2004 3

August 2004
Vol 17 # 3

Hive Lights

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Canadian Honey Council

Pollination

Importance of honey bee genetic diversity

Kashmir bee virus

Bees as Indicators of environment quality

The chocolate chip theory reviewed

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CHC is the national organization of the beekeeping industry. It is the vital link between beekeeper associations, governments and provincial apiculturists.

Beekeepers in business can claim CHC membership and travel to the annual meeting as eligible business expenses for tax purposes.

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HiveLights

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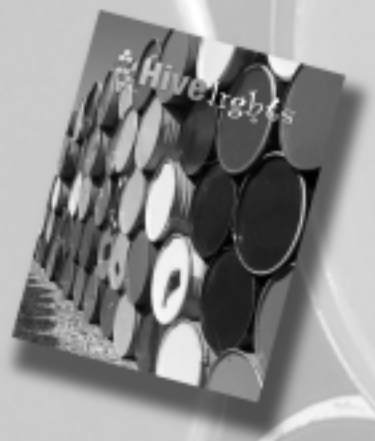

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CHC Activities

Heather Clay
National Coordinator CHC

Oxalic Acid Registration

The CHC has contracted Dr Robin Owen, Professor in Chemical, Biological and Environmental Science at Mount Royal College, Calgary, to proceed with preparing the documentation for the registration of oxalic acid. Dr. Owen will supervise a recent science graduate from University of Calgary who will collect and catalogue the required documentation for submission to PMRA on behalf of CHC.

The contract is supported by donations from beekeepers who contributed to the oxalic acid registration fund. To date a total of over $23,000 has been donated. We hope to reach the target of $30,000 by the end of summer. Any donations are welcome.

US Queen Importation

The new regulation for importation of queens from mainland USA came into effect 19 May, 2004. The regulation change applies to queens only, the prohibition on packaged honeybees from continental USA has been extended until December 2006.

Approval by the Canadian Food Inspection Agency (CFIA) was granted late in the season and many US queen producers were not in a position to gear up for supply. At first there were some difficulties in getting the necessary inspections done and the required documentation in place. As well, CFIA and customs officials had to familiarize themselves with the new process. Despite the bumpy start, over 5,000 queens were imported to Alberta in June. This relieved the strain on those who needed queens but were unable to make splits due to poor weather. Some beekeepers wanted to test the system by starting with small numbers and seeing how they overwinter before ordering larger numbers next year.

Hawaiian queens have been very good quality, consistent performers and reasonably priced. Many customers will remain loyal to the Kona queens, as long as they are available. The problem is supply. This year the Alberta Honey Producers Coop sold thousands of the popular Kona queens and could have sold another 20,000 if they had been available. The California queens proved to be a useful alternative when overseas supply was low.

C-BISQT

The CHC has received approval from Agriculture and Agri-Food Canada to proceed with developing a producer-led food safety system for beekeepers. The new Canadian Bee Industry, Safety, Quality, Traceability (CBISQT) program is taking shape and the steering committee hopes to have a manual ready for Technical Review by the end of the year.

The cost of annual audits and certification is under review. Affordability is extremely important or there will be no buy in to the CBISQT program. The current plan is for a full audit on a four year cycle with an annual partial audit for the three years in between. The committee is examining the feasibility of using a national certification body to keep the expense of on farm inspections to a minimum. Information will be posted on the CHC website, www.honeycouncil.ca, as the program is developed.

Recalled Honey

The media furor over recalls of honey on account of residues has died down largely due to the fact that Health Canada has downgraded the classification of low levels of nitrofurans in honey from Class 1 to Class 2. This means that there is no longer a requirement for public announcements about recalls. The CFIA assures us that they are continuing to request packers to voluntarily recall any imported honey that may contain low levels of nitrofurans. They are also testing imported honey and rejecting any shipments that fail to meet the grade before it enters the marketplace.

100% Canadian Logo

There is a need for producers of Canadian honey to be able to identify their product as 100% Canadian. The CHC is working on developing a logo for use on 100% Canadian honey but there is no point in having a logo without a certification system. The CHC and the BCHPA are examining the possibility of implementing geographic fingerprintng through isotopic analysis of honey. Laboratory analysis would identify not only the country but trace back to the region of origin. It is expected that the packer would be certified in conjunction with the new CBISQT program.

Membership Fee Increase

The costs of running a national association have increased annually without any increase in the cost of membership. As a result, the directors decided to increase membership fees for the next financial year starting November 1st, 2004. There has also been a change to the categories of membership to better reflect the makeup of our industry. The new fee structure is as follows:

Hobbyist (1 to 49 Colonies)	$50
Small commercial (50 to 299)	$100
Large commercial (300 +)	$200
Industry	$250

If you would like to beat the rate increase, any membership renewals received before November 1st will be processed at the current rate.

CHC - CCM Delegates 2003
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Provincial Reports

Maritimes

Winter losses in the Maritime this year were variable. Southern New Brunswick and Prince Edward Island seemed to be the hardest hit while Northern New Brunswick had their best winter ever by all reports. Nova Scotia's losses were at or below normal, however, a very cold spring led to a lot of dwindling as bees had trouble rebuilding their numbers.


Paul Kittilsen

The high winter losses in New Brunswick and Prince Edward Island resulted in a large shortage of bees for blueberry pollination in these provinces. Nova Scotia seems to have met the demand of their blueberry producers.

Again this spring queens were in short supply. All beekeepers in the Maritimes are optimistic that with continental US queens available to most provinces this will help eliminate the spring shortage in the east.


Alain Moyen

Plans are in place for the Maritime Apiculture Symposium and Tour to be held July 30 and 31 in Memramcook New Brunswick. There is a great line up of guest speakers and tours of Apiculture operations and general interest attractions. I wish you all a successful beekeeping and a bountiful harvest.

Quebec

Well, not a bad Spring, with a lot of feed and plenty of pollen patties, the bees are starting to look good. The honey flow stared early this year about at the 15th of June so lets just say we had to hurry to put on boxes.

Winter losses seemed to be back to normal for the most part but there were still a few beekeepers that refused to use products other than Apistan. There were a few beekeepers who reported losses over 90%!

Some Québec beekeepers decided to buy Australian packages this year to speed up the rebuilding of hives, but much to our disappointment in general, we found that they did not build up very well. Most of them are getting their queens changed before Winter.

Pollination went well this year for the apple crop. The weather turned out very good at the right time but blueberry pollination was not so good. Beekeepers moved hives to the Lac St-Jean area in early June and some never returned until late June. There

were reports of snow still not melted in mid June!

The Québec beekeepers are having a field day on the 10th of July at the Deschambault Research Station. We decided that with all the new products and methods of treating, we are going to take the time and actually compare all the different treatments or as much as possible to see what works and what we are doing wrong with others. Lets hope by putting heads together we shall slow down the process of losing colonies.

So until next time, have a great Summer and a good honey crop!

Ontario

According to the weather man we are expecting a hot dry summer but up till the end of June Ontario has had the exact opposite. At our recent summer meeting most beekeepers reported inconsistent honey flows and some colonies needed supplemental feed.

Honey prices have been reported in the $1.50 to $1.65 range for white and $1.15 for dark honey.

Hybrid canola pollination contracts have dwindled, with about only 1/5th of the number of hives last year required this year.

Glen Ackroyd

Despite the Canadian Food Inspection Agency's ruling to allow Mainland USA queens into Canada, the majority of Ontario beekeepers are opposed to the decision. It is still against the Ontario Bees Act to import these queens into Ontario.

Ontario beekeepers are looking forward to a hot dry summer with a great nectar flow.

Manitoba

Beekeepers in Manitoba have experienced record breaking amounts of precipitation and cold weather during the months of May and early June when colonies normally build up in advance of the first honey flow. After an unusually severe snow storm on May 11, beekeepers from around the province soon began to report that individual colony bee populations were dropping and colonies with small clusters were under severe stress. Subsequently, there has been only a few days when bees were able to gather pollen and enough nectar to feed a growing bee population. By the middle of June most beekeepers were reporting that hive populations were rebuilding but seemed to be two to three weeks behind schedule.

Ron Rudiak

Because the weather has been unusually cold, clover and alfalfa growth has been delayed accordingly which should give the bees an opportunity to catch up in time to take advantage of this valuable nectar source. The large number of fields which had been seeded before the May snow storm were very slow to germinate and generally appear to be three weeks behind in their growth. Because of continued precipitation there has been practically no seeding attempted since early May. A substantial number of growers that were planning to seed canola and soybeans may have to summer fallow their fields which in turn will reduce the number of locations available for bee yards. Manitoba beekeepers continue to report occurrences of bear damage at spring yard locations, many of these sites have never experienced bear damage previously. Manitoba's bear population appears to be rising continually, primarily because this large animal has no natural enemies.

Several Manitoba beekeepers are looking forward to having their orders filled for queen bees from California. The Manitoba Co-Operative Honey Producers will also be able to offer US queens to anyone who needs them.

Some queen breeders, in Manitoba, are reporting that many of their locally raised queens were not able to mate on schedule or possibly did not get mated at all this spring because of the cold and wet weather. Improved weather conditions will solve a lot of problems for everyone.

Manitoba Agriculture recently notified all beekeepers that if they are operating colonies within 2 km from the perimeter of any large community (population 1500 or more) in southern Manitoba that they should register those yard locations. In the event that aerial spraying to control mosquitoes carrying west Nile virus becomes necessary, advance notice will be provided so that colonies may be moved or protected.

Honey bee colonies are less costly to operate and more productive when they are kept in a disease free condition. In Manitoba, the Provincial disease inspection program has assisted beekeepers to remain profitable by routine examination of a portion of their colonies annually. To maintain this essential service Manitoba Agriculture has initiated cost recovery for hive inspections and lab services.

For the 2004 crop season, the MBA has recommended a price of $2.50 per pound for honey sold at the farm gate in the customers own container.

The June 16 beekeeping Field Day included a tour of ACSion Industries Inc., in Pinawa, Manitoba. ACSion, a privately run company, has an electron beam facility which is under assessment for use in destroying AFB spores infecting hive equipment and collected pollen. The educational demonstration of the accelerator in use was followed by an informative Power Point presentation by ACSion. The group of forty beekeepers, guests and family members remained at the location for a bear pit session and presentations from Dr. Robert Currie (U of M), Rhéal Lafrenère and David Ostermann (Manitoba Agriculture). The delightful potluck supper and barbecue was followed by a tour of the old Pinawa hydro electric dam site on the Winnipeg River.

Saskatchewan_

Spring came to Saskatchewan with slow, cold steps. However, as long as the winter was, the overall wintering success for beekeepers was higher than had been realized for several

years. Perhaps the absence this winter, of an extended period of bitter cold helped, or perhaps the snow cover, which most areas experienced, made the difference, but whatever it was, winter losses for the most part, were low. We know, too, that both varroa and tracheal mite infestations are spreading, but it would seem that we are not experiencing mite resistance at this point, as that would have been reflected in the winter losses.


Wink Howland

During May, we experienced a number of general rains, which hit most of the province. These rains provided welcome relief in many areas, which were drought stricken, due to the previous three years of below normal rainfall. These billion dollar rains, while delaying seeding and beeyard work, were a godsend, and should we get some heat during the next few weeks, should bode well for a good Saskatchewan crop.

The odd weather this spring, produced some bizarre things. The cold weather delayed the hatching of most bugs, and many migrating songbirds, not normally seen at bird feeders, appeared in good numbers. Unfortunately, many birds starved, and some even appeared to be killed in the beeyards, where they were competing with the bees for sugar syrup.

The Saskatchewan Beekeepers' Association, as mentioned in May Hivelights, is seriously investigating the formation of an Agricultural Commission, which would allow them to levy beekeepers for funds to support research and promotion. A letter that basically outlined what a commission could or would do, was mailed to everyone on the government's mailing list, who kept bees. A questionnaire was provided in that mailing, along with a return envelope, and the results of that questionnaire will be discussed at our forthcoming Field Day. So far, all but two of the respondents have supported the idea of a commission, and hopefully, after further discussion and refinement, a concrete plan will be tabled at our Fall Business meeting, and a vote will be taken, as to whether or not we can proceed. At this point, it looks like we will be proceeding.

The Field Day this year, was held at the farm of Albert Robertson, our beekeeper who is leading the way in the search for genetic markers that will help to determine whether or not certain lines of bee stocks, carry resistance to mites. Albert will also be overseeing a project called "Saskatraz", partially funded by the Canadian Bee Research Fund, and supported with money from the SBA and CARDS, which will establish an isolated yard of various bee stocks, which will be carefully managed and tested, to determine if mite resistance is present. Hopefully the project will produce some positive and measurable results, which could assist beekeepers throughout North America. Needless to say, we are excited by the prospects that this project might develop.

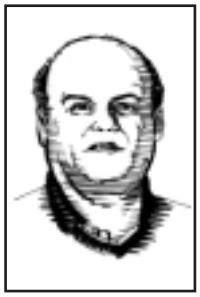
It's a busy time of year for all, and a difficult to do some of the other work that needs input. The "On Farm Food Safety" program is one of those projects where I've been neglectful. Thank goodness that Heather and Rudy have kept this project moving forward. Queen importation is now a reality, and some queens have come into the country, legally. Honey recalls are still taking place, but in a quieter way, but we still need to monitor the market to make sure that CFIA stays on top of the import situation.

I hope everyone has a good summer and experiences a bountiful crop.

Alberta

Winter colony mortality in Alberta will probably prove to be the lowest in many years. Spring colony mortality, or least delayed development may be the most pronounced in many years. Moisture conditions are seasonably adequate. An average crop should be expected.

The closed border for importation of bees from the continental U.S. has been indefensible scientifically and difficult for many beekeepers seriously interested in making a living in the bee business. The Alberta government recognized the merit of having traceability in place for imported queens and has worked diligently to put in place this risk management tool.


Grant Hicks

A major concern to Canadian beekeepers should be the marketing of honey, and an appreciation of how delicate this process is. We were all worried, at the CHC meetings in Winnipeg, that Canadian honey was being displaced on the store shelves with off-shore honey. Action has since been taken, but how much damage was wreaked on consumer honey consumption by that action? The situation of last winter was not about Canadian honey, but may have serious repercussions for honey consumption in the Canadian marketplace.

The Canadian honey marketing industry is immature and underdeveloped. We need in place a promotional process to emphasize the benefits derived from the consumers use of honey. Do we have the capability of putting together a programme, national in scope, that would annunciate the integrity of Canadian honey, correct the demographic skew to the older consumer, and promote the use of honey generally, and Canadian honey specifically? Hopefully we could finance, conceptualize and deliver a promotion package that would maintain the integrity of honey in the consumer's mind and lead to increased consumption. American beekeepers have taken ownership of threats to, and inadequacies of policy in, their marketplace. Can Canadian beekeepers do the same in our country? Further, one might ask, why should we need a stand-alone Canadian programme when Canadian beekeepers have contributed thousands of dollars to the

National Honey Board in the US. The NHB has enormous level of expertise in this area. Could we partner with them to open a "Canadian Desk" to address needs in this marketplace?

One tool that would be useful to our industry would be a fundraising mechanism which would allow our leaders to respond to issues in an ongoing basis, be they research, advocacy, promotion, education, etc. Saskatchewan, Alberta and B. C. are all exploring the possibility of developing voluntary fund raising instruments, under the Alberta legislation this tool is called a Commission. In Alberta we have explored how a process that would charge all beekeepers would work, and how one that might charge only the commercial beekeepers might work. Both models have their merits and detrimental aspects. Hopefully we can find the perfect balance that will be acceptable to our producers. The crucial decision issue is, are we mature enough as an industry to accept responsibility for our industry, which may include paying the price, or will we continue to whip in the wind at the behest of government funding.


Ed Nowek

British Columbia

Spring has been at least two weeks early this year in most parts of British Columbia. Surviving hives, although not abundant, built up rapidly allowing splits often more than once. Some apiarists reported a box of honey from the early flows of dandelions and orchard blossoms. One of our agriculture field men in the Okanagan felt that we were two full weeks ahead of normal and at least one week ahead of the previous all time record. Rains have come in late May and the first half of June to raise the level of optimism on our honey flow prospects.

High losses were reported in many districts attributed to poor nutrition levels last fall, some fairly severe winter weather in January, and higher than average mite levels due in significant part to the mite resistance to fluvalinate. If queens could be found many beekeepers were taking advantage of the early spring build up. The dropping of the embargo on U.S. mainland queens came too late for most British Columbians.

The B.C. association of honey producers has been reported to have made substantial decisions around the hiring of management, accounting and administrative assistants for conducting the association's business. This along with possible development of an industry council and the debates on the policy on movement has brought up controversy not seen in this province for several years.

Hopefully with a huge honey crop in the bag, high honey prices sustained and an open spirit of cooperation, British Columbian beekeepers will equipped to move above and beyond.

BEE MAID HONEY

In light of the recent quality concerns with some imported honeys, Bee Maid Honey is urging all Canadian beekeepers to use extreme care in the administering of antibiotics, bee medicines and bee repellents with their beekeeping operations. Canadian-produced honey enjoys a reputation for very high quality around the world and it is extremely important that this reputation not be jeopardized. All beekeepers are urged to contact their Provincial Apiarist for a list of approved products for beekeeping in Canada. Please make certain that you use only approved products, and that you follow the recommendations for use as supplied by your Provincial Apiarist. The Canadian beekeeping industry has worked extremely hard for many years to gain the reputation of producing a top quality product and we must do everything possible to ensure that this reputation remains in tact.


Neil Specht

Bee Maid Honey is pleased to support the Canadian Honey Council initiative for the registration of Oxalic Acid as a safe product for varroa mite control. This is a very responsible initiative by the Canadian Honey Council to ensure that only safe chemicals are used in Canadian beekeeping and Bee Maid Honey is pleased to provide support to this project.

At the time of writing of this report, the middle of June, it appears as if we are still waiting for summer conditions right across the Prairie Provinces. Alberta and western Saskatchewan are still dry and need significant rain to return to normal moisture levels. Northern and eastern Saskatchewan are slightly better off with moisture and Manitoba has received much higher than average rain resulting in the late seeding in many areas. Warm weather is now required in all areas.

This year is a milestone for Bee Maid Honey Ltd. as the Bee Maid organization will be celebrating its 50'th anniversary this September. Special events are being planned to commemorate this anniversary with an announcement to follow shortly.

Plants for bees - Sweet Clover

Douglas Clay, Research Scientist, Calgary

Common Name: Sweetclover (white and yellow) varieties include biennial and annual

Scientific Name *Melilotus alba* Medikus *Melilotus officinalis* L..

Native Range:

Melilotus spp. are originally from the Eastern Mediterranean and now naturalized across much of North America. The name *Melilotus* comes from the Greek 'meli' meaning honey and in its native region it has been valued as a honey plant for 2000 years. The European and Asian material exhibits such variation that many taxonomists suggest there are several sub-species. In North America it is found north to Canadian hardiness zone 2 and even zone 1 (dependent on cultivar). See Canadian distribution.

Canadian Distribution:

The white sweetclover (*M. alba* Medikus) and its sister species the yellow sweetclover (*M. officinalis* L.) are found in every Canadian province and territory. Although a common forage crop before the mid 20th century, sweetclover is now less common as many other crops can now provide as good or better quality forage. In many jurisdictions sweetclovers were commonly used as a component of the seed mix used in roadside reclamation. It is less commonly used today as it is considered an introduced species and many provinces are attempting to use only native plants for restoration projects.

Canadian Habitat:

Melilotus spp. occur in all regions where agricultural crops are grown. They are also found in many wastelands and roadsides north of the prime agricultural zones of Canada. It is not tolerant of flooding and thus requires well-drained sites. As a shade intolerant genus, they are not found wherever tree cover is continuous. Yellow sweet clover is found in slightly drier areas than white sweetclover.

Description:

The sweetclovers are not true clovers, which are *Trifolium spp.*, but are forbs in the legume or pea family - *Fabaceae.*

White sweetclover can be annual or biennial, generally erect and 1 m or more in height with 1 - 10 stems in the second year. The leaves are trifoliate with the leaflets 1 - 2.5 cm long, lanceolate or oblong in shape. Flowers form racemes 5 - 20 cm long with 40 to 80 individual blossoms about 2 mm in length.

Yellow and white sweet clover .

Yellow sweetclover can be taller, sometimes over 2 m high with a strong tap root. The leaves are more oval in shape and up to 5 cm long. The racemes are looser and often droop. The stem is finer than that found in the white clover although still substantial.

Ecology

The sweetclovers can tolerate a wide range of soils: pH 5 to 8, coarse to fine texture.

They produce long taproots, generally over 50 cm and often up to 200+ cm in depth. Biennial varieties of sweet clover tend to develop larger taproots than the annual varieties. This taproot is the mechanism for storing energy from the first year for growth in the second. The root mass can reach 900 kg/ha.

Nitrogen producing nodules are found along the entire root system. These plants "fix" nitrogen in the soil, resulting in improved soil fertility and structure.

Sweetclovers are drought tolerant but also do well in good soils with adequate water. They can tolerate some salinity and require full sun.

Blooming starts between May to late June, depending on the climate and the cultivar.

Coarse stems can be difficult for livestock to eat and digest, however when left in the fields in fall they can provide effective snow traps to provide spring moisture in dry regions.

The sweetclovers produce reasonable browse/forage in the field, however the traditional varieties have some drawbacks for hay production. One disadvantage is the thick main stem, with limited digestibility, that slows drying when cut for hay.

Another negative factor for the sweetclovers is a high coumarin content. Coumarin is a fragrant crystalline compound found in several plant species, including sweetclovers. It is widely used in perfumes. Although many beekeepers think the 'sweet' in sweetclover comes from the honey potential, it actually comes from the coumarin which results in a fragrant plant when it is dried.

Coumarin itself is not toxic to ruminants. But when sweetclover hay is not dried properly and becomes moldy, a fungus converts coumarin to dicoumarol, a compound similar to modern blood thinners. Cattle eating dicoumarol-

contaminated hay can experience internal bleeding, which can sometimes be fatal.

Bloat, although often considered a problem, is less common with sweet clover than alfalfa or the true clovers.

Methods of Reproduction and Spread:

Flowering occurs over an extended period, 6 to 8 weeks, although individual blossoms last only 3 to 4 days.

Sweetclover is prolific, seed production per plant ranges from 14,000 to 350,000 (some of the highest numbers have been recorded in Ontario). The seeds float and water may be a major means of dispersal. A hard seed coat helps the seeds survive in the soil for up to 20 years.

Before germination the seed needs to be scarified. This can happen naturally through fluctuating freeze/thaw cycles or through fire.

Honey/Pollen Potential:

Sweetclover is in widespread use as bee pasture producing both nectar and pollen. Pollen is generally less important than nectar. It has been suggested the decline in acreage of sweetclover over the past 50 years is linked with a general decline in honey production in Ontario and Manitoba. Where sweetclover is grown the potential for honey production is high, ranging from 100 to >500 kg/ha. Nectar production appears to be higher on dry rather than wet sites.

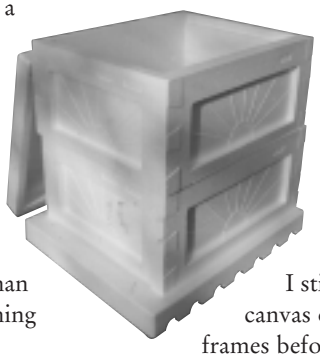
continued on page 10

Polystyrene Hives

Rudy Gelderblom, Calgary

IN August of 2002 I reviewed in HiveLights the performance of a polystyrene box I had purchased in the fall of 2000. I thought that I would update you on the further experience with this hive.

In case you haven't seen the article, let me quickly review. The hive is made out of an extremely dense polystyrene. It is shipped to you in panels which lock together tightly with dovetails, and I mean tightly. Once together, do not expect to take this hive apart again. The lid and bottom board are made out of the same material. The bottom board has a large square hole cut out of it which holds a plastic screen.



I found that the first winter I used the hive the colony wintered really well. The colony was stronger than my other colonies coming out of the winter. The subsequent two winters have been much the same. Clearly the bees like the insulation.

At the time of the last review I whined about the plastic screen in the bottom board which was just stapled in place and about the large footprint of the bottom board. There is no place to slip a handtruck in under the bottom board and, in any case, because the edges of the bottom board are not flush with the sides of the boxes, the board would likely suffer damage if you tried to tip the hive.

Those complaints still stand. You cannot keep that plastic screen in the bottom board in place, the staples just won't hold in the polystyrene. With that plastic screen loose the hive is open to rodents. Also, because there is an extra inch of space underneath the frames in the center of the bottom board, the bees like to build comb down into the cavity.

The polystyrene is starting to show some damage now from repeated assaults with the hive tool. In first use the edges on the panels are nice and clean and the bees did a wonderful job of cementing the boxes together. After a little use, however, you start to unavoidably mash a few bees between the boxes when you put them back together and the hive tool has made some dents. The edges of the boxes don't fit together quite so neatly anymore and it is actually a bit easier to open now.

I still put a piece of canvas on top of the frames before I put the lid on. This has kept the lid in good shape as I don't have to apply much pressure to pop it off. The bees will glue down the canvas instead and I have no problem with that.

Overall the experience with the polystyrene has been positive. I haven't lost a colony yet in this box and winter prep is absolutely minimal — I throw a tarp over the thing to keep the snow off.

I hope to be able to find the time to build a new bottom board for this hive, hopefully with a built-in screen. I also want to do some experimentation with building boxes with polystyrene sandwiched between plywood panels. If anyone has some experience along those lines I would be interested to hear about it.

In most of Canada white sweetclover blooms from July through August while yellow sweetclover usually blooms about 2 weeks prior, extending the season from June through September. In eastern Canada the bloom is generally finished by early August. Although having a longer season, yellow sweetclover is considered to produce less nectar however it does have a higher sugar content (up to 52 %).

All sweetclover honey tends to granulate easily, often beginning within a week of extracting. The honey is white to greenish–yellow in color and mild in flavor.

New Research:

Sweetclovers are considered to be cold resistant and two cultivars, 'Arctic' and 'Polara' are winter hardy and adapted to Canadian conditions. 'Polara' and 'Norgold' are also a low-coumarin varieties. Research is currently underway in the USA to develop more low-coumarin varieties that will not cause bleeding-disorders in livestock and at the same time will produce high-quality grazing and hay due to finer stems. The research is based at the Texas A&M University at Overton. Several varieties of *Melilotus spp.* were regularly grown until the 1950s when they were replaced by new improved strains of other forages with less risk to livestock.

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Use of Control Products on Varroa Mites in Beehives

Pest Management Regulatory Agency, Ottawa

An emergency registration was granted for coumaphos to control varroa mites in beehives in New Brunswick, Ontario, Manitoba, Alberta and British Columbia for 2002 and again for 2003. Beekeepers in these provinces were in a position of critical need and able to demonstrate that varroa mites had developed resistance to fluvalinate the only control product currently registered.

Starting in September 2004, Pest Management Regulatory Agency regional officers and/or Canadian Food Inspection Agency inspectors plan to monitor compliance with current label statements regarding the length of time the two products for Varroa mite control, fluvalinate and coumaphos, can be kept in beehives. As well they will inspect for the use of unregistered control products in beehives.

Inspectors will coordinate with provincial apiculture specialists in order to locate bee yards and arrange for assistance in handling bees and opening hives. Inspections will be conducted at randomly selected bee yards. Hives containing varroa mite control strips will be noted. For those hives found containing strips during the first inspections, repeat bee yard inspections will be conducted soon after the label treatment period has elapsed, to verify pesticide strips have been removed as specified on the label directions.

A report will be provided by August 2005 summarizing results of the monitoring program. This information will help determine the current level of compliance with label directions.

Non-compliance violations will be assessed on a case-by-case basis with enforcement actions consistent with Backgrounder B98-01, Compliance and Enforcement Policy Guideline.

For more information contact:

Pest Management Regulatory Agency
Phone: 1-800-267-6315 Within Canada
1-613-736-3799 Outside Canada (Long distance charges apply).
E-Mail: pminfoserv@hc-sc.gc.ca
Internet: http://www.hc-sc.qc.ca/pmra-arla/
Address: 2720 Riverside Drive.
Ottawa ON K1A 0K9

FACTS North American Pollinator Protection Campaign

- The number of commercially managed honeybee colonies in the U.S. has declined from 5.9 million in the 1940s to 4.3 million in 1985 and 2.7 million in 1995 (Ingram et al., 1996 In Kearns et al., 1998). Feral bees are essentially gone in the U.S. (Watanabe, 1994).
- At least 2 bat and 13 bird species listed in the United States as endangered by the Fish and Wildlife Service are pollinators. It remains unknown how many of the listed insects are pollinators or how many listed plants require pollinators (Nabhan, 1996).
- At least 82 species of mammalian pollinators and 103 species of avian pollinators are considered threatened or extinct according to IUCN criteria (Nabhan, 1996).
- Animal pollinators are needed for the reproduction of 90% of flowering plants and one third of human food crops (Buchmann and Nabhan, 1996; Free, 1970 In Tepedino, 1979; and McGregor, 1976 In Tepedino, 1993).
- Domestic honeybees pollinate approximately $10 billion worth of crops in the U.S. each year (Watanabe, 1994). Bee poisonings from pesticides result in annual losses of $14.3 million (Pimental et al., 1992 In Ingram et al., 1996a).
- Pollinators support biodiversity, as there is a positive correlation between plant diversity and pollinator diversity (Heithaus, 1974 In Tepedino, 1979; Moldenke, 1975 In Tepedino, 1979; del Moral and Standley, 1979 In Tepedino, 1979).
- The elimination, replacement or reduction of a specific species of pollinator may result in the decline of a specific plant species, which in turn may affect relative plant abundance, and hence community dynamics (Tepedino, 1979; Buchmann and Nabhan, 1966; and USEPA, 1998b) and impact wild animals and humans that depend on those plants (Buchmann and Nabhan, 1996; and Kevan, 1977 In Allen-Wardell et al., 1998).

The Great Pollination Partnership

THE National Botanic Garden, Washington DC has an exhibit that focuses on plants and pollinators. The exhibit is co-sponsored by the North American Pollinator Protection Campaign (www.nappc.org) and runs from May 29 through October 11, 2004

Dynamic Duos: Plants and Pollinators

This photographic journey invites us to examine closely the subtle magic that occurs when pollinator meets plant. Created from over 400 entries submitted by world-renowned photographers, these images are a tribute to the bees, butterflies, beetles, birds, bats, flies, wasps, and other species that perform the prodigious and vital work of transferring pollen—all in exchange for a little nectar and pollen to go.

Dancing with Flowers: The Pollination Connection

The growing season is upon us and flowers are a hub of activity of nonhuman visitors. Despite appearances, there is order to the chaos and far more than meets the eye to the who visits whom, when, and how. Twelve pollination gardens, each devoted to a different theme, will provide the answers and help you understand why your future, the global economy, and the survival of fine dining depend on these humble pollinators.

A visit to the exhibits will increase awareness about pollinator species, the vital ecological and economic services that pollinators provide and the issues surrounding their conservation. For more information visit http://www.nbg.gov

Campaign to Protect Pollinators

Kimberley Winter, NAPPC, San Francisco

THE North American Pollinator Protection Campaign is a collaboration of partners working to protect pollinators and raise the profile of pollinator issues. The mission is to encourage and support actions to benefit the health of pollinating species in North America.

Why Care about pollinators?

Eighty percent of agricultural production worldwide depends on pollination by animals, almost all of which are insects. One out of three mouthfuls of food we eat and of the beverages we drink is delivered to us by pollinators.

More than half the world's diet of fats and oils comes from oilseed crops many of which are pollinated by animals including cotton, oil palm, canola and sunflowers.

Worldwide approximately 1,000 of the estimated 1,330 crop plants grown for food, beverage, fibres, condiments, spices and medicines are pollinated by animals.

Insects, including honey bees, pollinated products worth $40 billion in the US and $1 billion in Canada.

Pollination is an issue that brings the concepts of sustainability and conservation hone to nearly all people. Pollination link urban and rural concerns. Since pollinators are currently largely overlooked, assessing

their condition and economic importance seeking to understand their circumstances, biology and benefits better and working to help keep them healthy are positive pro-active approaches to an emerging conservation issue.

If you are interested in the protection of pollinators help NAPPC with your membership.

For more information Coevolution Institute at 423 Washington Street, 4th Floor, San Francisco, CA 94111-2339 info@coevolution.org. Phone: (415)362-1137 Fax: (415)362-3070 http://www.coevolution.org/

Wildlife Habitat: Tips for Attracting Pollinators

Excerpts from USDA Natural ResourceConservation Service Fact Sheet

TREES and shrubs are the backbone of any landscaping design and are important for wildlife shelter. Many tree and shrub species are excellent sources of food for wildlife. Proper selection of plant material can meet both the aesthetic needs of the homeowner and the food and shelter needs of wildlife. Remember that you are part of the habitat!

Bees

There are nearly 5,000 different species of native bees in North America. Most of them are solitary, friendly bees that nest in holes in the ground or burrows in twigs and dead tree limbs. These bees do not have hives to protect them, so they are not aggressive and rarely sting. Bumblebees, carpenter bees, sweat bees, leafcutter bees, digger bees, and others pollinate many different kinds of plants. They play a critical role in healthy wild plant communities and gardens. About 30 percent of our diet is the direct result of a pollinating visit by a bee to a flowering fruit tree or vegetable plant. Providing bee habitat in your yard can increase the quality and quantity of your fruits and vegetables.

Bees are extremely sensitive to many commonly applied insecticides. If you must use chemical insecticides in your garden, apply them in the evening when bees are less likely to be active.

Bees are attracted to most flowering plants, and are especially fond of blue and yellow flowers. Try planting your garden to have different species blooming in the spring, summer, and fall.

Bee houses

A good use for untreated scrap lumber (at least 3 to 5 inches thick) is to drill holes (from 1/8-inch to 5/16-inch in diameter) about 90 percent of the way into the thick wooden block. Space the holes about 1/2-inch to 3/4-inch apart. The 5/16-inch holes work best as homes for orchard bees which are excellent pollinators of fruit trees. Hang your bee blocks under the eaves of your house or garden shed, protected from direct sun and rain.

Attracting Bats to your yard

Bats are a beneficial and interesting mammal. Bats are the single most important controller of night-flying insects, including mosquitoes, moths, and beetles. For example, a single little brown bat can catch up to 600 mosquitoes in an hour. Watching bats fly around light posts catching bugs can be an interesting nighttime activity.

A bat house in your yard will help attract bats and provide them with much-needed roosting habitat. The house should be placed on a pole at least 15 feet high in a spot that receives sun most of the day. Tree trunks are usually too shady for bat boxes. Some bat species such as gray bats, red bats, and hoary bats will use shrubs and trees for roosting under loose bark or in cavities.

Many species of bats migrate in the fall and hibernate throughout the winter months in caves, mines, or buildings. If disturbed during hibernation, their metabolism is increased, depleting fat reserves and reducing their chances of survival.

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As with all wildlife, bats should be watched, but not handled or chased. Generally, bats are shy of humans and will not attack or fly after a person. However, if caught or picked up from the ground, a bat may bite.

Butterflies

Adult butterflies require food in liquid form such as plant-produced nectar. They get some of it from flowers and from juices of extra-ripe fruit. The types of flowering plants you grow will determine the kinds of butterflies you attract to your backyard. Find out what species are common in your area and use plants they like. Nectar feeders can be placed in the yard to attract butterflies. Do not use insecticides near plants for butterflies. Learn to recognize larval and egg forms. That large green and black caterpillar eating your dill may one day turn into the gorgeous butterfly you were hoping to attract!

Butterflies, like all insects, are most active when temperatures are warmer. While moths are commonly found at night, most butterflies are active on sunny, warm days. Butterflies will benefit from a basking site where they can warm up on cool mornings. Add a light-colored rock or concrete garden sculpture as a basking site. Butterflies also need a source of water. A shallow dish of water or a depression in a rock that retains water is all they need.

For more information visit

USDA Wildlife Habitat website
http://www.nrcs.usda.gov/feature/backyard/wildhab.html

North American Butterfly Association http://www.naba.org/

National Wildlife Federation
http://www.nwf.org/backyardwildlifehabitat/

Dave Green's Alternative Pollinators
http://www.pollinator.com/alt_pollinators.htm

The Xerces Society
http://www.xerces.org/poll/consinfo.htm

Bat Conservation International
http://www.batcon.org/

National Audobon Society
http://www.audubon.org/

The BCHPA has produced a new brochure about bees and pollination. This handout is useful to share with growers, students, neighbouring farmers, and the backyard gardener. It communicates the value of honey bee pollination, basic principles of pollination, and the many benefits to crop production. Order from the BCHPA website www.bcbeekeepers.com. For more information contact Diane Dunaway email:dunawayranch@telus.net

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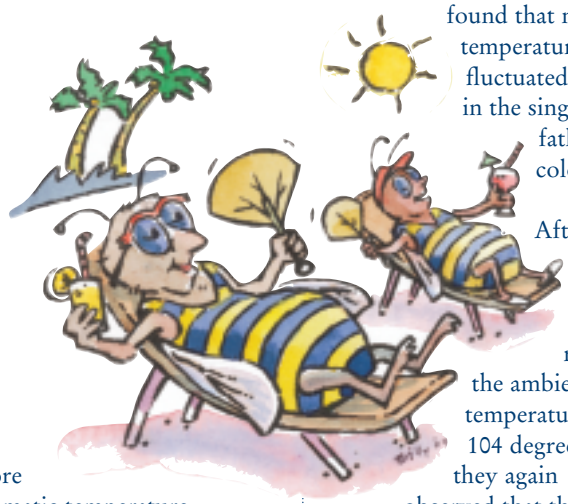
Honey Bees' Diversity Helps Keep Them Cool

Smithsonian National Zoological Park, June 2004

Buzzing with activity, a honey bee nest is always busy. And thanks to the promiscuous behavior of the queen, which mates with multiple males, colonies are also genetically diverse. Now, scientists from the University of Sydney have made a connection in a June 2004 study. They suggest that genetic differences help workers conduct the task of temperature maintenance more efficiently.

In order for new broods to develop normally, honey bee nests need to stay between 90 and 97 degrees Fahrenheit. A warm 95 degrees Fahrenheit is optimal. Workers regulate the nest by huddling together when temperatures dip and fanning air out with their wings when the nest gets too hot.

The study shows that bees with different fathers respond differently to temperature changes, and as a result begin fanning at different times. This staggered behavior enables the nest to be heated and cooled gradually. In contrast, uniform colonies with workers from a single father tend to start and stop fanning at the same time, leading to more dramatic temperature swings. The scientists link differences in the bees' internal thermostats to their genetic diversity.



The study compared four genetically uniform colonies, in which artificial insemination was used to ensure that only one male fertilized the queen, with four colonies in which the queens mated freely with multiple males. After two sets of week-long temperature measurements, scientists found that nest temperatures fluctuated more in the single-father colonies. After raising the ambient temperature to 104 degrees, they again observed that the internal nest temperature of the diverse colonies remained more stable than that of the uniform colonies. To test the idea that differences in internal thermostats were related to diversity, scientists used genetic markers to show that bees with different temperature thresholds for fanning were descended from different fathers.

Several explanations have been suggested for the queen bee's multiple mating behavior. But until now, few clear benefits of the resulting genetic diversity were known. This new research suggests that a genetically diverse colony can respond more appropriately to environmental changes without overreacting, thereby contributing to the fitness of the colony overall.

Sources: Science DOI: 10.1126/science.1096340, ScienceNOW Fischer 2004 (624):3

http://nationalzoo.si.edu/animals/invertebrates/news/

Kashmir Bee Virus, Mites and Bees

Heather Clay, National Coordinator, CHC

Kashmir Bee Virus (KBV) was identified in 1977 (Bailey and Woods) and has been found in North America, Australia, New Zealand and parts of Europe. Since there is no cure and, so far, the virus has not caused serious economic injury, the situation has largely been ignored by beekeepers.

Recent work done by researcher, Dr Judy Chen and her team in Beltsville Maryland, shows that KBV is virulent when varroa mite (*Varroa destructor*) levels are high. She has found molecular evidence that varroa mites can carry KBV both internally and externally. The transmission of KBV can be through multiple routes, not only mite to bee, but bee to mite and mite to mite through a honeybee intermediary. When varroa mite populations exceed a critical threshold, the balance between bees, mites and KBV is tipped and the virus can become epidemic (Sumpter and Martin, 2004). Paul van Westendorp, Provincial Apiculturist, BC Ministry of Agriculture Food and Fisheries spoke at the Beaverlodge, Alberta, meeting in June, about a growing concern with KBV in southern British Columbia. Many beekeepers have complained of dwindling bee populations especially among newly installed package bees. Inspections showed evidence of trembling bees, with a greasy, hairless appearance. Some young bees had a blondish, opaque colour with a reddish eye colour. Varroa mites were present and it was

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KASHMIR Continued from page 15

suspected that parasitic mite syndrome may be causing a problem, however there was no obvious sign of disease. Samples of frozen bees were tested in the laboratory for disease and viruses. The results confirmed the presence of high levels of KBV.

In countries such as New Zealand and Australia KBV has not been considered a threat. Perhaps the fact that varroa mites do not occur in Australia and they are relatively new to New Zealand has allowed the bees and virus to co-exist in tolerable numbers. Varroa infestation is spreading in New Zealand and the package bee industry is dealing with higher numbers of varroa mites than in the past. The B.C. situation suggests that imported bees may contain levels of KBV that can cause problems when the nucleus colony is stressed with rainy spring weather and high levels of varroa mites.

One obvious solution is to control the number of varroa mites in a colony. If Apistan (fluvalinate) is not working, then it is highly recommended that the honeybee colonies are treated with applications of 65% formic acid or with Checkmite Plus (coumaphos). Requeening with less susceptible stock may help and it is important to reduce stress on colonies. Without treating the varroa problem, the virus will continue to multiply.

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Tracing Product : CBISQT is on the track

Heather Clay, National Coordinator, CHC

The new Canadian Bee Industry Safety Quality Traceability (CBISQT) program is being developed by the Canadian Honey Council (CHC) to assist beekeepers in establishing an internationally recognized system for certification of farm safety. Planning is well under way and the steering committee expects to have a draft ready for review by beekeepers in a few months.

The first part of the program involves the development of a record keeping system that will allow tracking and tracing of honey from apiary to gate. Record keeping is a huge part of the new system. It is important to "say what you do and do what you say", but you must also be able to prove it. This means a careful documentation of everything that happens in the apiary, including and all the inputs and outputs.

Along with the record sheets beekeepers will have to introduce a system for identifying apiaries and linking them to the end product – whether barrels, buckets or bottles of honey. Agriculture and Agri-Food Canada's Agricultural Policy Framework (APF) has the objective of achieving 80% traceability for Canadian food by 2008. Under their new Can-Trace initiative, producers will be required to provide complete tracking for their product, "one up and one down". This means that it is necessary to be able to trace honey or hive products to the point of sale and it is equally necessary to trace back from the consumer to the producer and potentially to the apiary.

Tim Townsend, TPLR honey, runs a commercial operation in Stony Plain Alberta, producing honey and shipping bulk honey in drums. He also supplies barrels to the apiculture industry. Tim believes that the CBISQT program is long overdue for honey producers. "An on farm food safety program is being demanded by many buyers and it is important to let our customers know that we not only have a safe product but high quality too". As a participant on the CBISQT steering committee, Tim is reviewing the quality and saftey standards for honey drums. He would like beekeepers to pay more attention to the quality of the drum and the labeling put on them. He says "All drums must be clean, food grade and labeled with information that is linked to an on farm tracking system. It is very important that old labels should be removed with a pressure washer, or painted over and that the drums are washed inside and out before use."

In his system, barrels are labeled with the producer name, address, time, date, grade, gross weight, tare weight, net weight and lot number. To reduce the risk in case of recalls he packs one "lot" which is the amount held in one holding tank per day. At present his honey buyers are not demanding bar codes on barrels but should there be a requirement he is ready to adapt.

Bar codes are useful tools for tracking. In the grocery store a unique barcode is required for every weight category of honey or product description. It is generally used more for speeding up the checkout but traceability is important too. The barcode must be purchased from the Electronic Commerce Council of Canada (ECCC) for an annual membership and maintenance fee (up to $1,000 annually). Previously known as the Universal Product Code, or UPC, many grocery distributors have moved to new bar codes called GTIN or Global Trade Item Number. Every packing facility can now be given a unique GLN (Global Locator Number). These codes allow suppliers or distributors in any one of the EAN-UCC (European Article Numbering International - Uniform Code Council Inc.) participating countries to trace back to the producer and for the producer to trace to the field or apiary.

Scanning bar codes on boxes and barrels is a slow process but thanks to a new microchip based on radio frequency technology, it can be automated. RFID is becoming cheaper and more accessible. The technology has many uses including tracing equipment. AIM Global, the trade association for the Automatic Identification and Mobility industry reports in their April online news that Joe Traynor, a beekeeper in Bakersfield California has tagged his hives with RFID tags from AVID, Inc., a Norco, California-based RFID company. He is using proprietary, 125 kHz preprogrammed tags concealed inside each of his hives. In the event of theft, Traynor can now provide police with positive proof of ownership. And, if police have any question about the validity of Traynor's claim to ownership, they can call AVID who will confirm the serial numbers of all the tags assigned to Traynor. Tags are embedded in such a way that to remove the tag would mean damaging the hive.

Tim Townsend shows Heather Clay his newly upgraded honey house.

Like it or not tracking and tracing is coming to the bee world. CBISQT will provide the tools for the beekeeper to assess his or her operation and to choose the best means of documenting and certifying the process.

About Can-Trace

In July 2003, major Canadian trade associations, Agriculture and Agri-Food Canada and the Electronic Commerce Council of Canada (ECCC) convened a Tracking and Tracing Initiative named Can-Trace. The objective of Can-Trace is to identify requirements for a whole-chain Canadian food industry traceability (tracking and tracing) program. The Can-Trace initiative is managed by a Steering Committee, composed of trade association and government representatives, funded by Agriculture and Agri-Food Canada, and coordinated by the ECCC. http://www.can-trace.org/

Can-Trace Mission Statement

The mission of Can-Trace is to define and develop minimum requirements for national whole-chain tracking and tracing standards based on the EAN.UCC system. Can-Trace is an industry-led initiative that fosters open dialogue within the supply chain ensuring that the necessary framework for Canadian traceability is designed for implementation.

About ECCC

The Electronic Commerce Council of Canada (ECCC) is the not-for-profit, industry-led organization that promotes and maintains global standards for the identification of goods, locations and related e-commerce communication such as bar code issuance and maintenance. As an EAN International Member Organization, ECCC represents Canada in the continuing development of the global language of business.

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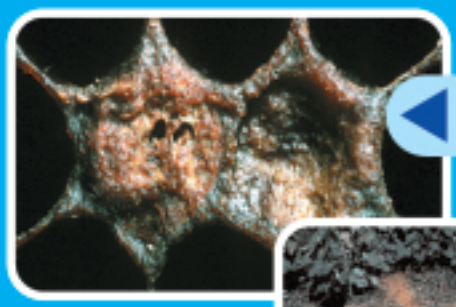

AFB

TREATMENT!

European Foulbrood (EFB) is a bacterial brood disease caused by several agents the main being the bacterium *Melissococcus pluton*. It occurs most frequently in the spring or early summer during brood rearing and is thought to be caused by stress in the colony and lack of pollen. Symptoms can be variable which makes EFB difficult to identify with certainty; frequently disappearing once there is a nectar flow. But EFB can seriously affect brood development and needs to be identified in a colony as soon as possible.

American Foulbrood (AFB) is an infectious brood disease caused by the spore-forming bacterium *Paenibacillus larvae var larvae*. It is the most destructive and widespread of the honeybee brood diseases.

AFB disseminates rapidly through the colony and, if left unchecked, spreads quickly to other healthy colonies both in the same apiary and those nearby.

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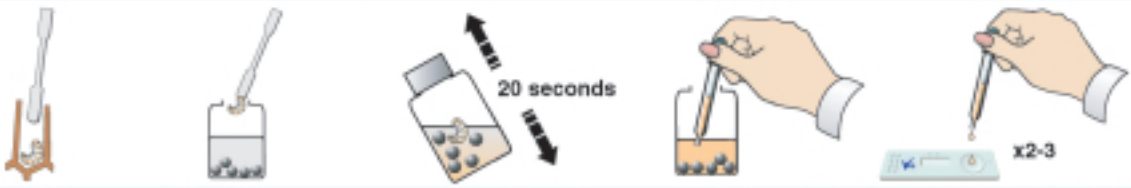

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Bees as Indicators of Environment Quality

Heather Clay National Coordinator CHC

There have been suggestions over the years to use bees as indicators of environmental quality. Most recently, May 3, 2004, the Council of State Governments and US Environmental Protection Agency (EPA) convened a meeting in Newport Rhode Island to determine if bees can be useful indicators of ecosystem conditions. The Environmental Monitoring Assessment Program (EMAP) is well established in the USA but their key species are fish, frogs and aquatic organisms. The question is can honeybees provide the necessary qualities needed for an indicator species. Dr. Jerry Bromenshenk, research professor with the Division of Biological Sciences at the, University of Montana, believes that bees are an ideal species for detecting environmental problems.

Jerry says. "Not only are bees affected by environmental pollutants, but they bring back detrimental chemicals to their colonies. Bees are like flying dustmops Wherever they go, they pick up dust, airborne chemicals, and other samples. If it's out there, they'll find it and bring it back".

Bees are foraging over large areas and in the process, they pick up minute particles of pollutants on their body and in the nectar and pollen that they collect. With modern technology it is possible to detect a wide spectrum of chemicals, including volatiles, pesticides and heavy metals that may be collected by the bees. The environment within a mile of the hive can be mapped for contaminants. Jerry says "What we'd like to see is an emphasis not on, is it there, but is it there in a form that's available to living organisms and is it there in harmful amounts?"

His team has successfully demonstrated that it is possible to train bees to detect chemicals in the environment, like TNT from landmines. This ongoing work is not only monitors the detection of trace chemicals but also uses high tech instrumentation to detect subtle changes in bees flight or fanning behaviour. Monitoring bee colonies electronically can form an early warning system for environmental issues.

Bees are like mine canaries that provide early warnings of potential air problems. Their behaviour may, indicate a problem before the pollutant affecting them becomes toxic to humans. In the Peace River area of northern Alberta there has been concern that sour gas (also called hydrogen sulphide, H^2S, or rotten egg gas) affects the health of humans and livestock. Environmentalists like the late Henry Pirker, an apiarist, in Debolt, Alberta have observed the relationship between sour gas and its effect on bees and plant growth. In 1998 Henry reported to the Environmental Monitoring and Assessment Network (EMAN) symposium in Quebec that

"Unusual nectar gathering patterns of honey bees and heavy winter mortality have drawn attention to the legumes which provide the basis for the world renowned Peace Country honey industry. Crops per colony were reduced by as much as 75 per cent, while wintering losses more than tripled, threatening the sustainability of the industry and the pollination of crops dependent on it. Nectar flow patterns shifted from the main flow in early Summer to late flows in August or September from second growth alfalfa.

Sampling of 27 fields found nitrogen fixation in alfalfa and red clovers lacking in areas downwind from major oil and sour gas flaring facilities. These areas coincided with areas of reduced crops from the main nectar flow, and severe forest damage. Synergistic interaction of ozone and sulphur compounds appears to be responsible for the drastic reduction of the early season nectar flow when ozone levels are at their highest. Reduced ozone levels in the fall permit a late, but due to variable weather of the advancing season, uncertain flow from alfalfa. The late flow from alfalfa plants, which are poor pollen providers, stimulates heavy brood rearing, but fails to provide the necessary pollen/protein nourishment that is responsible for longevity and winter survival."

Henry died in 2003 but his work in drawing attention to the effect of air quality on bee mortality, loss of honey and alfalfa production has been acknowledged by the Peace Airshed Zone Association. A new air monitoring station was unveiled at Grand Prairie Alberta in March 2004, dedicated to his memory. The new station will continuously monitor Grand Prairie's air quality by measuring concentrations of five pollutants and providing an Air Quality Index.

Dr Ken Lukowiak, Calgary Brain Institute, Faculy of Medicine, University of Calgary has found a remarkable effect of sour gas on *Lymnaea* (snails). His experiment was designed to test the learning and memory retention of snails in clean water and water with various levels of hydrogen sulphide. The snails that were exposed to hydrogen sulphide were severely impaired in learning ability and memory. Evidence of the neuron effect was seen at concentrations as low as 10 ppm hydrogen sulphide. New tasks took longer to learn and the snails could not retain the memory for a long term. Dr Lukowiak says that the neurotransmitter response is the same in all invertebrates, it only varies in the dose response rates. He cautions that levels of sour gas may be safe on their own but in conjunction with other toxins the effect may be compounded. He considers that there is no reason to believe that honeybees would not be affected by a rise in sour gas emissions.

Henry Pirker reported that bees flew over the blooming alfalfa to other plants at some distance. He surmised that the nectar production had been effected by the poor condition of the alfalfa. This is probably true but perhaps the issue is complicated by the exposure of bees to sour gas emissions. The work done by

Lukowiak suggests that learning ability and impaired memory retention could be a factor. Bees that were affected by sour gas may have lost their new memory of alfalfa flowers by the time they returned to the hive and thus could not communicate the location of nectar. As more research is done it is clear that bees can be extremely useful indicators of environment quality. There have been suggestions over the years to use bees as indicators of environmental quality. Most recently, May 3, 2004, the Council of State Governments and US Environmental Protection Agency (EPA) convened a meeting in Newport Rhode Island to determine if bees can be useful indicators of ecosystem conditions. The Canadian Honey Council was invited to represent the Canadian bee industry at the meeting.

Bromenshenk, J.J., G.C. Smith, and V.J. Watson. 1995. Assessing Ecological Risks in Terrestrial Systems with Honey Bees. In: *Biomonitors and Biomarkers as Indicators of Environmental Change,* F.M. Butterworth, ed. Plenum Press, New York. Chapter 2:9-30.

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Sour Gas, Liquid Manure and Hydrogen Sulfide

Hydrogen sulphide is found in commonly found in sour gas and manure gas.

Sour gas is defined by the Canadian worker safety standards, as natural gas which contains more than 10 ppm of hydrogen sulfide (0.001%). The petroleum industry defines it as natural gas that contains more than 1% hydrogen sulfide. Sour gas can contain more than 30% hydrogen sulfide.

Liquid Manure systems are utilized by many dairy, beef and hog operations (and to a limited extent poultry operations) for handling animal wastes. Decomposing animal manure gives off a variety of gases including hydrogen sulphide, carbon dioxide and methane. Of all these gases, hydrogen sulphide or more commonly called manure gas, is the most dangerous. Hydrogen Sulphide (H2S) has been responsible for many animal deaths as well as occasional human deaths.

Physiological response of adult humans to hydrogen sulphide **

Effect	Concentration Mg (H2S)/1 Kg (Air) (ppm)
Least Detectable Odour	0.01-0.7
Offensive Odour	3-5
Eye Irritation	10
Irritation Mucous Membranes and Lungs	20
Irritation of Respiratory Tract	50-100
Olfactory Nerve Paralysis	150
Headache, Dizziness	200
Nausea, Excitement, Unconsciousness	500-600
Rapidly Fatal	700-2000

** Source Nordstron, G.A.: J.B. McQuilty: "Manure Gases in the Animal Environment." University of Alberta - 1976.

Pollen Patties

Milling pollen does not make patty supplements less attractive to bees: A challenge to the chocolate chip theory.

By Adony Melathopoulos
Beaverlodge Research Farm, Agriculture and Agri-Food Canada, Beaverlodge, Alberta

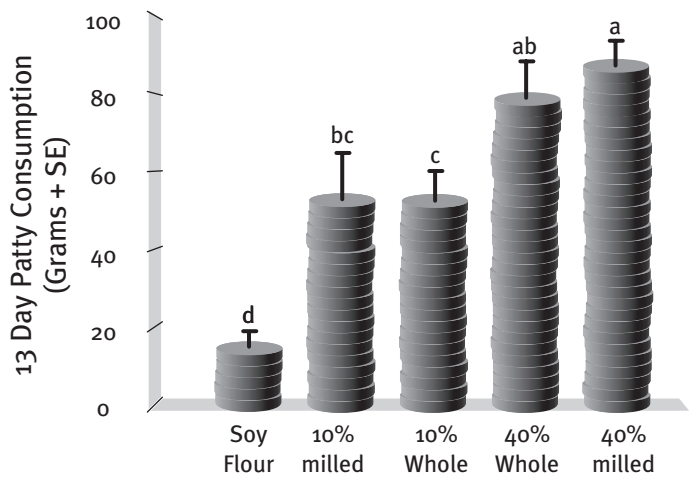

Figure 1. Patty consumption by newly established packages after the first 13 days. The patties were made from sucrose syrup, soy flour and various amounts of milled or whole pollen (% by weight of patty). Bars indicate the Standard Error (SE) Treatments followed by the same letter indicate differences are not statistically significant (Tukey-Kramer HSD, p=0.05).

There are a number of beekeepers who hold the firm conviction that milled pollen results in a less attractive patty supplement. It has been suggested to me on several occasions that whole clumps of pollen in a patty are like the chocolate chips in a cookie to a honey bee. Use powdered pollen in the mix, I am told, and your "chocolate-chip cookie" will degenerate into a distasteful "puck" of brewers yeast, soy flour and ground up pollen. The difference, they exclaim, is dramatic.

The attractiveness of supplements is far from a mere academic issue. The faster a supplemental patty is consumed, the larger the population of bees your colonies will rear. These are the findings of the Israeli scientist Dr. Yolanda Lehner (1983). She found that the amount of brood reared in colonies did not depend on the type or amount of protein in a supplement, but on how much protein was consumed over a given time. She observed that regardless of what diet she fed, colonies in her study produced an average of 25 bees for each gram of protein in the supplement. Nonetheless, she found that the most brood was reared in colonies fed an attractive diet, specifically a supplement containing 50% pollen. Colonies fed a pollen diet ate more of the diet, and consequently, produced three times as many bees than diets containing only yeast or soy flour, even though the amount of protein in the diets was identical. The increased brood, Dr. Lehner contends, is almost entirely the consequence of bees eating the pollen supplement at a faster rate.

Does milling pollen dramatically decrease patty consumption and, as a consequence, reduce the potential for maximizing brood production? The opportunity to test whether milled pollen decreases the attractiveness of patties came from American foulbrood research being conducted at our research facility by Dr. Stephen Pernal. Steve wanted to know if formulating antibiotics in pollen patties decreased the residue of antibiotics in harvested honey compared to the traditional treatments of sugar dusting or syrup treatments. Preliminary results of this residue work have since been published in Hivelights (Pernal, 2004). Before these important experiments could occur, however, a patty recipe that would ensure the entire antibiotic would be consumed in a short period of time needed to be determined.

On the hunt for a rapidly consumable patty, Dr. Pernal and I tested five patty recipes in an experiment involving 43 newly-established packages at the end of April 2002. These patties contained 0, 10 or 40% whole, milled pollen (particle size < 0.85 mm) (Table 1). Apart from the pollen, these patties contained approximately two parts 1:1 sucrose syrup to one part soy flour. Patties of each type, weighing approximately 100 grams, were mixed and formed by Medivet Pharmaceuticals, High River, Alberta. The patties were applied to the top bars of each colony on a piece of wax paper. The consumption rate of patties was determined by weighing what remained of the patty at 2, 4, 10 and 13 days after they were first applied.

Although bees consumed the various patties at different rates (figure 1, $F = 8.17$, $df = 4, 128$, $P < 0.001$) milling the pollen did not influence patty consumption. Patty consumption rate, however, increased dramatically with the addition of larger amounts of pollen (Figure 2). For each 1% increase in pollen, colonies consumed 1.35 times more patty supplement over the 13 days of the experiment. These results are striking; the 100 gram patties containing 40% pollen were completely consumed in only two weeks after they were applied, whereas the patties containing 10% pollen took about a month. Although the 10% pollen patties were consumed slower than the 40% pollen patties, twice as much of the 10% patties had been eaten after 13 days compared to patties lacking pollen (Figure 1).

Returning to the cookie metaphor, it is clear that the amount of chocolate (pollen)

constitution	# colonies
Soy flour (no pollen)	8
10% milled pollen	8
10% whole pollen	9
40% milled pollen	9
40% whole pollen	9

Table 1. Five different types of soy flour patties were applied to newly hived package colonies in April 2002. The patties varied with respect to the amount of pollen (0, 10 or 40%) and whether the pollen was milled or mixed whole.

in a cookie is critical. Whether the pollen is whole or in the form of tiny particles, appears to be unimportant- at least to bees. Milled pollen, however, is easier to formulate in industrial or pharmaceutical settings where even small inconsistencies in pollen content among batches may be unacceptable. Our finding may help facilitate the controlled pharmaceutical formulation of pollen supplement patties for delivering antibiotics.

For beekeepers our findings hold two important messages. Firstly the chocolate chip cookie theory has been overthrown and you should now feel confident that milled pollen will not affect the attractiveness of your patties to your bees. More importantly, however, our findings suggest you would benefit by increasing the amount of pollen in your supplemental spring patties. The addition of 40% pollen to a patty would result in your bees eating an additional 54 grams of patty every two weeks. If you assume a typical patty contains 15% protein, Dr. Lehner would predict the addition of 40% pollen would result in the rearing of about 200 more bees over the same two weeks than if you had left the pollen out. Your $0.72 investment in 40% pollen for each 100g patty you make (pollen costs $8.25 per pound) will return you $2.00 increase in bees (packaged bees cost $30 per pound (per 3,000 bees)); a 280% return on your investment. The additional brood rearing boost from adding pollen to your supplemental patty mix will result in larger and more productive colonies come summer and with high honey prices, this means cash in your pocket.

Reference:

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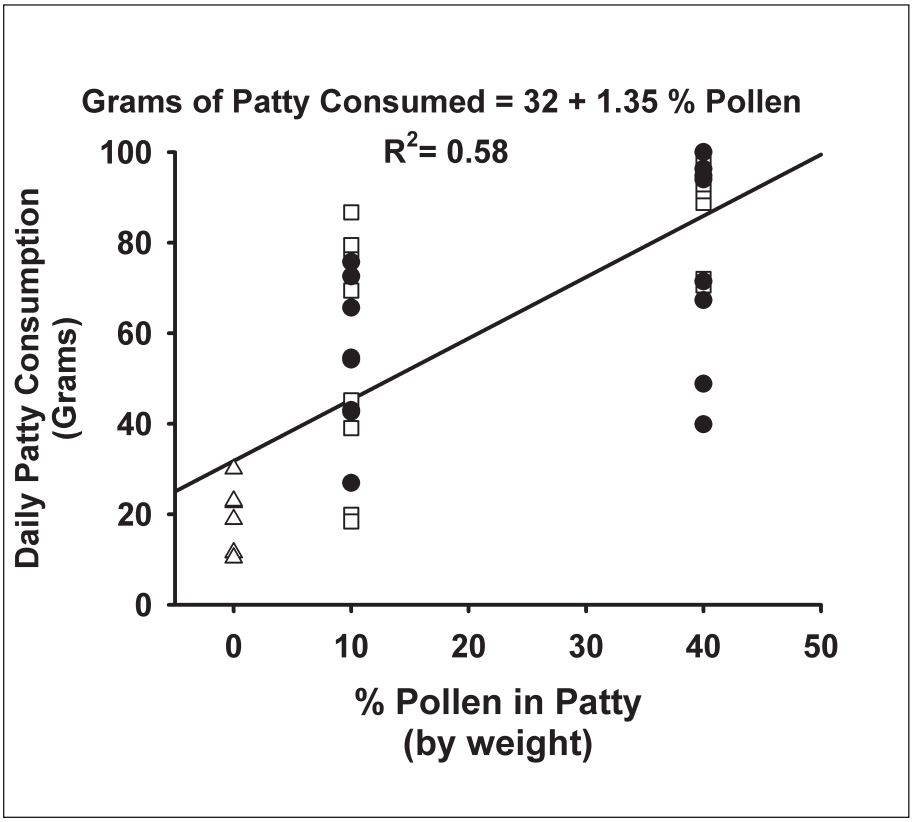

Grams of Patty Consumed

Figure 2. The effect of pollen concentration on patty consumption over 13 days. Consumption rates for the three percentages of pollen content (0, 10 and 40%) were determined by linear regression of patty consumption over 13 days vs. percentage pollen. Patties containing milled and unmilled pollen and the same concentration of pollen were pooled for the analysis. The symbols on the graph signify colonies fed patties with no pollen (white triangle), milled pollen (white squares) or whole pollen (black circles). The regression indicates that for each percentage increase in pollen concentration, there is a 1.35 times increase in the grams of patty supplement consumed over 13 days (not including the addition of 32 g for the y-intercept). The regression model is highly significant ($F = 55$, $df = 1, 42$, $P < 0.001$). The y-intercept term and slope are different than zero ($t = 6.59$, $P < 0.001$ and $t = 7.48$, $P < 0.001$, respectively).

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