba Cooperative Honey Producers Limited in Tisdale, Saskatchewan has decided that it is time to retire and has announced that he will be stepping down at the end of this year.

Wayne Styan, first started with the Saskatchewan Honey cooperative on July 5, 1965 loading rail cars of Honey Boy Honey destined for the United Kingdom. During this time, the Tisdale plant was very active packing a retail product for the growing UK market. In 1970 the Saskatchewan and Manitoba cooperatives amalgamated to become the Manitoba Cooperative Honey Producers Limited. In August of 1971 Don Robertson, the General Manager of the Manitoba Coop at that time, asked Wayne to take over the management of the Tisdale facility. In 1976, the honey packing operations were shut down in Tisdale as a result of the declining pound sterling and the new duties with England joining the Common Market. During this time, one of Wayne's co-workers at the Tisdale plant was Herb Butt, father to Brent Butt of Corner Gas fame.


Gordon Marks

The Tisdale plant was eventually sold in 1983 with the Bee Supply operations moving to new facilities in Tisdale with Wayne running the Bee Supply sales as a one man operation. The current location is on the west side of Tisdale on Highway 3.

Wayne is an avid collector of sports memorabilia, antique beekeeping equipment and has a honey container collection that is the envy of many collectors including Lorne Peters, former CHC representative for Bee Maid. Lorne just wishes he could get his hands on some of Wayne's collection. Wayne and his wife Marilyn plan to remain n Tisdale however will be planning the occasional trip to visit with their children and grandchildren.

We invite all of Wayne's friends to stop by and visit over the coming months to say hello and wish him a long and healthy retirement. From all of your friends at Bee Maid and the beekeeping community, congratulations Wayne on your retirement, you have earned it.

Why determine Diastase activity in Honey?

Eric Jonsson, Magle Life Sciences

The quality of honey concerns us all. We need ways to ensure and enforce that honey reaching our stores is of good and consistent quality and hasn't been tampered with. I believe the way to get there is by international collaboration and by harmonising global standards. The International Honey Commission (IHC) are dedicated to this task, i.e. finding new and better ways to certify the quality of honey and other bee products.

To help meet their goals, the IHC has compiled a host of validated and harmonised methods. Though widely accepted in Europe, these methods are having trouble finding their way across the Atlantic. In Europe, Diastase Activity is regarded an important indicator of the quality of honey. The EU Honey Directive even states that when marketed for human consumption, honey must meet certain criteria for Diastase activity (Schade units):

- In general not less than 8 (except baker's honey);

- Honeys with low natural enzyme content (e.g. citrus honeys) and an hydroxymethylfurfural HMF content of not more than 15 mg/kg: not less than 3.

Diastase in honey converts starch to short-chain sugars and the enzymes' activity hints at possible heating and/or poor storage conditions. Heating the honey degrades the enzyme, which is why the EU directive states minimum values. In the U.S., diastase activity is mainly controlled to ensure low Diastase values, because much of the honey supply is used at bakeries for mixing with starch-containing food ingredients. A high Diastase activity may cause poor bread texture. Regardless of the objective, measuring Diastase activity is important.

The IHC recommends two methods for determining Diastase activity, viz. Phadebas® and Schade. The Phadebas method uses the reagents of the Phadebas Amylase Test (Magle Life Sciences). However, analysing honey samples wasn't the intended use of this product and problems were soon reported by vigilant laboratories. To meet the demands for analysing honey, a new product was developed together with European laboratories. The result was the Phadebas® Honey Diastase Test (PHDT).

PHDT was introduced this year at the IHC meeting in Greece and has since gained a fast and widespread acceptance among the honey analysing laboratories. Today it's largely replacing the older Schade method, as it offers better precision, improved selectivity and an improved throughput. To receive further information about Phadebas® Honey Diastase Test and the IHC methods, please visit us at www.phadebas.com or e-mail to info@phadebas.com.

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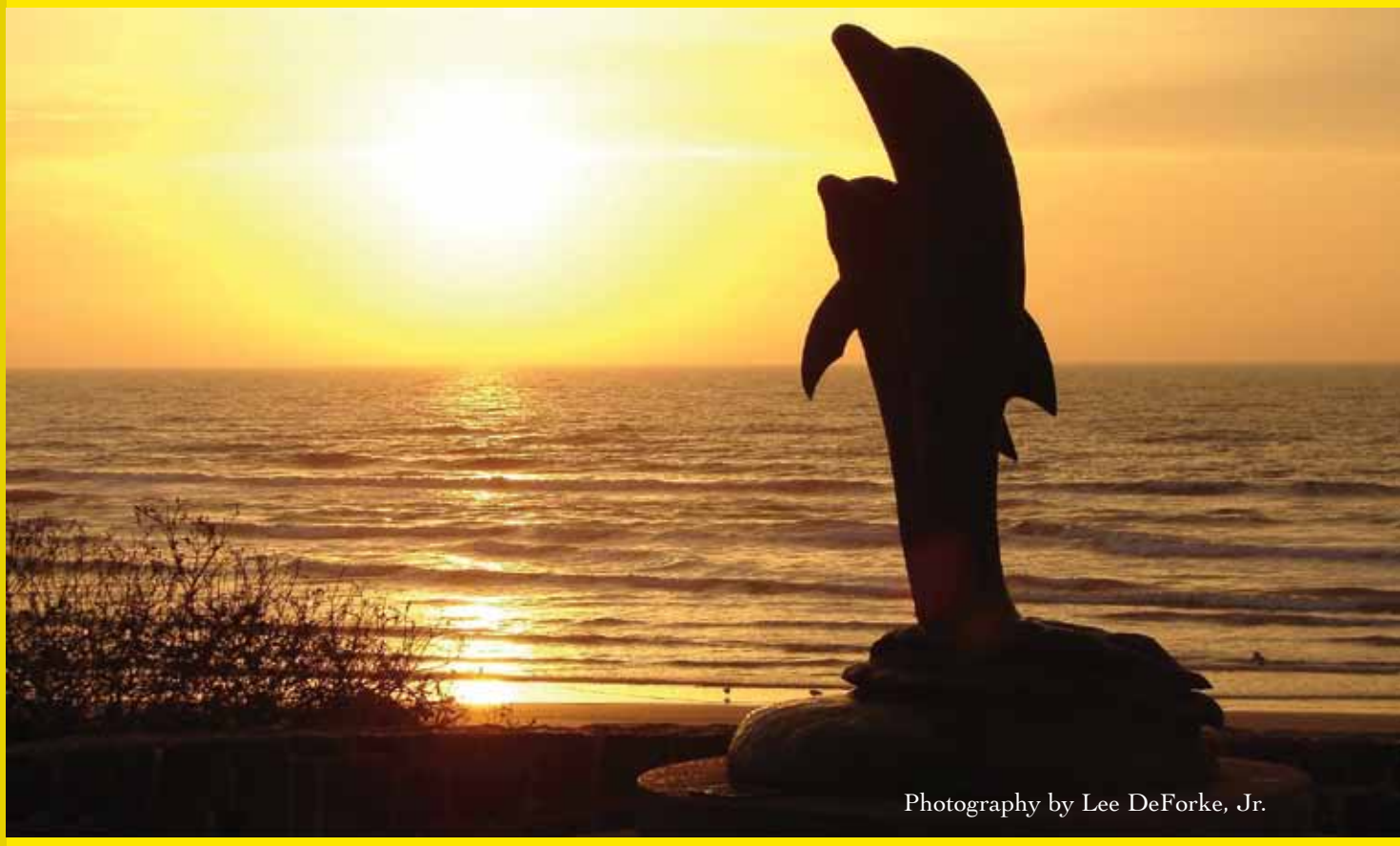
HiveLights

www.honeycouncil.ca



Photography by Lee DeForke, Jr.

Reports from 70th Canadian Honey Council Meeting in Galveston, Texas

Canadian Honey Council Activities

Canadian Bee Research Reports

Canadian Domestic Exports of Honey

Source: Statistics Canada, CATSNET Analytics

Canadian Dollars		Canadian Dollars							Quantity						
		2008	2009	2010	2011 - January	*2011 as % of 2010*	*Long-term CAGR (2001-2010)*	*Short-term CAGR (2008-2010)*	2008	2009	2010	2011 - January	*2011 as % of 2010*	*Long-term CAGR (2001-2010)*	*Short-term CAGR (2008-2010)*
04090000 - Honey, natural (Kilogram)	United States	54,927,957	33,257,702	41,136,613	2,455,923	5.97%	4.44%	-13.46%	17,272,537	8,302,454	11,053,443	633,308	5.73%	0.50%	-20.00%
	Japan	5,127,445	6,714,312	9,848,183	792,905	8.05%	28.49%	38.59%	1,616,402	1,692,286	2,440,219	172,670	7.08%	20.77%	22.87%
	China	96,517	1,530,989	917,367	76,805	8.37%	/0	208.30%	27,311	456,944	173,227	16,819	9.71%	/0	151.85%
	Germany	2,417,889	1,914,990	2,669,229	76,313	2.86%	3.67%	5.07%	967,367	584,853	749,389	20,350	2.72%	-1.88%	-11.98%
	Jordan	0	3,036	51,150	54,380	106.31%	/0	/0	0	600	18,600	17,550	94.35%	/0	/0
	Hong Kong	105,265	84,702	215,348	45,301	21.04%	5.41%	43.03%	22,837	17,278	23,274	3,485	14.97%	-9.57%	0.95%
	Algeria	0	0	0	14,106	/0	/0	/0	0	0	0	2,565	/0	/0	/0
	Barbados	204,624	87,404	134,755	13,722	10.18%	15.71%	-18.85%	57,770	18,161	21,687	2,495	11.50%	5.48%	-38.73%
	Bahrain	0	0	0	6,762	/0	/0	/0	0	0	0	1,008	/0	/0	/0
	France	255,889	341,638	267,623	116	0.04%	-3.69%	2.27%	77,481	72,602	59,368	17	0.03%	-9.38%	-12.47%
	Australia	4,630,406	2,038,644	223,391	0	0.00%	/0	-78.04%	1,619,863	511,027	56,540	0	0.00%	/0	-81.32%
	Austria	0	47	185,261	0	0.00%	/0	/0	0	9	41,150	0	0.00%	/0	/0
	Bahamas	79,401	30,245	25,682	0	0.00%	-4.38%	-43.13%	20,490	8,896	3,324	0	0.00%	-11.29%	-59.72%
	Belgium	327,950	173,341	89,840	0	0.00%	-4.26%	-47.66%	88,520	37,322	20,852	0	0.00%	-11.34%	-51.47%
	Bermuda	27,752	18,537	26,796	0	0.00%	11.51%	-1.74%	6,756	4,165	4,180	0	0.00%	-1.48%	-21.34%
	Burkina Faso	0	0	695	0	0.00%	/0	/0	0	0	126	0	0.00%	/0	/0
	Cuba	0	375	3,437	0	0.00%	/0	/0	0	68	629	0	0.00%	/0	/0
	Greenland	856	0	261	0	0.00%	/0	-44.78%	252	0	47	0	0.00%	/0	-56.81%
	Iceland	159,343	0	0	0	/0	/0	-100.00%	42,270	0	0	0	/0	/0	-100.00%
	India	40,841	8,492	0	0	/0	/0	-100.00%	15,708	2,491	0	0	/0	/0	-100.00%
	Indonesia	3,665	3,888	0	0	/0	/0	-100.00%	744	720	0	0	/0	/0	-100.00%
	Iran	2,604	0	0	0	/0	-100.00%	-100.00%	840	0	0	0	/0	-100.00%	-100.00%
	Kuwait	0	50,135	0	0	/0	/0	/0	0	9,177	0	0	/0	/0	/0
	Lebanon	16,848	13,770	34,342	0	0.00%	/0	42.77%	6,280	4,050	6,408	0	0.00%	/0	1.01%
	Malaysia	4,763	0	0	0	/0	/0	-100.00%	1,401	0	0	0	/0	/0	-100.00%
	Netherlands	0	16	0	0	/0	-100.00%	/0	0	3	0	0	/0	-100.00%	/0
04090000 - Honey, natural (Kilogram)	Panama	0	0	1,310	0	0.00%	/0	/0	0	0	238	0	0.00%	/0	/0
	Qatar	0	0	14,112	0	0.00%	23.54%	/0	0	0	2,566	0	0.00%	11.03%	/0
	Republic of Ireland (Eire)	187,918	0	0	0	/0	-100.00%	-100.00%	87,499	0	0	0	/0	-100.00%	-100.00%
	Saint Kitts and Nevis	0	2,745	0	0	/0	/0	/0	0	803	0	0	/0	/0	/0
	Saint Pierre and Miquelon	1,750	3,339	3,640	0	0.00%	/0	44.22%	539	579	530	0	0.00%	/0	-0.84%
	Saudi Arabia	36,147	49,765	103,075	0	0.00%	/0	68.87%	10,631	12,208	20,825	0	0.00%	/0	39.96%
	Singapore	13,312	12,491	18,335	0	0.00%	/0	17.36%	3,420	2,641	3,322	0	0.00%	/0	-1.44%
	South Korea	126,056	12,177	10,389	0	0.00%	/0	-71.29%	42,983	2,996	2,817	0	0.00%	/0	-74.40%
	Sweden	65,394	0	37,026	0	0.00%	/0	-24.75%	20,480	0	6,732	0	0.00%	/0	-42.67%
	Switzerland	144,145	140,612	469,412	0	0.00%	/0	80.46%	41,559	39,567	112,203	0	0.00%	/0	64.31%
	Taiwan	83,875	87,005	67,660	0	0.00%	/0	-10.18%	24,370	14,251	12,664	0	0.00%	/0	-27.91%
	United Arab Emirates	0	256	22,845	0	0.00%	/0	/0	0	57	3,893	0	0.00%	/0	/0
	United Kingdom	754,468	541,609	417,331	0	0.00%	-5.58%	-25.63%	264,725	132,942	93,862	0	0.00%	-12.77%	-40.45%
	Subtotal (included)	69,843,080	47,122,262	56,995,108	3,536,333	6.20%	6.48%	-9.66%	22,341,035	11,929,150	14,932,115	870,267	5.83%	1.93%	-18.25%
	Country	69,843,080	47,122,262	56,995,108	3,536,333	6.20%	6.39%	-9.66%	22,341,035	11,929,150	14,932,115	870,267	5.83%	1.82%	-18.25%

Canadian Beekeepers Association 1940-1972

President

Year	Name	Town	Prov
1940-41	William R. Agar*	Brooklyn	ON
1942	Sam M. Deschenes*	Montreal	QC
1943	J. W. Braithwaite*	Brandon	MB
1944	P.C. Colquhoun*	Maple Creek	SK
1945	Allan T. Brown	Peterborough	ON
1946	W.E. Phillips*	Dauphin	MB
1947-49	Frank Garland*	Winnipeg	MB
1949-51	J.N. Dyment	Smithville	ON
1952	Peter Kowalski*	Edmonton	AB
1953-54	W.H. Turnbull*	Vernon	BC
1955-56	H.C. Allen*	Toronto	ON
1957-58	Sid J. Lye	Oakville	ON
1959-65	Victor Mesley*	Kemptille	ON
1966-67	Earl J. Burnett	Roland	MB
1968-69	Robert Asher	Brooks	AB
1969-71	Lou Truscott	Creston	BC

Secretary

Year	Name	Town	Prov
1940	W.T. Patterson	Winnipeg	MB
1941-48	Roy M. Pugh	Tisdale	SK
1949	W.G. LeMaistre*	Edmonton	AB
1950-59	Roy M Pugh*	Tisdale	SK
1960-62	R.M. McKay	Ottawa	ON
1962-69	John E. King*	Ottawa	ON
1969-72	Hank R. Taylor	Ottawa	ON

Canadian Honey Council 1972-2011

1971-72	Don F. Peer*	Nipawin	SK
1972-74	Robert Bird	New West-minster	BC
1974-76	Jack M Smith*	Beaverlodge	AB
1976-78	Gerry Paradis*	Falher	AB
1978-80	Tom Taylor	Nipawin	SK
1980-82	Howard Bryans	Alvinston	ON
1982-84	Merv Abrahamson	Pelley	SK
1984-86	Jerry Awram	Hines Creek	AB
1986-88	Dale Hansen	Farmington	BC
1988-93	Roger Congdon	Cottam	ON
1993-95	Barrie Termeer	Rollyview	AB
1995-99	Wink Howland	Yorkton	SK
1999-01	Merv Malyon	Brandon	MB
2001-02	Dave MacMillan	Thornloe	ON
2002-04	Wink Howland	Yorkton	SK
2005-06	Alain Moyen	Mirabel	QC

Chair of Board

2007-2008	Ed Nowek	Vernon	BC
2009 - 2011	Corey Bacon	Kinistino	SK

1972-75	Frank R. Garland*	Winnipeg	MB
1975-82	Fred Rathje*	Bassano	AB
1982-85	Bob Douglas	MacGregor	MB
1985-98	Linda Gane	Nipawin	SK

National Coordinator

1998- 2008	Heather Clay	Calgary	AB

Chief Executive Officer

2008-2010	Heather Clay	Calgary	AB

Executive Director

2010-	Rod Scarlett	Sherwood Park	AB

*Deceased

2011 CANADIAN HONEY COUNCIL BOARD OF DIRECTORS

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Fred Rathje Award Winners

2010	Howard Bryans (ON)
2009	Dr. Medhat Nasr (AB)
2008	Roger Congdon (ON)
2007	Heather Clay (AB)
2006	Dale Hansen (BC)
2005	Domiongo d'Oliveira
2004	Wink Howland (SK)
2003	Mark Winston (BC)
2002	Doug McRory (ON)
2001	Don Nelson (AB)
2000	John Gruszka (SK)
1999	Doug McCutcheon (BC)
1998	Jean Pierre Chapleau (PQ)
1997	Merv Malyon (MB)
1996	Lorna & Jack Robinson (ON)
1995	Gordon Kern (BC)
1994	Kelly Clark (BC)
1993	Linda Gane (SK)
1992	Babe & Charlie Warren (BC)
1991	Gerry Paradis (AB)
1990	Cam Jay (MB)
1988	Don Dixon (MB)
1987	John Corner (BC)
1986	Gerry Smeltzer (NS)
1985	Paul Pawlowski (AB)
	First year of award

Honourary Members

1950	Hon J. G. Gardiner (ON)
1950	Tom Shield (ON)
1950	Harry Jones (PQ)
1950	G.H. Pearcey (BC)
1951	P.C. Colquhoun (SK)
1951	C.G. Bishop (PQ)
1955	J.N. Dyment (ON)
1956	F.R. Armstrong (ON)
1963	C.F. Pearcey (BC)
1964	Percy Hodgson
2002	Kenn Tuckey (AB)

SECTION 1:

Canadian Honey Council

Annual General Meeting

Tuesday, January 4, 2011

In Attendance: Corey Bacon, Gordon Marks, Lee Townsend, Gerry McKee, Tim Greer, Jerry Poelman, Bryan Ash, Paul Kittleson (arrived late)

1. Called to order at 8:25 a.m.

2. Approval of the Agenda

Under New and Other Business add:
- Executive Hiring Committee report
- CFIA honey story/ Health Canada
- BeeBac Update
- Letter of thanks to Heather Clay and Green Isle
- Honey botulism
- IPM booklet pricing
- CBISQT
- Oxalic acid registration

Moved by Gordon Marks
Seconded by Jerry Poelman
That the amended agenda be approved.
Carried

3. Approval of Minutes

Moved by Gordon Marks
Seconded by Lee Townsend
That the Minutes of the October 21, 2010 Board of Directors meeting be approved as presented.
Carried

4. Business Arising from the Minutes

a) Office – a number of boxed files from the CCHC have been accepted by the Glenbow Museum
b) Fee Increases – the issue of fee increases are to be raised informally at Canada night
c) Quebec – is seemingly interested in returning to CHC but Corey has not heard anything recently
Corey/Rod to check on status

5. Summary Action

Issues include moving CBISQT to Food Safety Committee and the IPM booklet to Hive Health Committee

6. Executive Report

Corey attended CAPA meeting in Ontario and the issue of oxalic acid was raised. He also reported on the status of various PMRA/CFIA registrations. Pesticide poisoning can result in a PMRA investigation and beekeepers need to be made aware of the fact. **(Rod to find the appropriate information from PMRA and post it on the web-site.)** The issue of multiple Emergency Use Applications has been raised and warrants further investigation. The Honey Story deals with a government report on the levels of butyric acid and benzaldehyde in honey. Apparently, CAPA was aware of the internal CFIA report but not the CHC and points to the need that there must be better communication between CFIA and the CHC.
With regards to Small Hive Beetle, CFIA is looking at the protocols and CHC has provided its feedback in the proposed numbers.
BeeBac– the CHC initiative has identified some deficiencies in the CFIA initiative. (Corey will supply the Board members with a detailed report about the concerns as well as what will be done with the survey and its results.
Moved by Jerry Poelman
Seconded by Bryan Ash
That the CHC office redirects any CIRCON survey calls to the appropriate Director to ensure that office time not be used.
Carried

7. Hiring Committee Report

Gordon Marks gave an oral report.
Moved by Jerry Poelman
Seconded by Lee Townsend
That the Hiring Committee report be accepted as presented.
Carried

Moved by Jerry Poelman
Seconded by Gerry McKee
That Rod Scarlett report back to the Board by mid-February on the services being offered by Geoff Todd.
Carried

Moved by Lee Townsend
Seconded by Bryan Ash
That the job title be that of Executive Director.
Carried

Moved by Gerry McKee
Seconded by Gordon Marks
That the CHC bylaws and policy be updated to reflect the name change to Executive Director.
Carried

Moved by Tim Greer
Seconded by Lee Townsend
That a contract agreement be drafted by a lawyer/professional council and that Gordon Marks be responsible for identifying an appropriate person to draft such agreement.
Carried

8. Finance Committee Report

Gordon Marks presented the 2009-2010 Financial Statements

Moved by Gordon Marks
Seconded by Jerry Poelman
That the 2009-2010 financial statement be accepted as presented.
Carried

Moved by Gordon Marks
Seconded by Bryan Ash
That Rod Scarlett get quotes from Parker Quine and other potential auditor's for the next Board of Director's meeting.
Carried

The discussion of the 2010-11 was deferred till after a break.

9. Membership and Events Committee

Lee Townsend reported that Canada night will be January 5, 2011 and that committee chairs will present oral reports. **(Rod to ensure last year's resolutions and actions be posted on the web)**

Moved by Lee Townsend
Seconded by Gerry McKee
That the 2012 Annual General Meeting be held in Winnipeg in January.
Carried

Moved by Gordon Marks
Seconded by Tim Greer
That the Membership and Events Committee report be accepted.
Carried

10. Ad Hoc Committee Reports

Foreign Workers Committee

Corey Bacon reported that some wage disparity issues still exist but large wage increase reduced to 1.5% from up to 37%. Success in harmonization of the TFWP and SAWP in apiary industry (NOC 8431 – general farm worker) for the prairies. Job descriptions need developed/reviewed for NOC codes in prairies and coordinated with CHC job descriptions and forwarded to Ottawa HRSDC after clarification of desire for job descriptions from industry versus industry specific NOC's. **(Rod to gather information on foreign worker employment issues and update the website.)**
Moved by Corey Bacon
Seconded by Lee Townsend
That the Foreign Worker Committee report be accepted as presented.
Carried

Hive Health Committee

Jerry Poelman indicated that the report distributed at the October Board meeting was still relevant.

Moved by Jerry Poelman
Seconded by Bryan Ash
That the Hive Health Committee report be accepted as presented.
Carried

Hive Stock Committee

Bryan Ash reported that the committee was designed to investigate hive replacement issues and that they had conference calls on November 10 and December 15. The main item at this time is trying to resolve the Hawaiian queen importation issue.

Moved by Bryan Ash
Seconded by Gerry McKee
That the Hive Health Committee report be accepted as presented.
Carried

(Industry funding for a National Diagnostic Centre be put on the agenda for the next Board meeting)

Seconded by Jerry Poelman
Moved by Lee Townsend
That a Food Safety Committee be formed.
Carried

Finance committee – continued
Gordon presented a revised budget for the 2010-11 fiscal year.

Moved by Gordon Marks
Seconded by Gerry McKee
That the proposed budget for 2010-2011 be accepted as presented.
Carried

Income	2010/11 Budget	2009/10 Budget	2008/09 Budget	2010/11 revised Budget	
Director Fees	$60,000	$60,000	$75,000	$60,000	
Hive Assessments	$64,881	$66,237	$72,135	$64,881	
Services	$36,360	$36,720	$20,720	$36,360	
Products	$10,000	$10,000	$5,000	$10,000	
Events	$5,000	$5,000	$5,000	$5,000	
Sponsorships	$40,000	$25,000	$50,000	$40,000	
Donations to SOB	$10,000	$5,000	$0	$5,000	
Donations to CHC	$5,000	$500	$0	$0	
Project Net Income	$50,000	$0	$22,750	$0	
Misc.	$500	$500	$13,500	$600	
Other (specify)	$0	$0	$0	$0	
Income	**$281,741**	**$208,957**	**$264,105**	**$221,841**	**$0**
Balance	**$75,000**	**$70,000**	**$45,000**		
Total Available	**$356,741**	**$278,957**	**$309,105**		
Operating Expenses	**$307,281**	**$272,000**	**$288,400**	**$0**	**$0**

	20010-11 Budget ($)	2009-10 Budget ($)	2008-09 Budget ($)		
Chief Executive Officer	$63,625	$62,500	$61,400	$100,000	
Business Manager	$50,000	$35,000	$45,000	$0	
Comm./TechSupport	$3,000	$3,000	$24,000	$0	
Office Manager	$24,000	$24,000	$24,000	$24,000	
External Consulting	$9,450	$18,500	$12,000	$9,450	
Staff EI,CPP	$6,000	$4,000	$4,000	$2,000	
Staff/Contractor Travel	$13,500	$10,500	$10,000	$13,500	
Office Supplies	$6,500	$4,500	$4,000	$3,000	
Office Rental	$12,000	$10,000	$10,000	$4,000	
Internet	$800	$800	$500	$400	
Telephone	$6,000	$4,200	$3,000	$3,000	
Honouraria	$1,000	$1,000	$2,000	$1,000	
Director Travel	$25,000	$25,000	$24,000	$25,000	
Board Meetings	$4,000	$4,000	$6,000	$4,000	
Insurance for Directors	$2,000	$2,000	$2,000	$2,000	
Services (details below)	$37,000	$38,000	$32,500	$37,000	$32,000
Products (details below)	$4,500	$4,500	$3,000	$4,500	
Events (details below)	$5,000	$5,000	$5,000	$5,000	
Sponsors (details below)	$4,000	$2,500	$5,000	$4,000	
Misc. (details below)	$500	$500	$500	$500	
CHC Memberships	$2,000	$2,000	$2,000	$2,000	
Promotion	$5,000	$5,000	$2,500	$5,000	
Awards	$500	$500	$1,000	$500	
Auditing Fees	$6,000	$4,000	$4,000	$3,000	
Other (Search Services):	$15,906	$1,000	$1,000	$5,000	
TOTALS	$307,281	$272,000	$288,400	$257,850	$32,000

11. Resolutions

1. In view of the recent articles in the media regarding foreign substances being found in honey in Canada, **be it resolved that** the Canadian Honey Council immediately establish a committee of industry experts to formulate a factual response to these situations based on all scientific information available and that this committee be empowered to appoint a spokesperson to handle inquiries and to make this response available to the industry.

Moved by Gordon Marks
Seconded by Jerry Poelman
Carried

2. **Be it resolved that** the Canadian Honey Council's AGM be conducted in a venue that allows members of the Provincial Associations to attend as observers when resolutions are presented and discussed.

Moved by Gerry McKee
Seconded by Tim Greer
Defeated

3. **Be it resolved that** the Canadian Honey Council as well as the proper regulatory agencies create an amendment to inter-provincial regulations and bee importation regulations to accept 3% or less as the standard Varroa mite threshold level.

Moved by Jerry Poelman
Seconded by Lee Townsend
Carried

4. **Be it resolved that** the Canadian Honey Council request the Pest Management Regulation Agency to grant an Emergency Use Registration (EUR) for Apivar from July 1, 2011 to June 30, 2012.

Moved by Lee Townsend
Seconded by Bryan Ash
Carried

(also meant that the following were approved)

Be it resolved that if Apivar is not registered by the expiration date of the EUR by June 30, 2011the Canadian Honey Council work with the Provinces to seek Emergency Use Registration for Apivar for the 2011-2012 season.

Be it resolved that the Canadian Honey Council support the full registration of Apivar and failing the full registration of Apivar, the Canadian Honey Council pursue the emergency use registration of Apivar for another year.)

5. **Be it resolved that** the Canadian Honey Council support the registration of 65% Formic acid as a potential miticide for use by beekeepers in Canada against Tracheal and Varroa mites.

Moved by Lee Townsend
Seconded by Bryan Ash
Carried

The resolution regarding the executive title name change was withdrawn

6. **Be it resolved that** the Canadian Honey Council request the Canadian Food Inspection Agency (CFIA) review current import conditions as they pertain

to Small Hive Beetle, thus facilitating and securing the importation of healthy queens free from Small Hive Beetles into Canada for the needs of the Canadian honey and crop pollination industries.
Moved by Lee Townsend
Seconded by Jerry Poelman
Carried

7. **Be it resolved that** the Canadian Honey Council requests that CAPA and CFIA review the current import protocols, in consultation with the CHC, for imported queens and bees to ensure they remain adequate to protect the Canadian honeybee industry.
Moved by Gerry McKee
Seconded by
Resolution not introduced

8. **Be it resolved that** the Canadian Honey council approach CFIA to investigate why exporting countries are not meeting protocols and implement measures to ensure protocols are being met.
Moved by
Resolution not introduced

9. **Be it resolved that** the Canadian Honey Council continue to work with PMRA to continue to increase the number of options for mite control (e.g. organic acids and essential oils)
Moved by Jerry Poelman
Seconded by Bryan Ash
Carried

10. **Be it resolved that** the Canadian Honey Council prepare a strategy and time line for full registration of all beekeeping facilities preparing honey destined for export and retail sales.
Moved by Jerry Poelman
Seconded by Lee Townsend
That the resolution be amended to read:
Be it resolved that the Canadian Honey Council prepare a strategy and time line to encourage the registration of all beekeeping facilities preparing honey destined for export and retail sales
Carried

11. **Be it resolved that** the CHC continue to support the CFIA import ban of package honey bees from the continental US.
Resolution withdrawn.

12. **Be it resolved that** the Canadian Honey Council encourage and support companies that develop and /or have the potential to develop and register new and/or better organic treatments for the control of mites.
Moved by Jerry Poelman
Seconded by Lee Townsend
Carrried

13. **Be it resolved that** the Canadian Honey Council work closely with the provinces to ensure protocol flexibility while mitigating risk of Small Hive Beetle dispersal during interprovincial movement of honeybees.
Moved by Bryan Ash
Seconded by Jerry Poelman
Carried

14. **Be it resolved that** even if risk mitigating conditions placed on importing queens from Hawaii cannot fully guarantee "zero" risk of acquiring small hive beetle, CHC support continued importation of queens from Hawaii.
Moved by Bryan Ash
Seconded by Jerry Poelman
Defeated

Moved by Jerry Poelman
Seconded by Bryan Ash
That the reporting format to the members include only the be it resolved portion of the resolution.
Carried

12. Status of Funding Application
No word yet.

13. Weston Foundation
Letter has been drafted and a few changes need to be made. It will be sent off as soon as possible.

14. Board Calendar
Rod to be distributed to the Board as soon as possible.

15. Other Business
- the IPM booklet needs to be updated and a cost determined for the work involved.
- Rod to get information on the Health Canada advertisement on honey botulism and get information back to the Board
- Oxalic acid request to be deferred for a couple weeks
- Food safety committee to handle CBISQT
- Fairview College is thinking of reintroducing beekeeping t3chnology course if they can find the money

16. Rathje Award
Howard Bryans selected as this year's recipient. **(Rod to find information on the origins of the Rathje award and distribute information to the Board)**

17. Board Elections
Paul Kittleston nominated for the position of President
Declined
Corey Bacon nominated for the position of President
Gerry McKee seconded
Corey Bacon declared elected.

Jerry Poelman nominated for the position of Vice-President
Declined
Lee Townsend nominated for the position of Vice President
Gordon Marks seconded
Lee Townsend declared elected

Tim Greer nominated for the position of Secretary
Declined
Jerry Poelman nominated for the position of Secretary
Declined
Gerry McKee nominated for the position of Secretary
Gordon Marks seconded
Gerry McKee declared elected.

Paul Kittleston nominated for the position of Treasurer
Declined
Gordon Marks nominated for the position of Treasurer
Declined
Jerry Poelman nominated for the position of Treasurer
Lee Townsend seconded
Jerry Poelman declared elected.

Moved by Jerry Poelman
Seconded by Bryan Ash
That the nomination ballots be destroyed.
Carried

19. Committee membership

Membership and Events Committee – Chair - Gerry, members- Lee and Tim
Finance Committee – Chair – Jerry, members - Gordon and Paul/maritime delegate
Foreign Worker Committee – now to be called Labour Committee – Chair – Corey, members – Lee and Bryan
Hive Health Committee – Chair – Jerry, member – Tim
Stock Replacement Committee – Co-chair – Bryan/Jerry, member – Gerry
Biosecurity Committee – Chair – Corey, member – Lee
Food Safety Committee – Chair –Lee, members – Gordon and Tim

(It should be noted with the committee's that the CHC chair is an ex-offico member of all committees not directly named as a committee member on and the exec director is an ex-offico/resource person and needs (chair and office) included in all committee correspondence. It should also be noted that there is a responsibility to prepare minutes/notes of all meetings and forward to the office within two weeks of the meeting. These minutes/notes will be shared with board as per standard procedure.)

20. Canada Night
Agenda
Board introductions
Staff introductions
Legislative report
Committee reports
Resolutions

21. **Moved by Gordon Marks to adjourn**

CAPA President's Report - 2010

Rhéal Lafrenière, CAPA President

2010 was another busy year for the Canadian Association of Professional Apiculturists. Although I have spent 12 years on the Executive, first 7 years as the Secretary/Treasurer, next 4 years as the Vice-President and now 1 year as President, I can honestly say every year has been a tremendous learning experience. Luckily for me now as in the past, I have had great people to work with. To my executive: VP, Medhat Nasr; Secretary/Treasurer Chris Jordan and Past-President Steve Pernal thank you for your support and hard work to keep things moving forward for our organization and the industry we support. Not only does that make the job a lot easier, at times it can even be a lot of fun.

The Chemical committee, chaired by Geoff Wilson undertook several important initiatives this past year. Based on need expressed by the industry, members were heavily involved with the Emergency Use Registration of Apivar®, a strip formulation of amitraz for varroa mite control. This committee was also consulted on several issues pertaining to PMRA's decision to enforce the phase-out proposal for Note to CAPCO C94-05 by March 2, 2011. The Chemical committee also hosted several conference call meetings to deal with a request for information on the national and provincial rationales behind the Emergency Use Registration of Apivar®. As a relatively new member to CAPA, it was great to see Geoff take on the challenge of chairing such a high profile committee so early in his career.

CAPA's import committee, chaired by Medhat Nasr also did a tremendous amount of work this year. Working with CFIA, they provided consultation on a number of important trade issues. None-the-less of which was the immediate response to the small hive beetle discovery in Hawaii this Spring. Medhat and his committee provided recommendations to CFIA to allow the safe supply of queens from Hawaii to continue to come into Canada virtually uninterrupted. This committee has also been working with CFIA to look at reviewing the current bee import conditions with the various trading partners to ensure consistency and that the conditions are defendable. The small hive beetle discovery in Ontario this fall really emphasised the importance for effective surveillance and disease/pest control programs in order to defend Canada's import conditions.

Given the early meeting date for the CAPA AGM this year some of the standing committees such as the Awards committee student competition and CBRF Proposal review will not have taken place yet, so those reports will have to be amended at a later date to include that information.

Another busy committee this year was the National Survey committee chaired by Steve Pernal. A common set of winter loss survey questions was devised in order to harmonize the data collected across the country to allow for better comparison between the regions and perhaps a more accurate representation of national trends. Steve also coordinated Canada's participation in an international survey of colony losses a.k.a. COLOSS. Although not every province was able to provide data for all the standardized questions, Steve was still able to generate the annual report on honey bee losses, which was posted on the CAPA website.

The Ad-hoc committees do a tremendous job ensuring that important information on disease and pest identification as well as information about CAPA is available to the public.

Lastly, I want to take this opportunity to congratulate Heather Clay on her retirement at the end of 2010. It is with mix emotion that we say good bye to Heather, knowing that in a very short time the voice we grew accustom to hearing when we call CHC's head office will no longer have a recognizable Aussie accent. We have confidence that CHC will find an exceptional person to fill the Executive Director position knowing that the bar has been set extremely high by Heather. Again, congratulations Heather!

SECTION 2:

Progress Report for 2010

Integrated Management of Nosema & Detection of Antibiotic Residues

Progress Report for 2010

Stephen F. Pernal, Abdullah Ibrahim and Andony P. Melathopoulos
AAFC Beaverlodge Research Farm

In 2010, our research team made measurable progress towards the goals of our project. In this year, we resumed our work to test alternatives to fumagillin in laboratory bioassays. In the field, we evaluated sampling methods by which to determine infections of *N. ceranae* in apiaries. We also undertook intensive sampling to determine long-term effects of treatments applied to colonies in the previous production year. The latter was done by: a) following the progression of *Nosema* development and productivity of colonies from our 2009 comb disinfection experiment, and b) monitoring the progress of *Nosema* infections in colonies that received prescribed treatments of fumagillin in the spring and fall of 2009. The latter two efforts produced data sets that not only evaluated the effect of treatments in the season that they were applied, but also over the winter and 2010 production season.

Objectives 2010:

1. To screen alternative chemotherapies for control of *N. ceranae* using incubator-based cage trials.

2. To evaluate the precision of different sampling methods to determine *N. ceranae* infection levels in colonies.

3. To monitor the long-term effects of acetic acid fumigation, heat and irradiation as methods of disinfecting *N. ceranae*-contaminated comb applied to colonies in the spring 2009.

4. To monitor *Nosema* spore levels in colonies previously treated with various formulations of fumgaillin during the spring or fall of 2009.

1. Screening alternative chemotherapies against N. ceranae.

Our previous laboratory experiments with cage-infected bees in 2007 tested a large list of potential compounds identified from the literature as controlling various *Nosema* species in other insects. Based on these results we chose four of the most promising compounds or products to evaluate further in 2010. These included carbendazim, thiabendazole, thymol and Nozevit. In addition, Mr. Johan van den Heever, an analytical chemist involved with this project, synthesized several functional analogues of fumagillin which included fumagilol and six others (coded as follows): JP-P1-7a, JP-P1-9a, JP-P1-30b, JP-P1-33a, JP-P1-34a and JP-P1-35a. These analogues were formulated to help us discover what functional regions of the molecule may be important in fumagillin's activity and to determine if specific analogues may be associated with more desirable properties in terms of ease of manufacture, stability in sugar syrup or reduction in residue production in honey.

The effectiveness of compounds was tested against cages of workers infected with a standard dose of *N. ceranae*. To accomplish this, cages were stocked with bees that were emerged overnight in an incubator from frames of sealed brood collected from *Nosema*-free colonies. Bees were pooled and mixed from all frames and 100 workers were added to wooden cages (9 x 11 x 14.5 cm). Bees were fed *ad libitum* 3:2 (v:v) sucrose syrup via gravity feeders for 24h, after which time they were fed 5 mL of syrup containing 10 million spores of *N. ceranae* prepared from freshly-killed bees for an additional 48h. After inoculation, cages of bees were fed syrup *ad libitum* that contained 0, 0.4, 0.04 or 0.004 mMol of each test compound, except fumagillin which was administered at 0, 0.04, 0.004 or 0.0004 mMol. Each concentration was replicated across 6 different cages. Treatment efficacy was assessed by comparing the density of spores among live and dead bees from each cage after 16 days of feeding on treated syrup. Compounds were considered promising if: a) spore levels declined in a concentration-response manner, similar to that for a positive control (fumagillin), b) were significantly reduced compared to those fed untreated syrup or c) toxicity to the bees was low.

Results and Discussion:

We observed a negative concentration-response relationship for *N. ceranae* for only three compounds: the positive control (fumagillin), JP-P1-7a and carbendazim (Table 1). It was clear that neither JP-P1-7a nor carbendazim were as effective as fumagillin at the concentrations tested, since fumagillin reduced *N. ceranae* infections to near undetectable levels at concentrations as low as 0.004 mMol. A comparable reduction was only observed for JP-P1-7a at 0.4 mMol, and not observed for carbendazim at any of the tested concentrations (Figure 1). Significant bee mortality, however, was observed for only two compounds at the concentration range tested, fumagillin (LC_{50} = 0.02 mMol) and fumagilol (LC50 = 0.08 mMol), suggesting that possibility that

Table 1. Concentration-response of 100 caged worker bees to N. ceranae infection 17d after feeding on one of 12 different antibiotic compounds.

Treatment	n[a]	R^{2} [b]	Root MSE[b]	F[b]	P[b]	Slope + SE[c]
Fumagillin	18	0.53	528.36	18.49	0.0006	-284.83± 66.24
JP-P1-7a	17	0.35	728.93	8.08	0.0124	-259.73 ± 91.38
Carbendazim	18	0.27	413.47	5.86	0.0277	-125.50 ± 51.84
Fumagilol	17	0.17	840.07	3.05	0.1011	-
JP-P1-35a	18	0.07	903.71	0.96	0.3411	-
Nozevit	18	0.07	816.02	1.11	0.3082	-
JP-P1-34a	18	0.06	693.71	1.07	0.3166	-
Thiabendazole	18	0.05	826.94	0.83	0.3757	-
Thymol	18	0.03	966.53	0.53	0.5215	-
JP-P1-33a	18	0.01	796.4	0.17	0.6836	-
JP-P1-30b	18	<0.01	670.35	0.01	0.9197	-
JP-P1-9a	18	<0.01	834.88	<0.00	0.9476	-

[a] Total number of cages of 100 bees across three doses, six replicate per dose.
[b] The proportion of variance explained by dose (R2), root mean square error, the F ratio and probability (P) of that the null hypothesis, that dose does not affect N. ceranae infection, is true.
[c] Slope (± standard error) of the regression of the logarithm of concentration on the square of the average spore numbers per bee per cage.

Table 2. Toxicity of 12 different antibiotic compounds on cages of 100 worker bees 17d after infection with N. ceranae using probit analysis.

Treatment	LC_{50} (95%FL)[a]	n[b]	X^{2C}	P[c]	b ± SE[d]
Fumagilol	0.0757 (0.0569-0.0983)	1800	170.96	<.0001	2.30 ± 0.18
Fumagillin	0.0226 (0.0155-0.0294)	1800	37.8	<.0001	2.61 ±. 0.42
JP-P1-34a	<0.0001 (-)	1800	3.14	0.0761	-1.11 ± 0.62
Carbendazim	8.07 × 10-8 (-)	1800	0.5	0.4805	-0.82 ± 1.16
JP-P1-7a	0.4558 (-)	1800	0	0.9988	13.35 ± 216.5
JP-P1-9a	0.4182 (-)	1800	0	0.9988	21.47 ± 14471.42
JP-P1-30b	0.4903 (-)	1800	0	0.9988	21.19 ± 14,531.00
JP-P1-33a	1.67 × 10-12 (-)	1800	0	0.999	-2.08 ± 8,773.31
JP-P135a	0.0031 (-)	1800	0	0.9988	22.13 ± 14,905.98
Nozevit	3.99 × 10-85 (-)	1700	0	0.9992	-0.28 ± 11,307.91
Thiabendazole	0.4838 (-)	1800	0	0.9988	21.28 ± 14,653.81
Thymol	0.5534 (-)	1800	0	0.9989	19.69 ± 14,159.67

[a] 50% lethal concentration (mMol) in 50% (w:w) sucrose solution. The lower and upper 95% fiducial limits in brackets. Natural response mortality rate corrected for mortality in cages fed untreated syrup using Abbott's formula.
[b] Total number of bees tested in six pooled replicates (cages of 100 bees) across three doses
[c] Chi-square value, and probability tests of equality of concentration-mortality regressions within each treatment.
[d] Slope (± standard error of concentration-bee mortality response regression.

higher concentrations of carbendazim or JP-P1-7a may provide better suppression of *Nosema* without impacting honey bee survival (Table 2).

Hence, after a summer of detailed testing of experimental alternative compounds against *N. ceranae*, we have two key findings. The efficacy observed for JP-P1-7a, an aspirin analogue of fumagillin, and the lack of efficacy for other analogues suggests a structure-activity relationship of the fumagillin molecule. Specifically, the side chain of the parent molecule (fumagillin) may not be very important in enzymatic recognition and hence it's overall biological activity. Secondly we have identified a widely

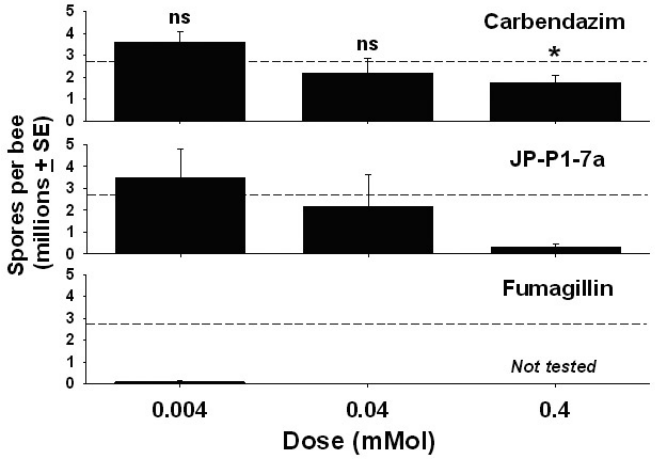

Figure 1. *Mean number of N. ceranae spores per bee following 17d of incubation among the three compounds demonstrating a concentration response (see Table 1) (n= 5 replicate cages of 100 workers/treatment × concentration). The dashed line indicates the average infection per bee among cages fed untreated syrup. Mean comparisons were made between Carbendazim and JP-P1-7a for each concentration (ns=non-significant and asterisk = significant, t-Test, α=0.05). Fumagillin was omitted from the mean comparison to meet the assumption of homoscedacity for the analysis and it was also not tested at the 0.4 mMol concentration.*

available fungicide, carbendazim, that appears to show some promise in reducing *Nosema* levels with no toxicity to adult bees.

Though compounds such as JP-P1-30b and JP-P1-33a did not prove to suppress *N. ceranae* infections in these tests, they are worthy of further evaluation. These compounds are simple to synthesize, very soluble sugar syrup and in the present study were only tested as racemic mixtures of their isomers. Enantiomerically pure mixtures could be ~50% more active.

Significantly, thymol and the commercially-available product Nozevit proved to be ineffective at suppressing *N. ceranae* infections in caged bees. These data support our previous screening work and confirms to beekeepers that fumagillin is by far the most effective commercial product available to suppress *Nosema* infections in honey bees.

2. Sampling methods for detecting N. ceranae in apiaries.

In order to determine the variability and precision of different sampling methods potentially used to identify the presence of *N. ceranae* by commercial beekeepers, we undertook a series of samples from 50 *N. ceranae*-infected colonies from a commercial apiary. Separate samples of 300 workers were collected from each colony in the following areas: the brood nest, the outer honey frames and from the underside the inner cover. Samples were collected biweekly from 12 May until 16 August 2010.

In our laboratory each sample from each hive location is being processed as follows: 90 bees processed compositely, 30 bee processed compositely, and 30 bees were processed individually. These data will provide us with information on the precision with which *N. ceranae* infections can be made from each of the three hive locales based on the variability of infection within bees from each of the locations. Furthermore, recommendations as to the number of colonies that should be sampled within an apiary for accurate disease diagnosis will be determined.

We are currently processing these samples and will be able to make recommendations in a later report.

3. Comb disinfection and long-term monitoring of N. ceranae infections: winter 2009-10, spring and summer 2010.

The reuse of contaminated comb is a significant avenue for spreading *N. apis*, a closely related parasite of European honey bees. While the mode of transmitting *N. ceranae* remains poorly understood, we hypothesized methods previously demonstrated to kill *N. apis*[1, 2] would also be effective at decontaminating *N. ceranae*.

The experiment involved artificially infecting frames of comb with *N. ceranae* spores, placing these frames into brood chambers, disinfecting them using acetic acid fumigation, heat or irradiation and comparing the subsequent infection after establishing bees on the comb. We hypothesized that the level of infection would be lower in treated colonies than in untreated ones.

Comb Inoculation. One hundred and ninety-two full-depth Langstroth frames containing fully-drawn honey comb were sprayed with an aqueous suspension of *N. ceranae* spores, prepared the previous day from adult bees sampled from infected colonies. Confirmation of *N. ceranae* was performed by polymerase chain reaction (PCR)[3]. Each inoculated brood chamber prepared for the experiment had four of these frames placed in its centre, surrounded by five additional non-inoculated frames. Consequently each inoculated brood chamber contained an overall dose 4.51×10^8 *N. ceranae* spores.

Treatments. The brood chambers were allocated to one of five different treatment groups:

1. Acetic Acid: Vertical stacks of four brood chambers, whose interfaces were sealed with duct tape, were fumigated with 480 mL of 80% (v/v) acetic acid in an insulated, outdoor chamber (4.52 × 1.78 × 2.42 m high) from 22 April to 29 April 2009. Two electric heaters were set to maintain a nominal temperature of 30 °C over the fumigation period of 7 days. Acetic acid was poured into a Styrofoam pan on the top bars of the uppermost box and covered by an additional empty box and telescoping lid. The airborne concentration of acetic acid in each stack was monitored every 12 h using Dräger tubes and was observed to range from 3 ppm at the beginning of the fumigation to 385 ppm on 28 April 09.

2. Heat: Inoculated brood chambers were subjected to 49 ± 0.1°C for 24 h in a constant temperature oven.

3. Irradiation: Inoculated brood chambers were irradiated with an electron linear accelerator (Impela® 10/50) operated by Iotron Industries Canada Inc. (Port Coquitlam, BC) that had a beam energy, power and width of 10 MeV, 60 kW and 107 cm (nominal),

respectively. Brood chambers passed through the accelerator on a linear conveyor, in normal vertical orientation to receive 10 kGy to their top surfaces and were then inverted to receive 10 kGy to their bottom surfaces. Radiation exposure was measured using radiachromic film dosimeters and frames received a total irradiation dose ranging between 16.7 and 23.6 kGy.

4. Inoculated: These brood chambers received no disinfection procedure.

5. Non-Inoculated: These brood chambers contained honey comb that received neither inoculation nor disinfection.

Treatment Evaluation.

Disinfection was assessed by installing spring packages of bees into the different brood chamber treatment groups to determine if the residual spore levels were sufficient to cause colony-level infections. Sixty 1-kg package bee colonies were imported from New Zealand to establish 12 replicate colonies in each of the five treatment groups. These were installed on 2 May 09. All colonies were put together in one apiary site (AAFC's Beaverlodge Research Farm, 55° 18' N; 119° 17' W); however, to prevent the spread of infection from inoculated colonies to the disinfected and non-inoculated colonies, inoculated colonies were placed 50 m away, separated by a belt of trees.

The severity of *Nosema* infection was assessed for each colony by collecting, and then macerating 30 foraging-age bees and microscopically determining the density of spores they contained using a counting chamber[4]. During 2009, samples were collected from each hive weekly from 2 May to 4 June and then biweekly until 22 October. Colonies were wintered indoors at 5 °C and sampled monthly from 22 October 2009 until 15 April 2010, after which samples were collected biweekly until 16 August 2010.

The effect of treatment on colony productivity was determined by assessing colony population growth and overall honey yield. Adult and immature populations were estimated using a standard technique of visually assessing the area of each frame covered by either adult workers or sealed worker brood. Population was assessed on 3 July 2009, 30 August 2009 and 15 June 2010. Honey production was measured by determining the net weight gain of previously irradiated honey supers added above the treated brood chamber during the honey production season of each year.

JMP version 7[5] was used for all analyses in this and subsequent experiments. Data are expressed as means ± standard error.

Results and Discussion

Multivariate analysis of our 16-month data set confirmed significant differences in *Nosema* spore levels among treatments (F=8.350 df=4, 31; P=0.0001), over sampling dates (F=4.84; df=27, 5; P=0.013) but showed no significant interaction between treatments and date (Wilkes' Lambda: F=0.937; df=108, 22.42; P<0.606). Thirteen days after hiving package bees on comb, spore levels within inoculated, untreated colonies rapidly proliferated to $2.4 \pm 0.4 \times 10^6$ spores per bee while all other treatments remained below a maximum of 167,000 spores (Figure 2). Nevertheless, by 21 May 2009 spore levels in the acetic acid fumigated and the heat treated colonies were similar to inoculated, untreated colonies whereas irradiated colonies still remained at levels similar to non-inoculated, untreated colonies. Over successive weeks, separation among treatments diminished until on 16 July spore levels in all colonies, including those inoculated and untreated, were at or below an average of 100,000 spores per bee.

We expected to see increases in spore density as the 2009 season progressed, notably among the untreated inoculated group. Nevertheless, spore densities increased in this group only on 12 August 09 and variation within the group was too great to resolve any statistical difference. Although the untreated inoculated group remained uniformly low in spore density since that date, we did

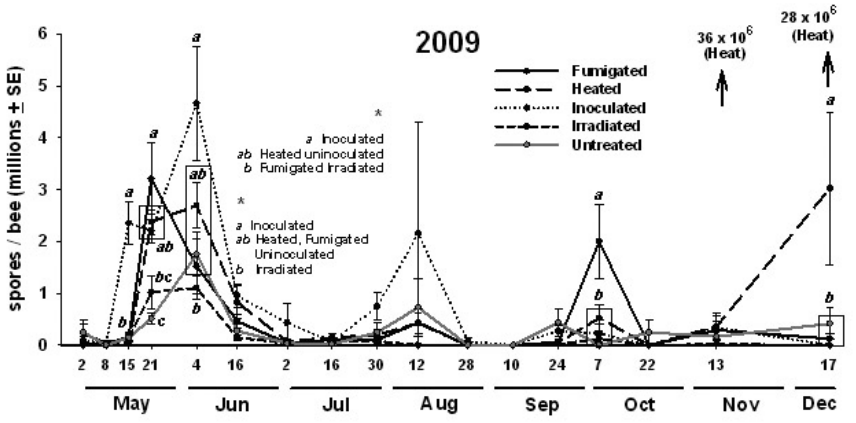

Figure 2. *Mean number of N. ceranae spores per bee following the establishment of colonies on Nosema-inoculated comb treated with one of three different disinfection techniques (acetic acid fumigation, heat, irradiation) versus comb inoculated and left untreated and comb nether inoculated nor treated. Bees were hived onto comb on 2 May 09 (n = 12 colonies / treatment). Spore densities (millions of spores/bee) underscored by arrows indicate individual colonies on 13 November and 17 December that fell well outside the range of the other colonies in the group. The name of the treatment group of these outlying colonies appears in parentheses below the number. Different letters above each date denote significant differences among means (Tukey-Kramer HSD, α=0.05).*

observe periodic and transitory increases among other treatments, namely the acetic acid group on 7 October 09 and the heat treated group on 13 November and 17 December 2009. The latter two dates are heavily influenced by spore densities in individual colonies that fell well outside the range of others in the group (> 25 million spores). Considerably less variation in spore levels were seen in 2010. Generalized increased levels of spores were seen in all treatments on 29 April and on 16 June 2010, particularly for inoculated untreated colonies on 29 April and heat treated colonies on 16 June. Nevertheless, differences among treatments could not be statistically demonstrated on these dates.

Over the entire course of the experiment, it was generally observed that acetic acid fumigation, heat and irradiation treatments suppressed spore development in colonies for a short duration of

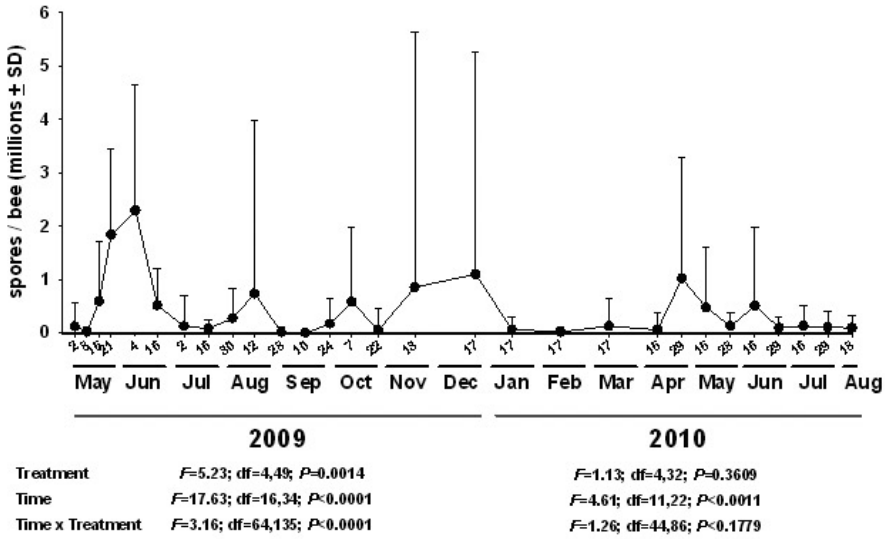

Figure 3. *Mean number of N, ceranae spores per bee following the establishment of colonies on Nosema-inoculated comb treated and plotted independent of comb disinfection treatment. Bees were hived onto comb on 2 May 09 (n = 60 colonies / treatment). Repeated measures analysis of variance (Wilk's Lambda) were conducted independently for 2009 and 2010 and suggested the effect of treatment was only significant in 2009.*

time during the spring peak of infection in 2009. Only spore levels in the irradiated treatment, however, were maintained at levels similar to non-inoculated colonies for the duration of the experiment. With the exception isolated cases of individual colonies with extremely high levels of infection, typically seen in inoculated untreated or heat treated colonies, differences among treatments diminished over the course of the experiment. Of notable interest, a peak of infection for all treatments re-occurred in the early spring 2010. In fact, while there were clear treatment and treatment × time interactions across 2009, the only significant source of variation in 2010 was time (Figure 3). These results tend to suggest that *N. ceranae* may have a cycle similar to *N. apis* in northern latitudes, and that spore reductions tend to occur by the mid-summer periods after peaking in the spring.

Determining *Nosema* infection severity by microscopically counting spores cannot discriminate between *N. apis* and *N. ceranae*. Consequently, to determine the species composition during the course of the experiment we have begun to analyze the bee macerates, generated initially to count spores, by PCR. Preliminary results indicate that while none of the packages were infected with *N. ceranae* at the time of colony establishment, approximately one third had low levels of *N. apis* (Figure 4). In contrast, a month after the colonies were established, when levels of *Nosema* were at their highest (Figure 3), pure *N. apis* infections could only be located among colonies established on acetic acid fumigated, irradiated or uninoculated comb (Figure 4). The remaining colonies were primarily infected with a combination of the two species. This

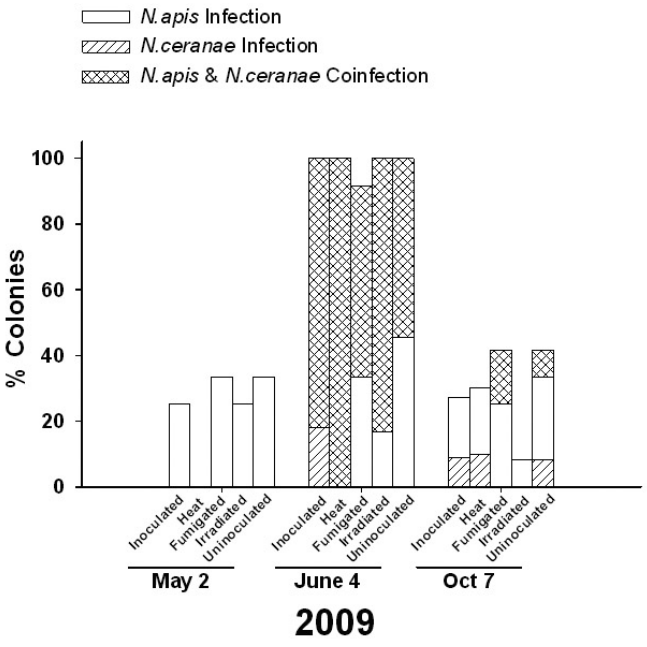

Figure 4. *The proportion of colonies that were infected with either N. apis, N. ceranae or a combination of both species at the time of colony establishment (2 May 2009, before contact with comb) or a month after (4 June 2009) (n =12colonies/treatment).*

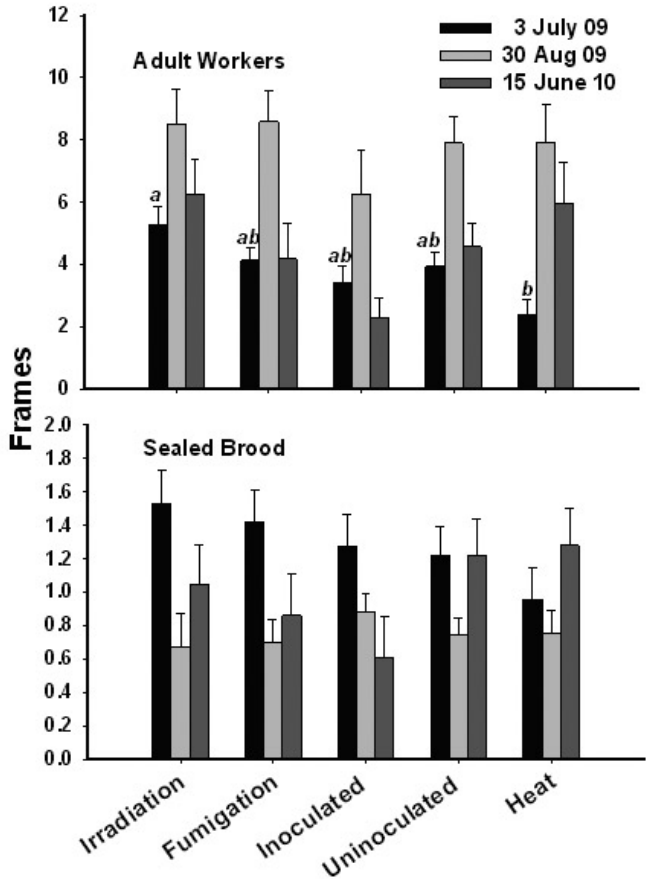

Figure 5. *Mean adult worker and sealed brood areas among colonies established on comb treated with one of three different disinfection techniques (Fumigation = acetic acid fumigation, Heat, Irradiation) versus comb left untreated receiving inoculums or not. Bees were hived onto the comb on 2 May 2009 (n = 12 colonies / treatment). Population assessments were made on three different dates, 3 July and 30 August, 2009 and 15 June 2010. Different letters above each treatment for either adult worker or sealed brood measurements indicate significant differences among means for a given assessment date (Tukey-Kramer HSD, α=0.05).*

finding suggests that *N. ceranae* was transmitted to the bees via the inoculated comb since it was not present among the founding bees. The occurrence of pure *N. apis* exclusively among uninoculated colonies and colonies on acetic acid fumigated and irradiated comb supports the finding observed from the spore counts (Figure 2) that both treatments reduce transmission of *N. ceranae* from comb.

The positive effect of disinfecting comb also appeared to influence the productivity of colonies, presumably through reducing *N. ceranae* infection. There were significantly more adult bees (F=4.520; df=4,52; P=0.003) in colonies two months after being established on irradiated comb compared to heat-treated comb, with colonies on fumigated, non-inoculated and inoculated comb being intermediate (Figure 5). No significant differences among treatments were found for the area of sealed brood on this date, or both parameters when evaluated on 31 August 2009 and 15 June 2010. While there was no evidence that honey production differed among the treatment groups in 2009 (F=2.240; df=4, 52; P=0.077) and 2010 (F=1.543; df=4, 39; P=0.211), colonies on irradiated and acetic acid fumigated comb, the two treatments which reduced spore levels, had the highest level of honey produced over the two years. Also in 2010 inoculated untreated colonies produced the least honey among all treatments, and unlike the other groups, where 2010 production was the same or higher, the inoculated untreated colonies produced significantly less honey compared to 2009 (Figure 6).

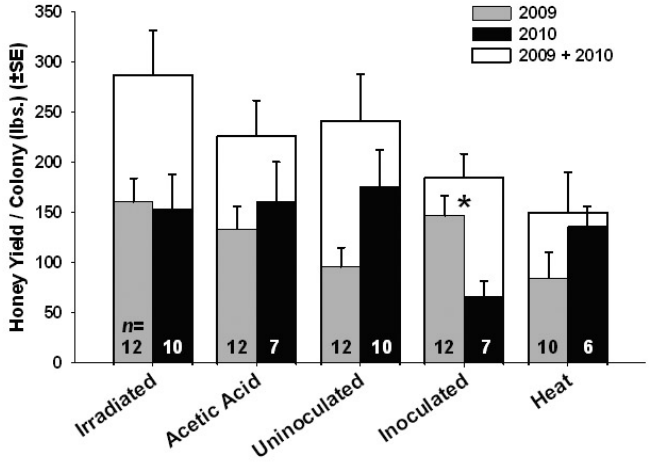

Figure 6. *Mean honey yield per colony (± SE) following establishment on Nosema-inoculated comb treated with one of three different disinfection techniques (acetic acid fumigation, heat, irradiation) versus comb left untreated receiving inoculums or not. Bees were hived onto the comb on 2 May 09 (n=12 colonies per treatment). Narrow filled bars represent average honey yield across 2009 and 2010. The wide white bars represent the total honey yield across two years and include colonies that only produced honey in 2009. Numbers within the narrow bars represent the numbers of colonies remaining in treatments when honey yield was measured in each year. Although there was no evidence to support a statistical differences in honey yield exist among treatments in 2009, 2010 or the total over 2009 + 2010 (see text for analysis of the hypothesis), asterisks represent significant difference in yield per colony between 2009 and 2010 for a given treatment.*

Aside from the declining average honey production in the inoculated untreated group, one factor explaining the high two-year average colony honey yield for the irradiated, acetic acid fumigated and uninoculated groups was that they lost fewer colonies upon entering the 2010 honey season. By the end of the 16-month experiment almost half the colonies in the heat and inoculated-untreated groups were dead, compared to only 16% among the non-inoculated and no colonies in the irradiated groups.

In conclusion, the beekeeping industry is advised to employ irradiation as a disinfection procedure for *N. ceranae*. Heat treatment for *N. ceranae* spores is not recommended; this finding is reinforced by the newly-discovered high temperature tolerance associated with these spores[6]. Though acetic acid disinfection does appear to reduce spore levels in colonies, it does not offer complete suppression. The economic consequences of natural population cycles of *N. ceranae* in northern climates, in relation to control decisions, warrant further study.

4. Fumagillin treatment trials. Monitoring through winter 2009-10 and spring 2010.

Fumagillin is the only registered treatment for *Nosema* spp. in honey bees. While its use in managing *N. apis* is well understood, it remains unclear how best to apply fumagillin to provide optimal control of *N. ceranae*. For example, label recommendations for applying fumagillin to control *N. apis* in overwintered colonies may not be optimal for *N. ceranae*, as the latter has been suggested to be more prevalent during summer months7. Furthermore, recommendations for syrup-feeding fumagillin to individual colonies are becoming increasingly inapplicable with the widespread adoption of barrel feeding. In order to test the importance of the timing of treatments as well as the effectiveness of alternative formulations, we established two experiments, one in the early spring and the second in the fall.

2009 Spring Trials

In February and March 2009, sixty single brood chamber colonies from a commercial honey bee operation in Girouxville, AB were identified as having average infections of $4.3 \pm 0.5 \times 10^6$ *N. ceranae* spores per bee. Later that spring, these colonies were moved to a common apiary and randomized into five treatment groups, each with twelve replicates.

Treatments. Four treatments containing fumagillin (Fumagilin-B, DIN 02231180, Medivet Pharmaceuticals, High River, AB) were applied to colonies at a rate of 50 mg a.i. per application, using different formulations. **Drench** treatments consisted of 250 mL sucrose syrup (1:1 v/v), **Dust** treatments consisted of 20 g of icing sugar, **Patty** treatments consisted of 100 g pollen patties (40% milled irradiated pollen, 20% soy flour and 40% sucrose syrup) while **Syrup** treatments consisted of 2 L of sucrose syrup. The **Control** treatment consisted of 2 L of unmedicated syrup per colony. All treatments were applied in two successive applications on 22 April 09 and 6 May 09, so that each medicated colony received a cumulative dose of 100 mg a.i. fumagillin, the spring label rate.

Management and Sampling of Colonies. Colonies were managed,

sampled and evaluated in a manner consistent with the previous disinfection experiment. Second brood chambers were provided to colonies as required for expansion of the brood nest. Adult bee and brood areas were assessed on 30 June and 26 August 2009 and honey production was also monitored. These measurements were repeated in 2010.

Results and Discussion:

At the commencement of the spring-applied fumagillin experiment (22 April 09), colonies had an average of 4.3 ± 0.5 x 10^6 spores per bee. Based on a multivariate analysis of spore levels over the experiment, significant differences among treatments (F=3.24 df=4, 37; P=0.0224), over sampling dates (F=2.31; df=18, 20; P=0.036) as well as a significant time*treatment interaction (Wilkes' Lambda: F=1.16; df=72, 81.002; P=0.260) were detected. Clear suppression of *N. ceranae* was evident after the first week of treatment application: irrespective of the formulation, 100 mg applications of fumagillin lowered *N. ceranae* spore levels until 27 May (Figure 7). On this date, levels of spores in the untreated colonies fell below 0.6 x 10^6 spores per bee and did not differ from the low levels observed in the patty and syrup treatments. From 3 June onward, spore levels in untreated colonies remained low and indistinguishable from those in other treatments.

While levels continued, on average, to remain low through fall and winter, and while no treatment differences could be discerned, we did observe an increase in the variability of spore densities among colonies, similar to that observed in the comb disinfection trial. These high, infrequent and transitory winter infections were found among all fumagillin-treated colonies, with the exception of the syrup treatment. On 23 February 2010, one colony in the drench treatment was found to have an infection level that was estimated to be in excess of 180 million spores per bee and one colony in the patty treatment was infected with 29 million spores per bee (Figure7).

Though colonies were monitored until August 2010, high colony mortality across all treatments was noted in the spring of that year. Consequently, we restricted our analysis of spore samples up to and including 14 April 2010. While over the entire time course of the experiment, these analyses did not show an overall treatment effect (F=1.840; df=4, 21; P=0.1589), however there was a significant effect of time on spore levels (F=2.200; df=4, 9; P=0.0385) and a significant interaction between the type of treatment and the time of sampling (Wilkes' Lambda: F=3.688; df=10.311, 80; P=0.0129) (Figure 7). As with *N. apis*, we can see that *N. ceranae* spores density seems to decline naturally during the month of May and stay at low level similar to the *Nosema* level observed in the treated colonies.

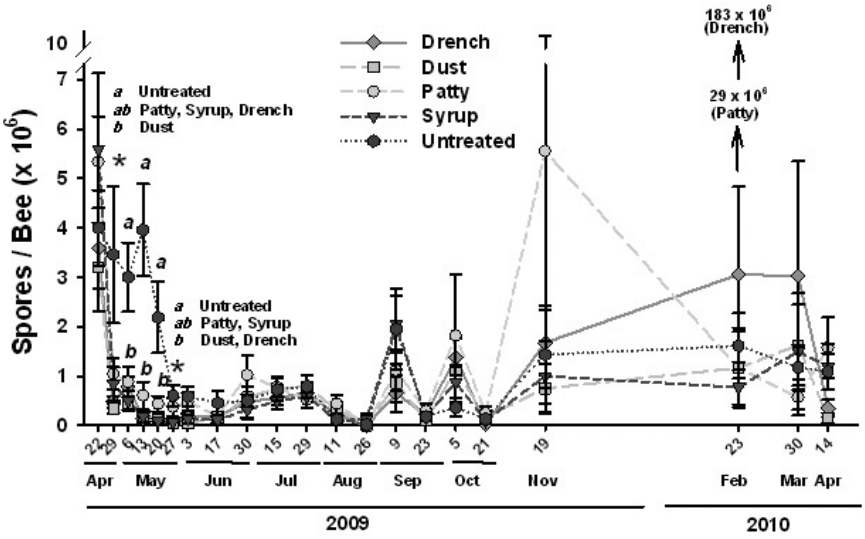

Figure 7. *Mean number of Nosema spores per bee among overwintered colonies following spring applied treatments of fumagillin (two applications of 50mg a.i. per colony on 22 April 09 and 6 May 09) formulated using four different techniques (Drench = low volume sucrose syrup applied onto bees; Dust = Icing sugar dustings; Patty = pollen patties; Syrup = bulk sucrose syrup feed) (n = 12 colonies / treatment). Different letters above each date denote significant differences among treatment means (Tukey-Kramer HSD, α=0.05). Spore densities (millions of spores/bee) underscored by arrows indicate colonies on 23 Feb that fell well outside the range of the other colonies in the group. The name of the treatment group of these outlying colonies appears in parentheses below the number.*

Viewed over the course of the year, there appears to be an overall trend toward *N. ceranae* spore levels declining during mid-summer, and more extreme variability over winter months. This phenology is similar to that normally seen among *N. apis*-infected colonies in temperate climates[8], and is in contrast to reports from Europe in which *N. ceranae* infections persist throughout the summer months7

As reported in our 2009 report, no significant differences were detected for areas of adult bees (F=0.96; df=4, 53; P=0.43) or sealed brood (F=0.82; df=4, 53; P=0.51) on 30 June 2009, or for adult bees (F=0.40; df=4, 53; P=0.81) or sealed brood (F=0.35;

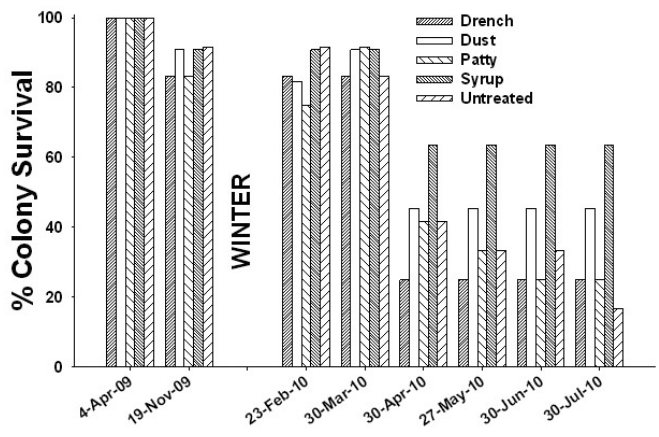

Figure 8. *Survival of colonies among spring-applied treatments of fumagillin (two applications of 50mg a.i. per colony on 22 April 09 and 6 May 09) formulated using four different techniques (Drench = low volume sucrose syrup applied onto bees; Dust = Icing sugar dustings; Patty = pollen patties; Syrup = bulk sucrose syrup feed) (n = 12 colonies / treatment).*

df=4, 53; P=0.84) on 26 August 2009. Honey production was also similar among treatments (F=0.48; df=4, 53; P=0.7498). There was a general lack of correlation among honey yield, colony population, and spore levels across most dates, suggesting that colony level productivity in northern climates is independent of *N. ceranae* spring infection levels. Due to reductions in the numbers of colonies by early summer 2010, colony brood areas, areas of adult bees and honey production are considered non-representative. As such these data are not reported.

By 30 July 2010, 15 months after the start of the experiment many colonies died and only 20% of the untreated colonies were still alive. The best survival (60 %) was in syrup fed colonies (Figure 8). Loss of colonies is attributed, in part, to the age of queens in colonies at the start of the experiment in 2009 (2 years and older) as well as the effects of progressive *Nosema* infection.

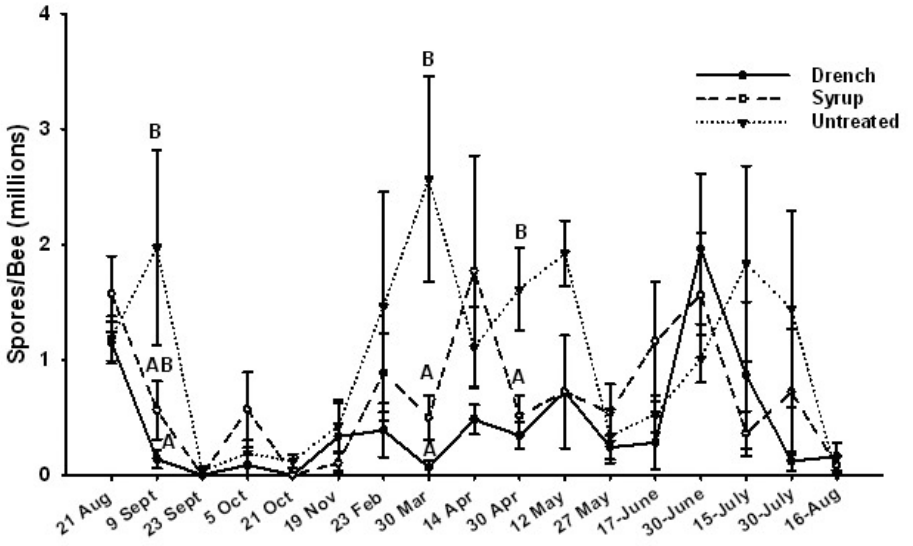

Figure 9. *Mean number of N. ceranae spores per bee among colonies after treatment in the fall with fumagillin (two applications of 100 mg a.i. per colony, 9 and 15 September 2009) using two different techniques (Drench = low volume sucrose syrup applied onto bees or Syrup = bulk sucrose syrup feed) (n = 12 colonies / treatment). Different letters above each date denote significant differences among means (Tukey-Kramer HSD, α=0.05).*

2009 Fall Trials

Colonies with naturally-occurring *N. ceranae* infections were identified in a commercial honey bee operation in Northern Alberta. These colonies were assigned to 14 blocks of homogenous levels of initial *N. ceranae* infection. Colonies were then randomly assigned to three treatment groups within these blocks on 21 August 09, two of which contained fumagillin (Fumagilin-B) and were applied to colonies at a rate of 100 mg a.i. per application. The two fumagillin application methods were: **Drench** treatments consisting of 250 mL sucrose syrup (1:1 v/v), or **Syrup** treatments consisting of 2 L of sucrose syrup. The **Control** treatment consisted of 2 L of unmedicated syrup per colony. All treatments were applied in two successive applications one week apart, on 9 and 15 September 09, so that each medicated colony received a cumulative dose of 200 mg a.i. fumagillin, the fall label rate. Bee samples were taken from colonies to determine *Nosema* infection levels from August 21 until October 21, 2009, after which time they were moved indoors to winter at 5° C. Sampling then occurred monthly from October 2009 until 30 march 2010 and then biweekly from 14 April until 16 August 2010.

Results and Discussion:

The average infection when treatment groups were established was $1.30 \pm 0.14 \times 10^6$ spores per bee and did not differ among treatment groups (F=0.88 df=2,40; P=0.422, (Figure 9). Two weeks later (9 September 2009), immediately prior to the application of the treatments, the average infection decreased to $0.90 \pm 0.31 \times 10^6$ spores per bee. Furthermore, on this date untreated colonies had over twice the density of spores compared with colonies in the treated groups (F=3.58 df=2, 40; P=0.037). Within three weeks of the treatment (5 October 2009), however, this difference was no longer apparent (F=1.50 df=2, 39; P=0.235).

Though colonies were monitored until August 2010, we have restricted our analysis to samples up to and including 14 April 2010, due to high mortality across all treatments from this date forward. Our analysis shows that the type of treatment had a significant effect on spore levels in the experiment (F=3.552 df=2, 23; P=0.045) however there was strong evidence to reject the effect of time on spore levels in colonies (F=0.425 df=8, 16;

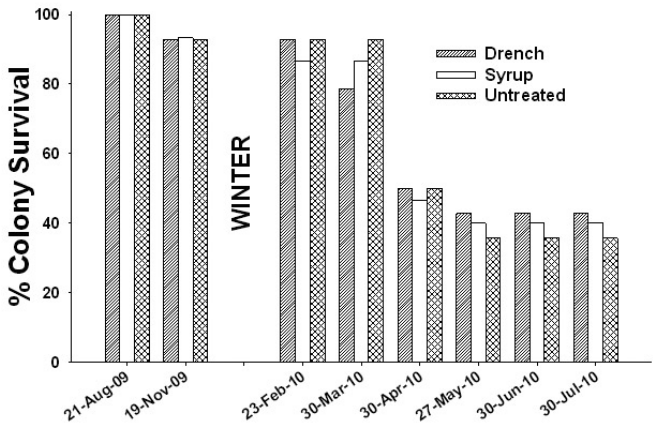

Figure 10. *Survival of colonies treated in fall 2009 with fumagillin (two applications of 100 mg a.i. per colony, 9 and 15 September 09) formulated using two different techniques (Drench = low volume sucrose syrup applied onto bees or Syrup = bulk sucrose syrup feed) (n = 12 colonies / treatment).*

P=0.889) as well as the interaction between time and treatment (F=0.960; df=16; 32; P=0.518). From our data, both drench and full volume applications of fumagillin in syrup are effective

at suppressing *Nosema* levels in the fall and continued to suppress spore levels relative to untreated colonies until May of 2010.

As indicated in figure 10, overwintering survival at the end of April 2010 was approximately 50% and did not vary across treatments. Queens from failing colonies during this spring period were retained for later determination of *Nosema* infection status. Though *Nosema* infection levels were approximately half of those of untreated colonies at this time, it is possible that the lack of re-treatment during spring 2010 contributed to the losses of colonies across all treatments. This aspect of fall and spring fumagillin treatment of colonies warrants further investigation.

In general, based on the results of both spring and fall application experiments, it is clear that fumagillin is effective at suppressing infections of *N. ceranae* in commercial beekeeping operations. Label dose applications (100 mg a.i.) of the product in the spring confer suppression from early spring until the end of summer, irrespective of formulation. Applications of 200 mg a.i., of fumagillin in the fall, whether in full volume syrup or drench applications, appear to suppress spore levels lower than untreated colonies up to and including the following spring. In both treatment paradigms, monitoring of colonies during the subsequent fall or spring season is essential to make appropriate treatment decisions.

General Conclusions from 2010:

1. Carbendazim and JP-P1-7a appear to be effective candidates at suppressing *N. ceranae* and these and related compounds warrant further investigation.

2. Irradiation is the most effective method of disinfecting comb contaminated with *N. ceranae* spores and promoting long-term colony survival.

3. Applications of 100 mg a.i. fumagillin during spring, irrespective of the formulations evaluated, are effective at suppressing active infections of *N. ceranae* until fall.

4. Applications 200 mg a.i. fumagillin in low or high volumes of syrup during the fall are effective at suppressing active infections of *N. ceranae* immediately after treatment and continue to depress spore levels below that of untreated colonies during the following spring.

5. For both spring and fall applications of fumagillin, monitoring of spore levels is still essential during the subsequent fall or spring periods to make appropriate treatment decisions.

6. In northern Alberta, *N. ceranae* spore levels appear to naturally decline during mid-summer, similar to patterns historically seen for *N. apis*.

Project Personnel

Four summer students were hired to assist with this project in 2010. Samantha Horswill (University of Alberta) and Carina Ness (Grande Prairie Regional College) were postsecondary students employed from May – August 2010. Jonathan Warr was also employed as an 8-month coop student from May – December 2010. During July and August, high school students Asrar Ibrahim and Sacha Lutsenko were employed as supplementary labour to assist with cage experiments and honey extraction, respectively.

Mr. Johan van den Heever continued the second year of his graduate tenure as a part-time Ph.D. student. Mr. van den Heever has been devising an LC-MS/MS residue detection technique for fumagillin and its degradation products in honey.

Outlook for 2011

In the summer 2011 we will continue to perform bioassays to evaluate alternative compounds for treating *N. ceranae* and will conduct a fall field trial to evaluate promising compounds against high and low volume sugar syrup applications of fumagillin. We also plan to perform a field experiment in the U.S. examining *Nosema* control with Dr. Jeff Pettis. Finally, we will finish validating our new LC-MS/MS technique for determining fumagillin residues in honey and will apply this to samples previously collected from our spring 2008 fumagillin efficacy experiment.

Acknowledgements

This research was generously supported by Medivet Pharmaceuticals, the Alberta Beekeepers' Commission, the Canadian Bee Research Fund, Bee Maid Honey, the Alberta Crop Industry Development Fund and the Matching Investment Initiative of Agriculture & Agri-Food Canada. In-kind support was also received from Iotron Industries Canada Ltd and Paradis Honey.

References Cited:

1. Bailey, L. 1957. Comb fumigation for *Nosema* diseases. Amer. Bee J. 1: 24-26.
2. Cantwell G.E., Shimanuki, H. 1969. Heat treatment as a means of eliminating *Nosema* and increasing production. Amer. Bee J. 109: 52-54.
3. Klee, J., Besana, A.M., Genersch, E., Gisder, S., Nanetti, A., Tam, D.Q., Chinh, T.X., Puerta, F., Ruz, J.M., Kryger, P., Message, D., Hatjina, F., Korpela, S., Fries, I., Paxton, R.J. 2007. Widespread dispersal of the microsporidian *Nosema* ceranae, an emergent pathogen of the western honey bee, Apis mellifera. J. Invertebr. Pathol. 96:1-10.
4. Cantwell, G.E. 1970. Standard methods for counting *Nosema* spores. Amer. Bee J. 110: 222-223.
5. SAS Institute. 2001. A guide to statistics and data analysis using JMP and JMPIN software, 2nd ed. SAS Institute, Cary, NC.
6. Fenoy, S., Rueda, C., Higes, M., Martín-Hernandez, R., del Aguila, C. 2009. High-level resistance of *Nosema* ceranae, a parasite of the honeybee, to temperature and desiccation. AEM 75: 6886–6889.
7. Martín-Hernández, R., Meana, A., Prieto, L., Salvador, A.M., Garrido-Bailón, E., Higes, M. 2007. Outcome of colonization of Apis mellifera by *Nosema* ceranae. AEM 73: 6331-6338.
8. Bailey, L. and Ball, B.V. 1991. Honey Bee Pathology, 2nd ed. Academic Press, London.

Effects of fluvalinate on honeybee survival, learning, and memory

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Introduction:

Bees' ability to learn and remember important environmental cues (e.g., floral visual or odour) that signal a nectar reward can be studied by evaluating their proboscis extension reflex (PER), in the same way that Pavlov studied salivation in dogs. An originally neutral odour can elicit PER in laboratory experiments when consistently paired with a sugar reward. Over time, bees learn that the odour predicts a reward and extend their proboscis in the absence of food. Reduced PER may suggest that some stressor has impaired a bee's ability to form these important associations. There is increased concern that pesticides may negatively affect bee survival and productivity (e.g., honey yield, brood production) either directly via mortality, or indirectly by weakening various aspects of physiology. Apistan®, one of the chemicals used most often to control *Varroa* mites, has tau-fluvalinate (hereafter fluvalinate) as its active ingredient, and bees come in direct contact with this chemical during in-hive applications. Two previous studies have investigated effects of fluvalinate on honeybee cognition (Taylor et al. 1987; Decourtye et al. 2005). Both found no significant effect on learning (short-term), but did not assess effects on memory (long-term). The primary objectives of this study were to test if fluvalinate reduced honeybee survival, and if exposure to fluvalinate affected bee learning or memory.

Summary of Methods:

Experiments occurred between 21 June and 8 September 2010. Bees were captured in aerated vials near hive entrances of colonies in Coldbrook, Nova Scotia, Canada, transported to the laboratory, and cooled in a freezer until immobile. Immobile bees were restrained in small tubes using wax so only their antennae and mouthparts were free.

Honeybee treatment

We used six treatments: dermal acetone and oral acetone applications for controls; low-dose (0.125-µg) dermal, low-dose (0.125-µg) oral, high dose (1.25-µg) dermal, and high dose (1.25-µg) oral for testing effects of fluvalinate. Dermal applications of fluvalinate were administered to the dorsal surface of the thorax, whereas oral applications were administered in droplets. The 0.125-µg treatments were based on estimated daily exposure per bee in treated hives (Johnson et al. 2009) whereas 1.25-µg treatments may reflect cumulative exposure. Dermal applications were used to mimic in-hive contact with Apistan® and oral applications were intended to mimic consumption of contaminated foods. Bees from each treatment group were assessed during same-day trials in a random order and PER responses were evaluated blind to treatment.

Learning and memory:

Treated bees were left in the dark at room temperature for 3 h before testing, and mortality rates were assessed over this period. Geraniol (an odour commonly encountered by bees in the wild) was used to train bees and was presented alone for 3 s and then in combination with presentation of a sugar reward. Individuals were trained for 8 trials (spaced by 8 min). Memory retention was evaluated 24 h later by assessing PER response to the odour in the absence of a reward (again noting mortality). A positive PER response was assigned when a bee extended its proboscis following presentation of geraniol (Figure 1) but before receiving a sugar reward. For each trial, a score of 0 represented either no response or extension of the proboscis only after antennal stimulation with sucrose, and a score of 1 indicated proboscis extension to the odour alone. Although there were 8 trials, the maximum score for conditioning experiments was 7; any positive response to geraniol on the first trial was spontaneous, suggesting prior exposure or an innate response (Gerber et al. 1996; Sandoz et al. 2000).

Results:

Treatment did not significantly affect mortality three hours post–treatment in June ($X^2 = 2.9$, df = 5, n = 383, P = 0.70) or July/early August ($X^2 = 4.6$, df = 5, n = 216, P = 0.50), but did in late August/September ($X^2 = 12.9$, df = 5, n = 368, P = 0.02) where honeybees were most susceptible to high oral, high dermal, and low dermal treatments. Mortality 24 hours post-treatment was significantly affected by treatment in June ($X^2 = 11.9$, df = 5, n = 383, P = 0.04) and late August/September ($X^2 = 24.8$, df = 5, n = 368, P < 0.0001), approaching significance in July/early August ($X^2 = 12.9$, df = 5, n = 216, P = 0.06). For 24–h cumulative mortality in June, acetone dermal (control) and low oral treatments had the lowest lethal toxicity rates whereas acetone oral and high oral treatments were highest. From July-September, bees were most susceptible to high oral treatments and mortality was lowest among control acetone dermal bees.

Learning and memory

Treatment affected learning for individuals throughout the summer (all Fs < 4.9, df = 5, all Ps < 0.007). In general, it appeared that oral treatments more than dermal treatments interfered with bees' ability to learn an odour-reward association (Table 1). Consistently, the most significant differences occurred between acetone dermal controls, and high oral fluvalinate treatments.

Treatment significantly affected bee memory retention scores ($F_{5,525} = 4.5$, P <0.0001). In general, individuals treated with high oral doses of fluvalinate had the lowest memory scores whereas the low dermal application had the least effect on honeybee memory (Table 1).

Discussion

There appears to be a slight negative effect of fluvalinate on survival, learning, and memory that is most pronounced when honeybees consume 1.25 µg of fluvalinate orally. It is unlikely that honeybees would be exposed to oral doses this high because

residues in honey and beeswax are not that concentrated. However, it is important to note that these were one–time applications, so inferences can only be drawn regarding immediate, rather than cumulative, effects of fluvalinate. Little research has been done to record the build–up of fluvalinate in honeybee tissues over time, although Haarmann et al. (2002) found that honeybees from colonies treated the previous year with Apistan® contained up to 0.1 µg fluvalinate per bee. Data suggest partial detoxification of fluvalinate over a 24-hour period (E. Frost unpublished data), but honeybees in the hive are exposed to fluvalinate daily for up to eight weeks during treatment with Apistan®. Future research should investigate effects of repeated low–dose treatments to more accurately mimic conditions in treated hives.

Literature Cited:

Decourtye A, Devillers J, Genecque E, Le Menach K, Budzinski H, Cluzeau S, Pham-Delègue MH (2005) Comparative sublethal toxicity of nine pesticides on olfactory learning performances of the honeybee *(Apis mellifera)*. Arch Environ Contam Toxicol 48:242-250

Gerber B, Geberzahn N, Hellstern F, Klein J, Kowalksy O, Wüstenberg D, Menzel R (1996) Honey bees transfer olfactory memories established during flower visits to a proboscis extension paradigm in the laboratory. Anim Behav 52:1079-1085

Haarmann T, Spivak M, Weaver D, Weaver B, Glenn T (2002) Effects of fluvalinate and coumaphos on queen honey bees (Hymenoptera: Apidae) in two commercial queen rearing operations. J Econ Entomol 95:28-35

Johnson RM, Pollock HS, Berenbaum MR (2009) Synergistic interactions between in-hive miticides in *Apis mellifera*. J Econ Entomol 102:474-479

Sandoz JC, Laloi D, Odoux JF, Pham-Delègue MH (2000) Olfactory information transfer in the honeybee: compared efficiency of classical conditioning and early exposure. Anim Behav 59:1025-1034

Taylor KS, Waller GD, Crowder LA (1987) Impairment of a classical conditioned response of the honey bee (*Apis mellifera* L.) by sublethal doses of synthetic pyrethroid insecticides. Apidologie 18:243-252

Table 1. *Number of positive responses to geraniol during learning (out of a possible 7) and memory (out of a possible 8) trials in honeybees exposed to different concentrations of fluvalinate*

	Learning		Memory	
Treatment	Mean	N	Mean	N
Acetone dermal	4.0	97	1.7	79
Acetone oral	2.7	111	2.3	104
Low dermal	3.2	104	2.9	81
Low oral	2.5	107	1.7	94
High dermal	3.0	101	2.5	87
High oral	1.8	106	1.2	86

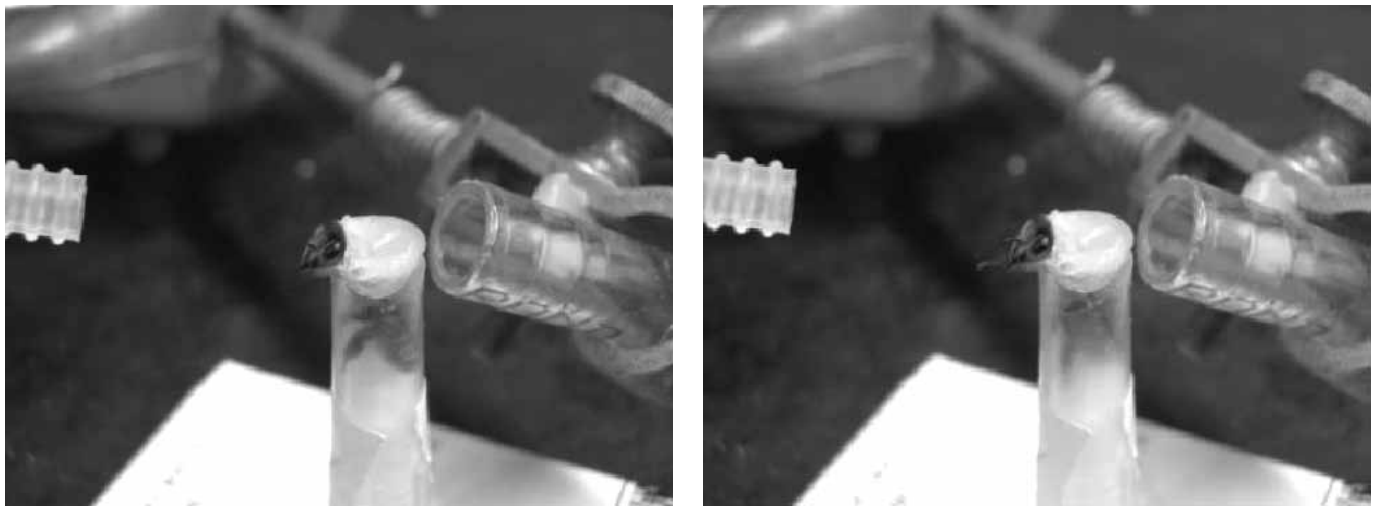

Figure 1. *After training to an odour, a bee fails to respond to air alone (left) but responds to the odour (geraniol) in the absence of a sugar reward (right).*

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DISCOUNTS FOR ORDERS IN EXCESS OF 200 QUEEN BEES

42nd INTERNATIONAL APICULTURAL CONGRESS APIMONDIA 2011 BUENOS AIRES – ARGENTINA

Lucas Daniel Martínez, President 42nd International Apicultural Congress APIMONDIA 2011 - ARGENTINA

WELCOME LETTER

Every two years all the beekeepers of the world gather with the apicultural researchers, supplies manufacturers, honey-traders and all the representatives of the apicultural sector, in a big event that is the International Apiculture Congress of APIMONDIA.

This impressive meeting that has been taking place since the beginning of this century, is hosted every time by a different country from around the globe, generating an exchange of experiences among beekeepers and all the members of the apiculture practice. Every time this meeting takes place, the host country has the opportunity to show its apiculture to the world.

For ten years now, the members of the Argentinean Beekeepers Association (SADA) have been considering the great importance of this event and also the need to be the host again, after more than 30 years of not hosting the Congress in this region.

In 2007,after several presentations, Argentina was chosen to be the venue in 2011. From that moment, we started working to organize an important Congress.

In 2009 we experienced a great Congress in Montpellier (France), with almost 10,000 assistants, more than 650 scientific presentations, representatives from nearly 100 countries and a big ApiExpo. Their effective organization team, headed by the current President of APIMONDIA, Gilles Ratia, was kind enough to support our coming Congress with all their experience.

In Argentina we have put together a great local team, integrated by beekeepers, scientists and professionals in organization and communication to assure the excellent level of this Congress.alt

Today all of the Argentinean apicultural community is working hard to be ready to receive thousands of colleagues from all over the world, in the best possible way.

Changes in the agricultural sector with new farming techniques, using more agrochemicals harmful to our bees and with a more degraded environment, works directly against the sustainability of our bee and therefore of our apiculture. We are living difficult times. At the same time, apiculture is still a very useful tool to generate the development of marginal communities, creating a new lifestyle for them. That is why we have chosen as goal of this Congress the search for "An apiculture that is sustainable and that generates development"

A big Congress in an apicultural country, that is what all the members of the Argentinean sector are trying to achieve, and that is why your assistance is vital to accomplish our goal. We will welcome you with the warm friendship that represent us.

Congress: From 21st to 25th, September 2011

Technical Tours: 26th and 27th, September 2011

The biggest event because it gathers more than 10,000 participants from more than 70 countries members

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of APIMONDIA. Because it has 2,700 square meters for apicultural companies from all over the world so they can offer their products to hundreds of beekeepers that want to find the best and the latest in terms of sanitation, nutrition, tools, machineries, services, supplies, technology and other products related to a better and greater performance in their production.

The most complete event because you will find not only a great variety in the audience, from Argentina, Latin America and all over Europe, but also because of the number and diversity of offers in terms of information.

International Scientific Presentations. Round tables with specific topics. Conferences and symposiums designed and presented by worldwide recognized specialists, that will cover many areas so the beekeeper can increase his production and make the most out of his resources. Whoever comes to La Rural, will be able to participate of a full agenda of shows, competitions, the latest news, besides getting to know a great number of people from all over the world who are also interested in the Congress.

Apimondia 2011 is a Congress, an Apiexpo and a meeting point for beekeepers from all over the world!

Bees Under Bombardment

Nick Nuttall, UNEP Spokesperson

From Chemicals to Air Pollution, New UNEP Report Points to Multiple Factors Behind Pollinator Losses

Geneva/Nairobi, 10 March 2011 - More than a dozen factors, ranging from declines in flowering plants and the use of memory-damaging insecticides to the world-wide spread of pests and air pollution, may be behind the emerging decline of bee colonies across many parts of the globe.

Scientists are warning that without profound changes to the way human-beings manage the planet, declines in pollinators needed to feed a growing global population are likely to continue.

- New kinds of virulent fungal pathogens—which can be deadly to bees and other key pollinating insects—are now being detected world-wide, migrating from one region to another as a result of shipments linked to globalization and rapidly growing international trade

- Meanwhile an estimated 20,000 flowering plant species, upon which many bee species depend for food, could be lost over the coming decades unless conservation efforts are stepped up

- Increasing use of chemicals in agriculture, including 'systemic insecticides' and those used to coat seeds, is being found to be damaging or toxic to bees. Some can, in combination, be even more potent to pollinators, a phenomenon known as the 'cocktail effect'

- Climate change, left unaddressed, may aggravate the situation, in various ways including by changing the flowering times of plants and shifting rainfall patterns. This may in turn affect the quality and quantity of nectar supplies.

These are among the findings of a new report published today by the UN Environment Programme (UNEP), which has brought together and analyzed the latest science on collapsing bee colonies.

The study, entitled Global Bee Colony Disorders and other Threats to Insect Pollinators, underlines that multiple factors are at work linked with the way humans are rapidly changing the conditions and the ground rules that support life on Earth. It shows humans' large dependency on ecosystem services even for such vital sectors as food production.

It indicates that bees are early warning indicators of wider impacts on animal and plant life and that measures to boost pollinators could not only improve food security but the fate of many other economically and environmentally-important plants and animals.

The authors of the report call for farmers and landowners to be offered incentives to restore pollinator-friendly habitats, including key flowering plants including next to crop-producing fields.

More care needs to be taken in the choice, timing and application of insecticides and other chemicals. While managed hives can be moved out of harm's way, "wild populations (of pollinators) are completely vulnerable", says the report.

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

"Human beings have fabricated the illusion that in the 21st century they have the technological prowess to be independent of nature. Bees underline the reality that we are more, not less dependent on nature's services in a world of close to seven billion people".

Bees and the Green Economy

Next year nations gather again in Rio de Janeiro, 20 years after the Rio Earth Summit, to evolve international efforts to achieve sustainable development including through accelerating and scaling-up a transition to a low carbon, resource-efficient Green Economy.

Part of that transition should include investing and re-investing in the world's nature-based services generated by forests and freshwaters to flower meadows and coral reefs.

"Rio+20 is an opportunity to move beyond narrow definitions of wealth and to bring the often invisible, multi-trillion dollar services of nature—including pollination from insects such as bees— into national and global accounts," said Mr Steiner.

"Some countries, such as Brazil and India, have already embarked on that transformation as part of a partnership between UNEP and the World Bank. It is time to widen and embed this work across the global economy in order to tip the scales in favour of management rather than mining of the natural world and that includes the services of pollinators," he added.

The new report on bee colony disorders has been led by researchers Dr Peter Neumann of the Swiss Bee Research

Centre and Dr Marie-Pierre Chauzat of the French Agency for Environmental and Occupational Health Safety. The team also included Dr Jeffrey Pettis of the United States Department of Agriculture's Agricultural Research Service.

Dr Neumann said: "The transformation of the countryside and rural areas in the past half century or so has triggered a decline in wild-living bees and other pollinators. Society is increasingly investing in 'industrial-scale' hives and managed colonies to make up the shortfall and going so far as to truck bees around to farms and fields in order to maintain our food supplies".

"This report underlines that a variety of factors are making these man-made colonies increasingly vulnerable to decline and collapse. We need to get smarter about how we manage these hives, but perhaps more importantly, we need to better manage the landscape beyond, in order to cost-effectively recover wild bee populations to far healthier and more sustainable levels," he added.

Highlights from the Report

Regional Losses

Declines in managed bee colonies date back to the mid 1960s in Europe but have accelerated since 1998, especially in Belgium, France, Germany, Italy, the Netherlands, Spain and the United Kingdom.

In North America, losses of honey bee colonies since 2004 have left the continent with fewer managed pollinators than at any time in the past 50 years.

Chinese bee keepers, who manage both western and eastern species of honey bees, have recently "faced several inexplicable and complex symptoms of colony losses in both species".

A quarter of beekeepers in Japan "have recently been confronted with sudden losses of their bee colonies".

In Africa, beekeepers along the Egyptian Nile have been reporting signs of 'colony collapse disorder' although to date there are no other confirmed reports from the rest of the continent.

Multiple Factors

Habitat degradation, including the loss of flowering plant species that provide food for bees, is among the key factors behind the decline of wild-living pollinators.

• An Anglo-Dutch study has found that since the 1980s, there has been a 70 per cent drop in key wild flowers among, for example, the mint, pea and perennial herb families.

Parasites and Pests, such as the well known Varroa mite which feeds on bee fluids, are also a factor.

Other parasites include the small hive beetle, which damages honeycombs, stored honey and pollen. Endemic to sub-Saharan Africa, it has spread to North America and Australia and "is now anticipated to arrive in Europe".

• Bees may also be suffering from competition by 'alien species' such as the Africanised bee in the United States and the Asian hornet which feed on European honey bees. The hornet has now colonized nearly half of France since 2004.

Air pollution may be interfering with the ability of bees to find flowering plants and thus food.

• Scents that could travel over 800 metres in the 1800s now reach less than 200 metres from a plant

Electromagnetic fields from sources such as power lines might also be changing bee behaviour. Bees are sensitive as they have small abdominal crystals that contain lead.

Herbicides and pesticides may be reducing the availability of wild flowers and plants needed for food and for the larval stages of some pollinators.

• Other impacts include poisoning of pollinators and the weakening of honey bees' immune systems

• Laboratory studies have found that some insecticides and fungicides can act together to be 1,000 times more toxic to bees

Some insecticides, including those applied to seeds and which can migrate to the entire plant as it grows, and others used to treat cats, fish, birds and rabbits, may also be taking their toll.

• Studies have shown that such chemicals can affect the sense of direction, memory and brain metabolism in bees

The management of hives may also be adding to the problem.

Some of the treatments against pests may actually be harmful to bees and a growing habit of re-using equipment and food from dead colonies might be spreading disease and chemicals to new hives.

Transporting bees from one farm to another in order to provide pollination services increasingly unavailable from nature could be an additional factor. In the United States, trucks carrying up to 20 million bees are common and each year over two million colonies travel across the continent.

• Mortality rates, following transportation, can be as much as 10 per cent of a colony

MISCO Digital Honey Refractometer

provides a sweet solution for measuring honey moisture content

Michael Caminer - Marketing Group, MISCO Refractometer, 3401 Virginia Rd., Cleveland, OHIO 44122 (USA)

MISCO introduces a new handheld digital refractometer to measure moisture content in honey, critical to its grade and overall quality. Although designed for government inspectors, the MISCO Digital Honey Refractometer is equally beneficial to professional beekeepers, honey producers, honey mixers, honey brokers, or anyone requiring the absolute most accurate, repeatable readings of moisture content. If the moisture content is too high, there is a risk of fermentation; too low and it may crystallize or granulize. This battle between fermentation and crystallization in honey production is a delicate balancing act that can hinge on just a couple percent. An accurate measurement of moisture content, using a refractometer, represents the best weapon in this battle.

To operate, simply place a drop or two of honey in the stainless steel sample well on the MISCO Digital Honey Refractometer. Then close the cover, to prevent the absorption of moisture, and press a single button to receive an instant, accurate reading on a large two-line 24-character, backlit LCD display. At the bottom of the sample well, a sapphire prism, the next hardest substance to diamond, provides a virtually unscratchable measurement surface.

The magic behind the precision of the Digital Honey Refractometer is a result of MISCO's proprietary optical-engine. This optical-engine combines high-precision optics with a linear detector array containing 1,024 elements. That's more than seven-times the detector elements of the leading competitor. The optical-engine allows the MISCO Digital Honey Refractometer to repeatedly measure with a precision better than +/- 0.1%. This precision is comparable to mid-range bench-top laboratory refractometers costing thousands of dollars more.

The MISCO Digital Honey Refractometer represents the highest-level of development in the field of honey measurement, and far exceeds the requirements for honey refractometers established by the USFDA, the Canadian Food Inspection Agency, and the Food and Agriculture Organization of the United Nations.

MISCO BKPR-1 Digital Refractometer - % Honey Moisture (13 to 30 %)

Additional honey measurement scales available include: % solids, specific gravity and density. MISCO's digital refractometers offer twice the precision of competing refractometers, while removing the subjectivity of reading shadow lines in analog refractometers. Plus, they are made and serviced in the U.S.A. Options for the instrument include a rubber-armor jacket (in one of three colors), a virtually indestructible storage case, and NIST traceable certified calibrations.

For those of you producing additional products like maple syrup, wine, jams or jellies, MISCO will custom-program a "combo" unit to cover all of your needs.

SUMMARY OF SASKATRAZ RESEARCH PROJECT ACTIVITES 2010-11

THE SASKATRAZ RESEARCH TEAM : Tom Robertson1, Neil Morrison1, Mohammad Mosterjeran1, Syed Qasim Shah1, Wayne Connor2, Sanjie Jiang3, Philip Griebel2, Xiao Qiu3, Albert Robertson.*1

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INTRODUCTION

The objective of this project is (i) to continue development and distribution of productive, gentle, honey bee colonies with tolerance to mites and brood diseases. (ii) to identify new types of molecular markers by comparing high and low honey producers, varroa sensitive and tolerant lines and viral sensitive and resistant (immune) lines (using infection models), for differences in expression of key genes (microarrays) and molecules (kinome arrays).

This report will be divided into three sections.The first section will deal with: (1) continued progress on the Saskatraz breeding program at Meadow Ridge Enterprises LTD,in collaboration with cooperating queen breeders: (2) the second with progress on microarray design and printing for identification of informative molecular markers for economic traits in collaboration with Dr. Xiao Qiu and graduate student Sanjie Jiang at Food and Bioproduct Sciences, University of Saskatchewan: (3) the third with the effect of varroa on expression of pathogenic honey bee viruses and screening of Saskatraz breeding lines for susceptibility and resistance to viruses in collaboration with Dr. Philip Griebel, Wayne Connor and associates at the, Veterinary infectious Disease Organization, University of Saskatchewan.

SECTION 1: SASKATRAZ HONEY BEE BREEDING PROGRAM, MEADOW RIDGE ENTERPRISES LTD.

SUMMARY OF STOCK DISTRIBUTION.

The Saskatraz breeding program distributed 887 queen cells from Saskatraz breeders and 17 breeder queens to Saskatchewan and other Canadian queen breeders in 2010. This returned $15,950 to the Saskatraz breeding program and $3200 to the Saskatchewan Beekeepers Association in 2010. Since 2006 Saskatraz breeding program stock sales has returned approximately $138,150.This represents distribution of a total of 4977 queen cells and 82 breeder queens . Many of the queen breeders purchasing Saskatraz breeding stock multiply this stock not only for use in their own operations, but for resale and distribution to commercial honey producers. A number of queen breeders continue to return outcrossed and new selections back to the breeding program for evaluation in exchange for certified Saskatraz stock. Saskatraz stock is becoming wide spread in Saskatchewan, and now present in BC, Alberta, Manitoba, Ontario, Quebec and New Brunswick.The stock is also part of breeding programs in BC , Manitoba,Ontario and New Brunswick. Considerable interest has also been expressed by queen breeders in the United States. Some progress has recently been made in the export of breeder queens to Chile. An official document prepared by Drs. Pierre Lafortune and Albert Robertson in consultation with the Hive Health Commitee (Canadian Honey Council), and CAPA, the Canadian Association of Professional Apiculturists was completed in January and has now been sent to SAG, CFIA's counterpart in Chile. Australia has also expressed interest in importing Saskatraz stock, and they are eventually looking at importation through their quarantine facilites.

Current Saskatraz Breeding Program Activities, Meadow Ridge Enterprises LTD.

Personnel. Mohammad Mosterjeran research associate (varroa analyses, selection, stock multiplication), Tom Robertson, Neil Morrison (honey production, stock selection, distribution and multiplication), Dr. Syed Shah (visiting scientist, varroa analyses and selection), Dr Albert Robertson.

In 2010 three Saskatraz natural selection yards were operated. The original saskatraz-Q yard site is used to test pre-selected colonies (honey production, wintering ability, temperament, etc.) for varroa tolerance. Many of the colonies tested at the original Saskatraz yard site have been outcrossed and subjected to recurrent selection.The second (Saskatraz-PW) and third (Saskatraz–D) are used for progeny analyses of breeders selected at the Saskatraz–Q apiary. The best daughters are re-selected (recurrent selection) from each breeding line at these two yard sites, for outcrossing, back crossing and closed population breeding. During the summer months selection involves measuring honey production, temperament, varroa populations on adult bees, varroa death rates (sticky board analyses), brood diseases (chalk brood, etc.), checks for virus infections (visual and molecular) and microsporidia (Nosema apis and ceranae) by microscopic analyses and PCR (polymerase chain reaction). In the fall of 2008 we began brood analyses for percent varroa infection. Both the percent brood infected and the number of varroa per cell were scored. During the summer of 2010 Meadow Ridge Enterprises Ltd, hired a full time student to score brood for varroa infestation to test for Varroa Sensitive Hygiene phenotypes. Fourteen breeding lines and over 100 frames

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were thoroughly analysed.

Honey production is our primary selection criteria, and all Saskatraz colonies are assessed for honey production every year. Honey is harvested and weighed from each colony at least 3 times during the summer, and net honey production at each time period compared between colonies. In 2010,112 colonies from Saskatraz breeding lines were assessed and seven (S113, 114, 23A, 84C, 86C, 28A, BG1F) were selected for honey production and further multiplication in 2011.

The same colonies were subjected to intensive tracheal and varroa mite analyses, as well as our varroa nursery and all closed population mating yards (4 apiaries, 156 colonies). In addition, outcrosses of Saskatraz lines were assessed at 50 different apiaries at Meadow Ridge. Varroa infestations of adult bees were determined by alcohol washes as well as natural drop on sticky boards. Sticky boards were scored by counting the number of mature and immature mites every 7 to 10 days. Samples of varroa mites as well as adult bees and pupae were also collected for virus and nosema analyses. Tracheal mite analyses was performed by the provincial apiculture laboratory, by standard protocols, in Prince Albert, Saskatchewan and reported by Geoff Wilson. Most, if not all, Saskatraz breeding lines are now showing excellent resistance to tracheal mites without treatment. In 2010 the following colonies showing good honey production and suppression of varroa mite reproduction were selected for further analyses and distribution in 2011 (S23A, 65C, 84C, 86C, 88 and 113). Sat 84 showed a VSH phenotype in 2008, and a daughter of S84, 84C showed a similar phenotype in 2009. We are still analysing large amounts of data collected in 2010 for VSH phenotypes. Sat 88 is now the longest surviving colony at Saskatraz-Q, existing for 42 months without synthetic miticide treatment.

The figure presented below summarizes our current Saskatraz field breeding program logistics. A novel feature of this breeding initiative involves the application of natural selection recycling after outcrossing, back crossing and recurrent selection. Letters A to E represent sources and F to G reservoirs of selected breeding lines or familes. A genetically diverse gene pool was established by preselecting stock from unrelated populations showing economic traits (honey production, wintering ability, good temperament and mite tolerance [Russian stock]). Selections from these populations were assembled at the original Saskatraz yard site and re-selected for honey production and mite tolerance for three years. Re-selected outcrosses and back crosses of selected Saskatraz familes are recycled through a natural selection process at

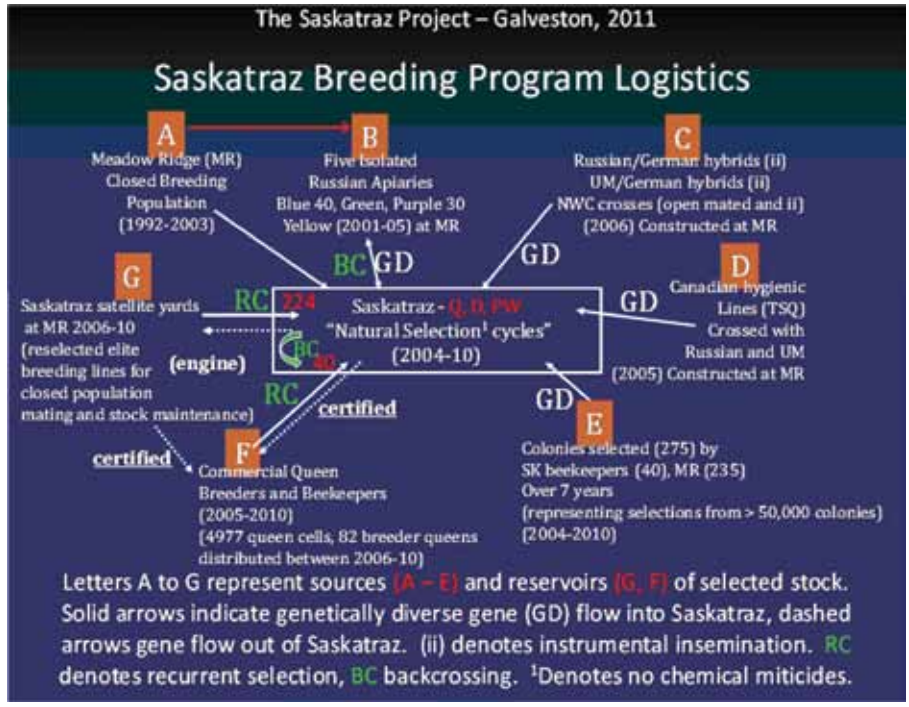

Figure 1.Saskatraz Breeding Program Logistics.

each of the three natural selection yard sites (Saskatraz–Q, PW, D). Saskatraz PW and D are used for progeny analyses. This process functions to continually enrich for genes producing the most benefical phenotypes,combining the most fit drones and queens. For example back crossing virgin queens from colonies showing the best honey production and varroa tolerance under high varroa infestation selects for the most fit drones under natural selection conditions. Twelve back crosses made in 2010 at Saskatraz will be evaluated in 2011.

In 2008 we initiated indoor wintering experiments focused on grooming behavior, morphometric measurements, varroa population growth, virus and Nosema suceptibility (2009-2010) on the progeny of selected breeding lines. This allowed us to select for certain traits during the winter months. In 2007 we introduced selection for varroa sensitivity, removing colonies showing higher varroa populations from our closed population breeding yards, and commercial apiaries. In 2010 these colonies (17) were moved to an isolated apiary and used as a varroa nursery for molecular analyses (microarrays and viruses). No treatments were made and these colonies are left to die of varrois and associated pathogens.

Morphometric analyses (Mohammad Mosterjeran) of body parts on 21 Saskatraz breeding lines was performed in an attempt to correlate morphological traits with honey production, suppression of varroa population growth and grooming behaviour. "Morphometric analyses involved sampling 30 worker bees in to a preservative from each selected Saskatraz colony (43) and measuring body parameters and appendages (legs, wings, proboscis, etc,) with a stereo microscope using the Ruttner Standards. Twelve colonies remain to be assessed and statistical correlations made between phenotypes (honey production, varroa tolerance, grooming behaviour, etc.). Preliminary observations indicates Sat 65 and 88 have the longest legs and show good grooming behaviour.

Whole colony grooming assays continue with 64 colonies from 8 different Saskatraz families being assayed. These assays are performed by normalizing the varroa mite populations in each colony by miticide treatments, and then adding equal amounts of varroa mites to each colony and assaying for varroa drop on sticky boards at frequent intervals over several weeks. Eight daughters from each family are used in progeny analyses, to identify the best groomers for selection and propagation. Sat 84C is an example of a selection with good grooming behaviour that also showed a VSH phenotype, good varroa suppression in the field and excellent honey production at Saskatraz PW in 2010. Daughters from this family are undergoing further multiplication and recurrent selection.

The 64 colonies undergoing grooming assays are also being monitored for viruses, and microsporidia (Nosema apis and ceranae). Virus monitoring was initiated to screen for colonies showing possible resistance to pathogenic viruses (Deformed Wing Virus [DWV]; Kashmir Bee Virus [KBV]; Israeli Acute Paralytic Virus [IAVP]). Sampling consists of collecting dead and live bees and dead and live varroa mites from test colonies every 14 days. These samples are assayed in collaboration with VIDO, and will be discussed in the next section. All colonies are monitored for Nosema infections according to standardized procedures which involves measuring spore levels in the gut by microscopic analyses. Typing species involves PCR procedures at VIDO, University of Saskatchewan

Section 2: Microarray analyses for identification of genes involved in the expression of varroa tolerance and honey production.

Personnel involved. This part of the project is being carried out in collaboration with Dr. Xaio Qui, and graduate student Sanjie Jiang at Food and Bioproduct Sciences, University of Saskatchewan and Dr. Albert Robertson, Meadow Ridge Enterprises Ltd.

This project was initiated in August,2010, with the arrival of a graduate student, Sanjie Jiang to work on as part of his master's thesis. The following information was provided by

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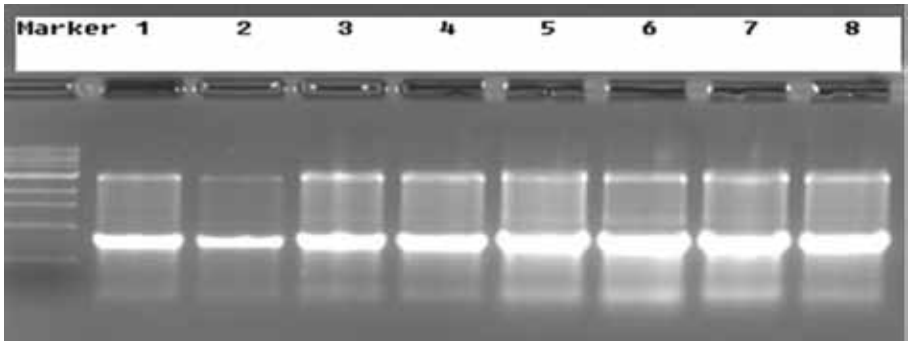
Sanjie Jiang as a progress report on the microarray project.

Investigation of possible molecular mechanisms involved in conferring tolerance to varroa mites in domestic honey bees is being approached by comparing gene expression profiles (microarrays) of sensitive and tolerant Saskatraz breeding lines. Honey bee pupae at different developmental stages were collected , as well as from adult worker bees in the fall of 2010. All bees were collected from Meadow Ridge apiaries by Sanjie Jiang with the assistance of the Saskatraz field research team. Brood frames were removed from sensitive and resistant colonies, and brought to the field laboratory for harvesting pupae. They were stored at 32 C and 80% humidity until collection was complete. Collection involved carefully opening capped brood cells, and removing pupae at the described stages under a 10× stereo microscope. Pupae with and without varroa were collected from both sensitive and tolerant colonies. Adult honeybees (approximately 200 per sample) were collected from sensitive and tolerant colonies by hand catching live worker bees with and without varroa infestations. Rubber surgical gloves were worn to prevent contamination with nucleases and keratin, etc. Samples were frozen in liquid nitrogen before being stored at –80°C.

Total RNA was extracted from the heads of two bees (dark-eye pupae) using RNeasy kits (Qiagen, Valencia, California) as described by manufacturer and treated with DNase (Rnase free DnaseI, also Qiagen). RNA purity and integrity were checked by electrophoresis (1% agarose gels) as shown in Figure 2



The RNA extracted from the bees heads shows excellent quality, and is being used for microarray analyses

Section 3. The effect of varroa on expression of pathogenic honey bee viruses and screening of Saskatraz breeding lines for suceptibility and resistance to viruses and Nosema; in collaboration with Dr. Philip Griebel and associates at VIDO.

Personnel: Wayne Connor, PCR technical specialist and Dr. Philip Griebel (scientist) and associates, VIDO, University of Sask.and Dr. Albert J.Robertson, Meadow Ridge

Above, picture taken February 14, 2008 (TX)

Below, picture taken March 18, 2008 (TX)

Enterprises Ltd.

In the spring of 2007 all of the original Saskatraz colonies died during the winter, after varroa infestations reached high levels in the fall of 2006. Although 6 colonies were selected over a three year period, which showed good honey production and suppression of varroa population growth, none showed resistance to varroa. We began an extensive and thorough post mortem analyses of colonies which collapsed during the 2007 winter at Saskatraz, as well as tests on colonies from Saskatchewan beekeepers having higher than normal loses.These studies are still in progress. Briefly, in addition to over 30 Saskatraz colonies, we investigated viral and nosema pathogens in more than 17 case history studies for commercial beekeepers since 2007. We tested for viruses by RT-PCR (DWV, IAPV, KBV, Sac brood, Black Queen cell virus and microsporidia (Nosema apis and ceranae) by PCR. Methods were developed to test a variety of samples from collapsed colonies. We tested adult bees, pupae, bee feces, varroa, varroa feces, hive products (bee bread and honey), and commercial pollen. It was found that the presence of more than two viruses (DWV + IAPV or KBV) and microsporidia (either and or both) results in high colony losses. We also observed that high spore counts of both apis and ceranae causes high colony mortality and continued colony dwindling in the spring. Fumidil B was an effective treatment with ceranae infection disappearing often before apis in follow up testing.The discovery that hive products (bee bread and pollen) can be infected with viruses and microsporidia in colonies showing high levels of infection is of concern.This indicates reuse of equipment may cause infection of new colonies. However, we do not yet know the infectivity of pathogens in hive products,and more experiments are required to answer these questions.The detection of pathogens in dead bees, pupae and feces has proved useful in determining what factors are involved in colony losses, and in determining treatment protocols. A search for viral and microsporidia in natural reservoirs was also investigated. Wasps in the vicinity of bee hives in some, but not all cases carried DWV and IAPV. Bumble bees showed DWV, and KBV, but we did not identify any with IAPV. A sample of flys at the Saskatraz apiary showed high levels of DWV and IAPV, where as samples from another area did not. Floral sources (clover blossoms, canola, wild flowers, etc.) were sampled around the Saskatraz yard site, and all tested negative for viruses. PCR analyses of bumble bees in the Saskatoon area for Nosema species was negative.

Some of our investigations on the effect of varroa infestations on the incidence of virus infection at Saskatraz in 2005 and 2006, detected three pathogenic honey bee viruses (DWV, KBV and IAPV) showing up over time, by Rt-PCR analyses of varroa sampled from bottom boards (natural drop). As varroa infestation levels increase more virus was detected in the varroa. However, colonies selected for suppression of varroa population growth (SAT 28, 30, 34) showed less virus infection in the varroa collected, than non-selected colonies (Sat-01, 24) showing higher varroa infections earlier. In addition,varroa sensitive colonies died quickly after virus infection, where as varroa tolerant colonies survived longer, even after detection of viruses in the varroa infecting these colonies. This led us to look at the susceptibily of selected Saskatraz colonies to viruses.

A report by Maori et al. 2007. Virology, 362: 342-349 showed certain lines of Israeli honey bees showed resistance to IAPV. We assayed some of our Saskatraz breeding lines, exposed to all three pathogenic viruses (Sat-65,84), which did not show any detectable IAPV sequences (infection) by RT-PCR,for genomic sequences of DNA homologous to IAPV. The presence of genomic sequences in these lines would suggest that retrotransposition of recombinant RNA from host and pathogen may have occurred to confer immunity to IAPV. Except for one weak signal in genomic DNA from a Saskatraz selection we have not been able to dulpicate the Israeli results. Further testing of Saskatraz breeding lines showing some resistance to viruses is in progress.

In 2010 we established cell culture lines of several Saskatraz breeding lines (SAT-28, 30, 65, 84, G4abp, etc.) using honey bee pupae (Hunter, W.B. 2010 In vitro cell. Dev.Biol,- animal 46:83-86.). These cultures are being developed as an assay system for screening the infectivity of honey bee viruses, and to determine whether breeding lines showing some immunity to viruses maintained the immunity in vitro. We succeeded in establishing honey bee cell cultures from Saskatraz breeding lines and cultures established from pupae infected with virus maintained the virus infection, but no amplification of the virus was detected. Attempts at infecting the cultures with dead varroa containing identifiable virus sequences failed, and experiments with live varroa are planned. The cell cultures were slow growing and died after several months of incubation. Repeats of these experiments, with some modifications, are planned in 2011.

In our current breeding trials we have added varroa to 64 colonies (8 daughters from 8 SAT breeding lines) for grooming assays. These colonies are also being monitored for the presence of viruses (DWV, KBV, IAPV) by RT-PCR and Nosema species by PCR in live and dead bees and varroa at two week intervals during the winter. Preliminary results indicate that viruses are detected in varroa before they show up in the worker bees. Although varroa are thought to spread viruses through out the honey bee population, it is curious that virus multiplication appears to begin in the varroa. These experiments will assist us in identifying Saskatraz breeding lines with virus immunity and some resistance to Nosema. Variabilty within and between lines has already been identified, but the analyses is preliminary.

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Development Fund, Agriculture Council of Saskatchewan and Meadow Ridge Enterprises Ltd in 2010 is gratefully acknowledged. We thank Wink Howland ,Secretary Treasurer of the SBA for administering grant funds. All proceeds from the sale of Saskatraz breeding stock is used to support the breeding program. We gratefully acknowledge the support of all queen breeders purchasing Saskatraz breeding stock ,and collaborating by contributing re-selected outcrosses and new selections back to the program for evaluation.

Copies of The Saskatraz Project - A Review (2004-2009) are available from the CHC office for $25.00 each, includes postage. Contact geoff@honeycouncil.ca

Classifieds:

Bee Supplies for Sale

Bee Supplies - Extraction equipment: Yorkton, SK

For Sale: One 1000lb stainless steel tank complete with quick shut off valve, one capping spinner with hot plate, miscellaneous equipment, frames, etc. Call Bob at 306-782-5075

Bee Supplies - Silicon Moulds for Candles: Petawawa (ON)
Over 18 years selling high quality silicon moulds for making beeswax candles. The moulds do not require lubrication. Easy to follow instructions included in $5.00 catalogue. Cost of the catalogue is refunded on your first order. Contact: E. & R. Schmitt, 3468A Petawawa Blvd. Petawawa, ON K8H 1X3. Phone: Business 613-687-4335

Honey supplies - Foundation for honey comb: Fairview (AB)
For all your foundation needs, any size wired or without, organic or conventional, place orders by phone 780-835-2115 or fax 780-835-2873 or email tegart@telusplanet.net.

Honey Bees For Sale

Bee Operation - For Sale: Oxbow (SK)
25 Hive Operation, passed inspection. Asking $7,000.00. Contact: Paul MacFarlane, 306-925-2001

Honey bee colonies - over wintered stock: LePas (MB)
200 Double colonies available for pickup mid May 2011, all hives have 2010 queens
Queens are selectively bred for:
excellent honey production
very successful outdoor wintering in the harsh Canadian north
superior brood patterns
All hives are disease free
Bill Perchaluk, 204 623-3982, The Pas, MB

For Sale: Four frame nucs, Portland, Ontario.

Available in May 2011. Queen cells ready for pick-up June and July. Mated queens shipped June through September. Phil Laflamme, 6-Z2 Old Kingston Rd., Portland, Ontario, KOG 1VO. 613-272-2091

Wanted to Buy

Wanted - Borage or buckwheat honey: Toronto (ON)
Borage and buckwheat honey wanted. 100% pure honey. We are just north of Toronto. Call Henry Nauta, Penauta Products Inc. Phone 905-640-1564 or fax 905-640-7479

Wanted - Round Comb Honey Equipment: Milo (AB)
Used Round Comb Honey Equipment. Supers, Frames, etc. Cobana/Ross Round Size. Best Price. We pick up. 403-599-3953. Summit Gardens Honey, Milo, Alberta. www.summitgardenshoney.com

Wanted – Bees Wax for candles: (ON)
Light Yellow rendered beeswax cappings.
Email: busybeewax@busybeebeeswax.ca,
Phone: 613-478-3784
Contact: Ian or JoAnn Fraser.

Wanted – Barrels of white and buckwheat honey: (ON)
Phone: 416-938-6698
Contact: Vicky Staite.

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Contact Paul Bartrum for more information.

Email: lynn.bartrum@gmail.com

Phone: +6436147790

2012 Canadian Beekeeping Annual Convention

Combined CHC, CAPA, MBA Convention and Symposium January 26 - 28, 2012 at the Fort Garry Hotel, 222 Broadway Avenue, Winnipeg, Manitoba (phone 204-942-8251).

Thursday January 26 will be separate CHC and CAPA meetings during the day with a combined group meeting in the evening.

Friday-Saturday, January 27 & 28 will be Beekeepers' Symposium, with a Banquet planned for the evening of Friday January 27th.

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