Winter 2004

The Journal of the Western Apicultural Society of North America

Western Apiculture Society Annual Meeting
July 12-15, 2004

The Conference

Plan on having a great time in Missoula, Montana this summer. We're putting together an ambitious program, ranging from the latest information about bees and mites, to what's new in beekeeping, with hands-on activities.

We're also highlighting some of the unique bee-related businesses located in Montana, including Western Bee, the world's largest manufacturer of beekeeping wooden ware; Montana Naturals, who produce some of the finest bee products in the world; Bee Scent, producers of pollinator attractants; and Mycotech, specializing in agrobiologicals or fungal-based agents for control of pest insects with little or no threat to bees.

Our location in the mountains of Western Montana has proven to be an asset in attracting speakers, who are coming from as far away as the east coast and Canada for the meeting and a vacation. You will also see some new faces. The University of Montana has specialists in both bees and native pollinators,in native plants, and sustainable agriculture. Therefore, we're going to expand the program to include other pollinators and the wild flowers that pollinators visit.

We're still planning on holding a day-long conference on pollinators and pesticides, the day before the WAS meeting. And, we expect the bear specialists to bring you the latest in protecting your colonies from bear damage.

Don't forget the tour of the National Bison Range, Western Bee, and the Barbecue on Flathead Lake. And, we may squeeze in a stop at Montana Naturals.

The Place

Big Sky Country, The Last Best Place, A River Runs Through It, Garden City - descriptors of Missoula and Montana. This is the city made famous by Norman Maclean's book and Robert Redford's movie. Expect warm, dry, sunny weather. Daily maximums average 80 degrees.

Missoula has a population of 75,000 and is a center for education, medicine, retail, and arts. The University of Montana's 200 acre campus is considered to be one of the most beautiful in the nation, given its location at the base of Mount Sentinel on the banks of the Clark Fork River.

Recreational areas include three major rivers for fishing, rafting, kayaking, and canoeing and nearby Flathead Lake, the largest lake west of the Mississippi. City attractions include the first fully hand-carved carousel in America in the last 60 years, Art Museum of Missoula, Historical Museum at Fort Missoula, the paintings of St. Francis Xavier Church, The Rocky Mountain Elk Foundation Wildlife Visitor Center, the Boone and Crocket Headquarters, and the Smokejumper Visitor Center.

Historic Downtown Missoula features classic early-century buildings and offers unique shops, galleries, fine dining, and cultural activities. Plan on attending Downtown Tonight, when the city comes alive for an evening of family entertainment, including art galleries, cinema, theater, and live music. Attend the Farmer's Market at the end of Higgins Street for a European-flavor market, with fresh produce, cut flowers, music, and, of course, lots of local honey.

Western Apicultural Society of North America

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"People don't come downtown just to shop or to go to the courthouse. This area brings people together - when you want to meet and greet your community, go downtown," advises Linda K. McCarthy, Executive Director of the Missoula Downtown Association.

Don't forget to bring along your fishing poles, bikes, and golf clubs. You can step outside of your hotel room and cast your line into the Clark Fork, or walk, hike, run, or bicycle any of hundreds of miles of trails that run along the river, throughout the city, into the adjacent wilderness, or up Sentinel Mountain. The bus system has routes all through the town, with BIKE racks on the front of every bus. And, we have five golf courses.

Located a two-hour drive from Glacier National Park, and a half-day from Banff (to the north) and Yellowstone Park (to the southeast), Missoula is the starting point for a western vacation. Don't forget to plan on spending a few days in Missoula itself.

25 THINGS TO DO IN MISSOULA

Call 800-338-5072 for more information on finding these adventures.

1. Visit A Carousel for Missoula & Dragon Hollow
2. Check out the Missoula Children's Theater
3. Go Whitewater Rafting
4. Visit Fort Missoula
5. Attend Out to Lunch, Downtown Tonight, festivals in Caras Park
6. Hike or Bike the Kim Williams Trail
7. Experience the Blue Mountain Recreation Area
8. Hit the Mall
9. Explore Downtown Missoula's galleries and shops
10. Visit the Smoke Jumper's Center
11. Go fishing
12. Hike to the "M" (not for the feint of heart)
13. Visit the Nature Center
14. Visit the University of Montana
15. Picnic on Kelly Island
16. Explore the Rattlesnake
17. Go Birding at Grenough Park
18. Visit the Ninemile Valley
19. Check out Lolo Peak
20. Golf, Golf, and more Golf
21. Taste our Micro-Brew Beers and Wines
22. Tour the Bison Range
23. Visit the Peoples Museum/Native American History
24. Ride a Mountain Bike
25. Experience the Mission Mountains

Come early and stay late. We're sure that you'll agree that Missoula is a great place for a bee conference and a vacation.

Jerry Bromenshenk
WAS President, 2004

WESTERN APICULTURE SOCIETY
MINUTES-AUGUST 15, 2003
Pre-Conference Directors & Delegates Meeting

(missed from the Fall issue)

The President, Jaquie Bunse called the meeting to order at 5:05 p.m. Those attending were: N. Stewart, E. Mussen, G. Steffensen, K. Hallopeter, I. Farber, J. Bunse, R. Smith. President Bunse reported that the Society had to purchase liability insurance for this conference, an unplanned expense.

The minutes of the pre-conference Directors and Delegates meeting, 2002 in North Lake Tahoe, CA were approved on a motion by I. Farber, seconded by K. Hallopeter.

The Secretary's report was postponed until the Annual Business Meeting.

The Treasurer's report was presented and a copy will be placed on file. He reported a loss on the 2002 conference. The Treasurer will provide printed copies of his annual report to those attending the Annual Business Meeting.

The President appointed Ian Farber, Eric Mussen and Bob Stump as the Auditing Committee to audit the books and present their report at the Annual Business Meeting.

There was no Sites Committee report, however, previously approved were 2004 in Missoula, Montana and 2005 in the state of Washington. We were all asked to think about a location for 2006. Information on the Montana meeting will be printed in the next Journal.

Awards Committee reported that Don Dixon would receive the Outstanding Service to Beekeeping Award at the banquet.

Keri Hallopeter was appointed Nominating Committee Chair and will present nominations at the Annual Business Meeting.

Eric Mussen reported that Charlie Duncan, good friend, long time WAS member and By-laws Chair, has passed away. He had updated the by-laws and Eric reported on proposed changes to be brought up at the Annual Business Meeting. The President appointed Eric as By-laws Chair.

Old business was a report by Nancy Stewart on updating the old brochure. She handed out several copies of proposed changes for further input from members.

New business concerned continuation of a WAS website after the current site connected to the Jaquie Bunse. She will bring it up at the Annual Meeting.

The meeting was adjourned at 6:15 p.m.

Respectfully submitted by Nancy Stewart, Secretary

Why Montana is a 'Bee" Place to Gather

By Jerry Bromenshenk

Bees, beekeeping, bee supplies, bee products, bee attractants, bee research - you can find it all in Montana. Fourth largest state in the nation, with mountains in the west, prairies in the east, and home to over 150,000 colonies of bees, Montana can produce some of the highest honey yields in the nation (but not in a drought year) and is a major supplier of bees for pollination in western and northwestern states.

This fall, more than 80,000 colonies started on the path back to California. About now, most of these colonies are going into the almond groves for pollination. From there, they will go to cherries, apples, and other fruits in California, Oregon, and Washington. By May, these colonies will be back in Montana to recuperate and produce a honey crop.

Our beekeeping is unique in other ways. The majority of our beekeepers are commercial beekeepers, and many of these are 2nd and 3rd generation beekeeping families. Typical bee operations range from 2500 to 10,000 colonies. As has happened in many other forms of agriculture, some of them are going out of the business since their children and grandchildren have chosen other careers. Yet, our beekeeping operations generally find buyers, and rather quickly. Why?

For one, we still have extensive areas of wild flowers and native vegetation adjacent to nectar producing fields of alfalfa and clover. The state remains relatively rural and un-urbanized, and our agriculture is less intensive, with croplands generally are more diverse, and with less pesticide usage than is typical in many other areas of the west and northwest.

Add to this the fact that Montana is one of the few states that still has and enforces apiary registrations. Commercial apiaries can not be placed within three miles of any apiary owned by another commercial beekeeper. Exceptions to the distance rule are made for hobbyist beekeepers and landowners. Large beekeeping operations have hundreds of registered sites. At last count, Montana had close to 6000 registered beeyards. When a Montana beekeeping operation is sold, the registered apiary locations are as important to the business, if not more so, than the bees and bee equipment.

When mites appeared and spread across the US, many of our beekeepers initially sustained large losses. Most commercial beekeepers weathered the storm, but most of our hobbyists lost their bees, and many did not regroup and continue. However, that may be changing. Last Saturday, our new state entomologist, Patty Denke, organized a beekeeping workshop in Bozeman, MT. Patty, Dick Molenda from Western Bee, Ron Burnett, a commercial beekeeper from Belgrade, and I served

as instructors. The turnout was amazing. Patty capped the class registration at 56, and all showed up! A few had kept bees before, but most were new to beekeeping. They drove from all parts of the state and even from Wyoming, many traveling 200 - 300 miles, and some from almost 500 miles away.

Which brings me to another unusual aspect about bees and entomology in Montana. MSU, at Bozeman, is the agricultural, land grant school, and it has a long-established entomology program. In fact, back when MSU was called Montana State College, its entomologists started the Rocky Mountain fever research that subsequently lead to the establishment of the Rocky Mountain National Laboratory (National Institute of Health, NIH) in Hamilton, near Missoula.

On the other hand, UM is a liberal arts college with the Law, Forestry, and Pharmacy schools. We don't have an entomology program, nor an agricultural program, but we do have several entomologists, and we have been the center of Montana's bee research for 30 years. Go figure!

Not only is bee research conducted at UM, but we also perform some of the most unusual bee research in the nation. The idea of using bees as environmental sentinels was pioneered at UM. More recently, we proved that bees could be used to detect buried land mines, and that conditioned bees could improve seed crop yields. You can read about our land mine trials last summer at the Ft Leonard Wood, Missouri, minefield by going to the web site of the Mine Action Information Center at James Madison University.

Because we conduct unusual bee research, we also have unusual problems to solve. As such, we developed electronic hives and more recently have been working with two other companies to provide inexpensive, permanent hive and equipment inventory and theft recovery equipment, using the newest, radio-frequency identification tags - the same nanotechnology that is being phased into use by Walmart in its warehouses and stores.

However, we are not the only group in Montana involved in non-beekeeping, bee-related activities. Many of you know Dick and Rick Molenda at Western Bee in Polson, Montana. Western Bee produces all of the woodenware sold by Dadant in the U.S. and around the world. Yet, you'd never know that the biggest bee equipment manufacturing company in the world was located in Polson, at least not by driving through Polson and up to the door with the small sign above it, located on a side-street in the industrial area south of town. Walk through that inconspicious door and you find a surprisingly large manufacturing plant in full production.

If you drive up to Polson from Missoula, you will pass a rather modern looking building on the east side of the road near Arlee. This is the home of Montana Naturals, who buys pollen, royal jelly, and propolis and turns these materials into a wide range of dietary supplements. They sell their products worldwide and take pride in assuring that the bee products they purchase and use come from environmentally clean areas, such as the remote areas of Montana and other parts of the west, far from sources of urban and industrial pollution and heavy pesticide usage.

Head east to Butte and you will find Mycotech, a Montana company that specializes in microbial pesticides. These fungal-based products target a narrow range of pest insects, have little or no effect on bees and other pollinators, and so far have proven to be more or less harmless to humans, pets, birds, and wildlife. They produce products for use in greenhouses, gardens, and fields. Obviously, one objective is to provide pest control agents that pose little harm to non-target organisms like bees.

Farther east, and you will clear the mountains, arriving at Billings on the edge of the plains. Billings probably is not a place that most of you will recognize as having much to do with bees, other than the displays each year at the NILE Agricultural Exposition. However, this is where the Bee Scent natural attractants are produced. In a sense, Bee Scent products are designer pheromones, designed to increase the number of bees attracted to plants for pollination.

Finally, for all of you with a copy of "The Hive and The HoneyBee", look through its chapters, and you will find that Harry Rodenberg, a beekeeper and pilot, at Wolf Point, in the northern part of the state, authored one of its main sections.

So come and visit us in Montana. Our beekeepers and bee-related businesses will welcome you, may be interested in buying some of your products, will be glad to supply you with equipment and bee-friendly products, and of course, will be more than happy to talk bees.

2003 Conference Proceedings .....

Preparing Honey for Exhibiting

By Michael Young, Hillsborough, Northern Ireland

Judging bee produce has been an inspiration for many beekeepers and others throughout the history of apiculture. Honey shows play an integral part in many areas of apiculture. It brings competition between beekeepers and other associations, improves quality, standards, excellence in its product and a better overall marketing value, which will demand a higher price.

Primary Honeys

From my experience showing liquid honey, I have found it most useful to gather prime sources of nectar solely for this purpose. Prime honeys are a large crop source of one particular honey. Collecting prime honeys can be achieved by migrating colonies to the floral source. This has many advantages, not only for exhibiting but for marketing your product.

Primary honeys are the foundation stone for producing superior exhibits. This can be particularly important if you want to carry away top prizes. Blending prime honeys and mixing with other types of honeys can improve the benefits of honey, which is not only different from the rest but will be far superior. Just by mixing and correcting the balance of different honeys, one can achieve a better aroma, viscosity, colour, and most important of all the overall taste.

Types of Prime Honeys

My main supply of prime source honey in Northern Ireland is gathered from the apple orchards in County Armagh, bell heather from the Mountains of Mourne, County Down, and ling from the Sperrin Mountains in Londonderry. It would be fair to say that the ling honey is the most difficult of all honeys to blend, and therefore must be given particular attention in its blending.

Having been fortunate to be invited by Dr Keith Delaplane of the Georgia Beekkeepers' Association to judge their 10th Anniversary Honey Show at the Beekeeping Institute, Young Harris College in Georgia USA, I was rewarded by being able to sample just a few of the US primary honeys, i.e. sourwood, tupelo, basswood and tulip. There is no doubt in my mind that these types of honeys must be some of the finest in the World. Sourwood honey is unique, with a flavor unbefitting its name.

It is said that there are more than 300 varieties of honey in the United States of America and each one tastes different. The ones that come to mind are almonds from Florida, buckwheat from New Mexico, orange blossom honey from Arizona, avocado from California and blueberry honey produced in New England and in Michigan -- truly a honey judge's paradise.

There is no doubt in my mind that blending sourwood honey that is too sweet, is silky on the tongue and embraces a good overall quality, with another type of honey similar to privet or ivy on a 10% ratio, would give it a kick and liven it up to give the judge a feeling of "there's something different about this honey."

One must question the motive here and ask "why blend a classic honey which, in itself is superb?" This is a fair point. But remember that in Georgia, beekeepers migrate their honeybees to the mountains around the end of June where the sourwood is in abundance. Let's imagine it is collected, strained and bottled for the show bench. The problem arises when one ends up with a show bench full of immaculately prepared jars of sourwood honey in the same colour class. This was the case at the Georgia Beekeepers' honey show. Becky Williams from Shadow Ridge Bee Farm entered her sourwood honey. It was superb in every way and received first prize for the exhibit. But it was true to say that the supreme honey of the show went to exhibitor Paul Smith from Athens, who also received best in show. This entry had shown evidence of sourwood honey in it but the secret was the something else, that little extra, that mystery blend, making Paulís honey a cut above the rest. I am not suggesting that Paul blended his honey purposely, but many exhibitors, on tasting it, agreed that blending would be their preferred choice in the future.

Preparing the Supers for the Honey Flow

When showing honey, whether liquid, chunk, cut comb or frames, it is important to have everything prepared and ready for the honey flow, by making sure that the supers are clean and contain clean frames with new wax foundation. This will enable you to produce fresh, clean produce for the show bench. The frames must be tight fitted with no space or movement between them or the supers as this reduces the risk of bees propolizing, which will add an unpleasant, almost antiseptic taste to the honey. Tight fitted frames can also reduce damage from carrying the supers from the hives to the extracting house.

Removing Frames of Honey from the Super.

On the return visit from collecting the honey from the hives, it is important to choose a warm day. This is not because its just common sense. If you want to prepare cut comb or chunk honey for showing, it would be best not to use the smoker to control the bees, the reason being that the bees automatically gogre themselves with honey and by doing this they put small holes in those lovely,,, freshly created cappings. This is unsightly for showing and would downgrade or even disqualify the exhibit.

On removing the frames, keep in mind cut comb and chunk honey, and select the very best for exhibiting. Make sure that the frames are full. If there are cells with no caps on they could contain green honey (unripe), which contains a high percentage of moisture. This, when mixed with bulk honey, would encourage fermentation and destroy the honey.

If there are a very few cells uncapped it is possible to remove most of the green honey by shaking it out on top of

the brood frames or even a quick spin in the extractor before removing the cappings.

Have ready an empty nucleus or a specially adapted super for holding and carrying frames of comb honey. Lets call this the "Show Box", which should also contain clean frames with fresh wax foundation. This will enable you replace the frames that are to be removed from the hive. These frames also act as a buffer by placing the selected frames from the super between them, preventing frames that are full with honey crashing into each other and preventing any damage on returning home. Make sure that the Show Box is fitted with a carrying handle, base and top cover to keep bees, wasps and other predators out.

The selected supers should be fitted with a clearing board a few days prior to the removal of the super from the hive. On lifting the crown board a few days later, check to see if the bees have withdrawn from the super or supers. On removing the super, place it straight onto a crown board or canvas sheet cover and cover with the same.

If you are only removing selected frames from the super for show purposes, remove alternative frames from the Show Box and replace with the show frames from the supers. Cover immediately. If, on opening the hives, some of the frames are not fully capped, you need to leave them for a while longer. For argument's sake, lets imagine that the clearing board has been on the hive the day before and the super still has bees clinging on to the frames.

When removing the frames from the supers, gently brush the bees off with a bee brush or a swan's feather. Place the frame into the Show Box as in the previous paragraphs. After removing the selected frames from the supers make sure you place empty frames in their place. The frames left for extracting can be collected later after placing the clearing board on. A word of caution here, frames of honey that are removed from the supers should be placed in the Show Box the correct way round as they were in the super.

Preparing Frames for Extracting and Colour Grading

Extracting honey from the frames is achieved best at a temperature of around 35^{0}F, being the same temperature as the hive. It would also be advisable to start extracting the frames as soon as they are removed from the hive. This allows the honey to flow swiftly from the combs. This, however, excludes honeys that are very viscous i.e. sycamore. But never the less it will still enable extraction to become a little easier. Frames that have a degree of warmth will empty much quicker during the spinning process, and will relieve pressure on the combs and cause less damage. The other advantage of extracting warm combs instead of cold ones is that, surprisingly, it will provide extra honey. Some honeys are so viscous it is a necessity to warm up the frames in order not to damage the wax combs.

My own particular method is to put the supers in a warming cabinet at a temperature around 35^{0}F. It must be mentioned that heat does have an effect on the quality of honey and increase the HMF content. Heat can also change the colour, altering and even removing the bouquet from delicate honeys. Many parts of America do not have this dilemma, as the atmosphere is high in humidity. I experienced this personally for the first time in Georgia in 2001, at Dr Keith Delaplane's extracting room. On removing the cappings, almost immediately, the honey started to flow from the combs. When the frames were spun in the extractor, the honey took very little persuasion to vacate the combs. It took us a mere two hours to completely remove the cappings, extract the honey, clean down and have the wet supers back in the garden for the bees to clean up. In Ireland, I would have to start Saturday and would be lucky to finish on Sunday.

As a rule, exhibiting liquid honey at shows requires different colors. They range from light, medium to dark. Unless bees are migrated to primary sources, it is unlikely they will achieve these colors. Therefore, if the colonies are not migrated and moved from source to source, it would be advisable to select and color grade the combs. This should make it possible to achieve the different colour grades that are required in the honey show, or at least some of them.

Grading Frames for Color

Honey frames should be selected for colour grading before extracting commences. There are times during the nectar flow when all the frames are mostly the same colour. That is fine. However, there are many times during the year that the honeybee will collect from whatever is available, especially during a dearth period. This is when the honeybees will surprise you. My experience has taught me that bees will collect

nectar from any kind of forage, when it is in short supply and will quickly move on to other types of forage. The consequences are that the wax combs will eventually be filled with a multi-coloured array and unusual flavors of honeys. On extracting these combs, the honey would be of all the same colour and it would be difficult to separate light from medium or dark.

Grading different honey colours plays an important role in exhibiting at honey shows as this allows the exhibitor to enter all the classes of honey, for light, medium and dark. To do this, just hold the frames up to a strong flashlight or by looking through them, match the colors of the honey inside the frames, selecting the light, medium and dark. It is astonishing to see that there could be different colored honey frames in the same super. If there are plenty of supers to grade, it is best done by using three empty supers and marking them light, medium, and dark. If not, place the frames in the same order in an empty super. This task should be completed before extraction commences. If you keep the honey in separate containers, this will give an advantage for exhibiting in the light, medium and possibly dark classes. It also gives an added advantage for blending, not just for taste but colour as well.

If you have dark and light honey by blending it will be possible to make a medium from them. It is always possible to produce many different flavors on the strength and percentage of blending.

Preparing frames for extraction

After the first task of colour grading has been accomplished, the next task before extracting the honey is to scrape the frames to free them of any debris or propolis. First, remove any frame dividers (if used). Stand the frame on its end and hold firmly, using a seven-inch chef's knife or a similarlar implement. I realize that most beekeepers have their own particular tool for this purpose. However, I like the chef's knife. Scrape down the wooden frames, and this will remove any material i.e. propolis etc, that produce a strong odour in the honey. For safety reasons, when using a knife, always scrape away from you.

It is important to extract the light honey first and remove it from the extractor before extracting the medium or dark honey. All the different colored honeys should be held in separate containers, not just for colour but different flavors as well. This will enable the exhibitor to blend his honeys as well. The potential of mixing and blending at different strengths from just two types of honey is vast and certainly would give the exhibitor the edge over his/her competitors.

Bumble Bee Drift in a Commercial Greenhouse Environment

By Anna Birmingham, Department of Biological Sciences, Simon Fraser University, Burnaby, BC

Bumble bees are the sole managed pollinator that sustains the commercial tomato greenhouse industry (*Lycopersicon esculentum Mill. Solanaceae*) world-wide (Kevan et al. 1991; Dogterom et al. 1998), an industry valued upwards of $200 (CDN) million annually in British Columbia, Canada. This relatively new technology has greatly improved pollination (Banda and Paxton 1991; Kevan et al. 1991; Straver and Plowright, 1991; Dogterom et al. 1998; Pressman et al. 1999), yet satisfactory colony management techniques have not been fully developed. Growers perform little or no bumble bee management, which is surprising because colonies are expensive and inadequate pollination results in decreased fruit set and small fruit. Growers often increase hive numbers to alleviate poor pollination rather than manage existing hives, which may contribute to increased confusion and disorientation of foraging bees. Substantial population declines from bumble bee colonies are reported when they are first introduced into a greenhouse, but the reasons for this loss are unknown (Whittington 2003; Morandin et al. 2001).

Bee drift, when a bee leaves one colony to join another, normally is associated with orientation errors (Jay, 1966; Pfeiffer and Crailshem, 1998; Paar et al., 2002) and could be a factor contributing to bumble bee loss. Drift is a well-documented phenomenon for honey bees housed in similar-looking hives kept in close proximity in apiaries (Free, 1958; Jay, 1966; Pfeiffer and Crailshem, 1998), and for alfalfa leaf cutter bees (Goerzen et al., 1995). Beekeepers attempt to minimise drift because of the potential for disease transfer (Goodwin et al., 1994; Fries and Camazine, 2000) nectar robbing, and mortality due to aggressive interactions (Free and Butler, 1959; Jay, 1966, 1968). Drifting out of natural colonies likely increases individual fitness (Jay, 1968; Goodwin et al., 1994), and nestmate recognition is important in this context to minimize the extent of drifting (Downs and Ratnieks, 2000).

Orientation cues such as nest entrance patterns and spatially non-uniform apiary layouts are usually employed to decrease the amount of honey bee drift (Jay, 1966; Goerzen et al., 1995). Bumble bees nest in the ground in pre-existing burrows, commonly disguise their hive entrances (Plath, 1934), and normally do not aggregate their nests (Gamboa et al., 1987; Kearns and Thomson, 2000), whereas in greenhouses colonies are highly visible and are located in one central area. A typical commercial greenhouse contains a homogenous distribution of tomato plants repeated in regularly spaced rows, providing worker bees with

clear visual access to a large number of similar-looking hives. The uniformity of a greenhouse environment may further promote bee disorientation and loss, leading to increased bee drift, subsequent pollination decline and colony expenditure increase.

Is bumble bee drift a consequence of the uniform greenhouse environment?

To test the hypothesis that disorientation contributes to bee loss and drift, we investigated the orientation and drifting behaviour of *Bombus occidentalis Greene and Bombus impatiens Cresson*, the two major pollinators of greenhouse tomatoes in British Columbia in three separate experiments. Bumble bee orientation ability when hive entrance patterns and landmarks were provided was examined, as was the extent and direction of bumble bee drift into foreign hives, and foraging time and pollen collection as a consequence of increased contextual landmarks. On average 28% of marked bumble bees drifted into foreign hives, making up 0.3-34.8% of the population in those colonies. The use of simple black and white patterns and large landmarks did not affect the number of drifting bees, suggesting that disorientation is not a major contributor to drift or to the substantial loss of adult bees from colonies during their first week in a greenhouse. Bees had decreased foraging times when landmarks were present in the greenhouse, and showed a marginally increased rate of pollen input to colonies.

Does a greenhouse environment provide the opportunity for social parasitism?

We examined the reproductive development of adult worker bumble bees in the greenhouse to test whether *Bombus occidentalis Greene and Bombus impatiens Cresson* were drifting for behavioural reasons. Colony assessments were performed to determine what type of colony a drifting bee was most likely found in. Drifting and non-drifting bees were dissected and their ovaries examined for numbers of mature and immature eggs. More drifting bees were found in colonies with higher worker and brood populations and greater pollen stores. Drifting bees had a significantly greater number of mature eggs in their ovaries than did resident worker bees residing in colonies hosting drifters, suggesting that drifting could potentially increase fitness of individual worker bees and may not be solely a function of disorientation and/or nectar robbing. Taken together, our results suggest that drifting of workers into foreign colonies within greenhouses may demonstrate a predisposition to social parasitism. These studies contribute to understanding bumble bee behaviour in a novel environment and determining whether orientation cues are feasible management options to reduce drift and potential bee loss.

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ANNOUNCEMENT

Bee at the Pfeiffer Center, Chestnut, New York for the 2nd International Organic Beekeeping Conference, Chestnut Ridge, NY, USA, March 5, 6, 7,2004. Speakers are Medhat Nasr (Alberta, Canada Provincial Apiarist), Thomas Radetzki (from Southern Germany), and the Pfeiffer Center founder, Gunther Hauk.

Pre-registration due Feb 28.

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845-352-5020

Practical Treating with Formic Acid

Verification Testing for Infestation, Resistance and Treatment Efficacy

By Bill Ruzicka, P.E, and Commercial Bee Breeder, Kelowna, British Columbia, Canada.

Testing is a must! Do not rely on your neighbor, government official or supplier of treatments to tell you what to do. You must know what mite infestation levels you have in your hives to treat successfully and not waste money on unsuccessful or unnecessary treatments.

HOW MANY HIVES TO TEST AND WHEN: In most commercial operations where hives are mixed during pollination or transport (in groups of 500 or so), any twenty hives from such a group will give you a good indication of mite levels in your operation. The same hives should be tested in the fall and the spring. Test hives that have approximately 30,000 bees, 10 frames of bees with 3-5 frames of brood in two standard deep boxes or the equivalent in shallow or dadant box combinations. Where apiary populations are not mixed, test 5% of your hives or a minimum of four hives per yard.

METHOD: Before mite resistance, Apistan drop and alcohol or soap wash were considered the best tests. Ether role and sugar shake tell you that you have a few or a lot of mites. However, since these methods require taking samples of bees, they are dependant on where the sample was taken from and can therefore be inaccurate. At low infestation levels the mite drop will appear in one to three rows on sticky boards while the rest of the board will be clear of mites.

Calculating the prorated 24 hour natural drop on a full size sticky board collected over a 3-5 day period provides the best indication of mite infestation levels.

RECOMMENDATIONS FOR DROP BOARD /STICKY BOARD EQUIPMENT: Commercially made pre-glued boards and screens are available. Don't cut these in half. Minimum board size for a standard Langstroth hive is 12" x 16" and must be put in the middle of the bottom board. It must be covered by 1/8" wire screen raised 3/8"above the board. If the screen is touching, the bees have access to the board and will remove mites along with debris and your drop count will be inaccurate.

Re-usable homemade boards are commonly used, but be careful! Do not use core-flue or other plastics that can carry debris from one hive to another. You MUST clean the board and screen before moving them to another hive to prevent the spread of disease. Metal screens can be cleaned and sterilized in boiling water or sterile solutions.

24 HOUR PRORATED NATURAL DROP TEST FOR THE VARROA MITE: The strength of the hive is important to obtain a reasonable indication of infestation.

All data in our literature is for hives of approximately 30,000 bees, 10 frames of bees and 3-5 frames of brood in two deep boxes. In the early spring and early fall your hives will probably be this strength.

Always count the entire board. Prorating by counting half the board is a big mistake.

Count only mature female mites. Concentrate on the size and shape. Be aware that mites can be of any shade of brown from light to dark to fully black and, reportedly, half black and half white.

Do not count mites of smaller size, white, pearly white, or yellow. These mites are either males or immature mites which cannot cause future damage.

Reusable Testing Equipment:

Sticky boards (.040 Styrene plastic sheet 12" x 16")

50/50 petroleum jelly/cooking oil mix. Stir this mix with a drill or a hand mixer.

Foam brush to fit into the petroleum jelly jar.

Screen: 1/8" mesh raised 3/8" by two mid wedges, bend the edges of the mesh.

Stucco wire mesh 14" x 20" with 2" squares as a counting guide.

Butcher paper

Counting clicker and watch maker glasses for easy counting.

Detailed information can be obtained from our website: www.mitegone.com. Click on "Print Literature", "Support Package" and then "Testing Methods & Materials".

Cover one side of the sticky board with the mixed petroleum jelly in an even layer (the drier the climate the thicker the layer). Insert the sticky board under the hive by placing it on the bottom board and cover it with a screen. Record the date and hour.

After three to five days, remove the sticky board and count the mites. Record the number onto the test chart.

If the weather or circumstances require, you can take the boards home and count them in comfort: cover them with the waxed side of the butcher paper, write the number of the hive on it. Record the date and hour the sticky board was removed on the test chart.

At the counting place, remove the wax paper from the sticky board. Check to see if any mites stuck. Count these. Place the "stucco wire counting guide" over the board and count the mites in all squares (a counting clicker helps), divide the total by the number of hours the boards were in the hives. Multiply this number by 24 and you have the prorated (average) natural drop for a 24-hour period. Write these numbers into the chart.

24 HOUR PRORATED PESTICIDE OR ACID DROP FOR THE VARROA MITE: The boards must be in for the first 24 hours but no longer than 48 hours of treatment application. A good working treatment will kill or cause all mites outside of the capped cells to drop in 24-48 hours. After that, only mites emerging with the bees will drop and will dilute your average.

To do this test, follow the same procedure as in the natural drop but install new sticky boards at the same time you put in the treatment. Record the actual and prorated mite drops into a chart.

Any retesting with a higher dose or other product must be done on new hives, not previously used or treated hives.

WHAT DO THE 24 HOUR PRORATED NATURAL AND PESTICIDE OR ACID DROP TELL YOU?

THE NATURAL DROP: Tells you how high your infestation levels are and what kind of treatment is required. In the case of formic acid and the MiteGone method these are general recommendations:

The natural drop will also tell you how well your fall treatment worked in the spring and vice versa.

Natural Drop /24 hrs	Infestation Levels	Treatment in Spring	Treatment in Late Summer
0 - 8	Low	21 day	21 day
8 - 15	Moderate	21 day	40 day
15 - 30	High	40 day	80 day
30+	Critical	80 day	80 day*+25%

TREATMENT EFFICACY AND PESTICIDE RESISTANCE MULTIPLE: The "multiple" is obtained by dividing the 24 hour pesticide or acid drop by the 24 hour natural drop. It will tell you if you have resistance to man-made pesticides and how well your

treatment is working at the beginning of the treatment.

RESISTANCE TO FLUVALINATE, COUMAPHOS, AND AMITRAZ BASED TREATMENTS: If the "multiple" (amount of times the pesticide drop is greater than the natural drop) is:

- 20 + times - no serious resistance and your treatment will work.
- 10 to 20 times - resistance building, treatment may/may not work.
- 5 to 10 times - switch to another treatment. You will only increase resistance.
- 5 or less times - an alternative treatment is a must.

EFFICACY of pesticide and prolonged acid treatments

If the "multiple" is:

30+ times, this is very good - represents 95-100% efficacy.

20 to 29 times, this is good - be happy at 85-95% efficacy.

For acid treatments only if the multiple is:

10 to 20 times - satisfactory for low infestations at 70-85% efficacy.

5 to 10 times - may not be sufficient at 50-70% efficacy.

WHAT LEVEL OF EFFICACY IS SUFFICIENT WITH NATURAL SUBSTANCES? Pesticides act on a narrow band of nerve genes that easily mutate and mites build resistance quickly. Scientists are advising beekeepers to use natural substances like tymol, formic acid, and oxalic acid, which, depending on application, have 70-100% efficacy. Since natural substances act on a very wide spectrum of genes from respiration, reproduction, and skin, mites are very unlikely to build resistance quickly. A treatment with 70% efficacy used twice a year can keep mites below the economic damage threshold.

Keep mites below the 8-10 mite natural drop. A low presence of mites may also allow bees to build up resistance to them by increasing grooming and building natural defenses against mites. All of Brazil has a natural selection population of bees and mites that exist together and Brazilian beekeepers do not treat at all. Unfortunately, having 90% of colonies die through natural selection is not an option in North America.

EFFICACY OF FORMIC ACID TREATMENT depends on the mode of delivery. Generally the higher the infestation, the stronger or longer the treatments you need. Retest and continue treatments if infestation persists. In short blast methods (soaked towels, cardboard, napkins, etc) you can increase efficacy by repeating treatment more times (i.e. 7 - 8 instead of 5 times). In prolonged blast methods (newspaper pouches, MiteAway, Gel Packs) extra slots/cuts can be made to increase the evaporation rate but generally these methods are not easily adaptable to varied hive sizes and conditions. Modifications often shorten the length of treatment.

A low dose continuous formic acid application using the Mitegone method has the advantage of ultimate adaptability. If your acid induced drop is 5 times the natural drop, increase your dosage by 1 pad. If it is 10-20 times, your treatment is working at 75-85% efficacy. You may be happy with these results or you may choose to increase the dosage by 1 pad.

WHAT CAUSES LOW EFFICACY IN ACID TREATMENTS? It is often due to equipment, bees, or temperature and humidity. Often acid is lost and wasted through unsealed holes in the hive body or cracks in the bottom board. Also, some bees may ventilate too vigorously, causing the acid to be ventilated out of the hive. Large, strong hives will require larger amounts of acid. For example, a hive that is twice as strong as another may require 4 times or more acid. Extremely large, strong hives are difficult to treat.

Placement, internal temperature and the humidity of the hive affect the evaporation rate of the applicator. In temperate climates the bees keep constant temperatures and humidity between the combs but not on the bottom board or under the top cover. They have no means of lowering high humidity in a hot climate. This causes a drop or stop in the evaporation rate.

To offset the internal reduction of evaporation and humidity, simply cut the MiteGone pads into quarters or thirds to increase the evaporating surface. Recommendation for "Preparing Hives For Treatment" and "Modifying Treatment For Your Conditions" are on our website www.mitegone.com.

PLEASE START TESTING! IT WILL SAVE YOU MONEY AND YOUR BEES!

MEMBERSHIP RENEWAL FORM
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