
THE NOT SO LAZY DRONES
Aug 2011
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Going Gloveless
August In The Northeast
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It would seem our lucky drone has landed in honey bee heaven, surrounded by all these eager queens. Find out about the not-so-lazy drones in Jennifer Berry's article on Page 23. (Berry photo)

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Bee Culture

FEATURES . . .

DEPARTMENTS & COLUMNS

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Address Request

Would the advertisers and writers to *Bee Culture* please include your mailing address, as there are still a lot of beekeepers out here that don't have Internet access.

John Yoder
Freeport, OH

Roadway Plants

I have always liked the idea of pollinator plants beside roadways. But over the last few years, I have taken several long trips to various parts of the U.S., and on those trips, we stop frequently at the rest areas provided. Most of those rest areas have an abundance of flowering plants around the site, but for the last few years, I have not found a single honey bee on those flowers. For that matter, I saw very few insects of any kind. I have noticed the same things along the dirt roads out in the country. I am guessing that practically all federal, state, and county highway maintenance crews are spraying insecticides along the roads to prevent the insects from bothering the people driving there. I KNOW the city crews spray insecticides along their roads. Next time you take a trip, perhaps you would like to do your own survey on this to verify what I am saying.

It is really a great idea to put pollinator plants beside the roads, but I really hate to see all these companies and people putting a lot of money into this project if the road maintenance crews are going to nullify the project in this way. I have not read the bill, but would sure like to know that something would be done at the same time about the insecticides along the roads. Is the personal comfort of drivers more important than our food supply?

Thanks for letting me sound off.

Ray Norton

Groundnesters

Hello, I have been a long time subscriber to *Bee Culture*. It is a bright spot in the world of magazines. Your beekestra of writers consistently play in tune and enlighten their audience. Jeff Goff, the person Karen Kirsch wrote about in his dealing with yellow jacket collection in June issue asked, "I'm always on the lookout for other environmentally-friendly extermination techniques." After years of using beer or soda bottle with inch of gas in it, then waiting till dark when all yellow jackets were home I would put neck of bottle in entrance, which offers good control, but is environmentally unfriendly. But I have evolved by word of mouth to using good grease cutting dish soap. Simply put enough soap like you were doing a load of dishes into five gallon bucket, enough for plenty of suds. Three to four gallons of water is plenty. Instead of using petrol pour the soapy water into entrance. Again, good control. Soapy water suffocates insects. If there is a yellow jacket collector in your neighborhood call them first. Thanks again for your publication.

Larry Weinberg
Eugene, OR

Bee Space & Jim's Good Work

I know this may complicate relations with your advertisers, but I would love it if Jim Thompson (re: 2/2011 p36) would update his exhaustive data base and tease out a grading system, whereby, if one were to build out *with all one XYZ manufacturer's gear*, that one would have grade "A" 5/16" bee space or grade "D" beespace etc.

Of course the data is relative to article sample size and tolerances, and manufacturers change orders, and lot deviation sign offs, but we as beekeepers receive whatever they send to us and what they send should be in spec. 100% of the time. Nice work Jim!

Patrick Driscoll

Asian Honey Bees In Australia!

On receipt of your "Catch The Buzz" newsletter on Asian Bees In Australia (**http://home.ezezine.com/1636/1636-2011.02.27.10.46.archive.html**), I wrote to my local members of Parliament (in Australia).

Today I received a letter from

Robyn Martin, General Manager, Parternships, Biosecurity Strategic Projects Division advising that the Australian Government would commit $2 Million to support a national pilot program aimed at creating an ongoing solution to the management of Asian honey bees. This is wonderful news.

I am happy to share the letter below:

Dear Mr. Kennedy,

Further to my letter to you of April 8, 2011, I would like to update you on actions to date to manage the potential impact of the Asian honey bee. I apologize that it has taken so long to get back to you on this issue.

The Australian Government takes any threat to our biosecurity seriously, as we are fortunate to be free from many pests and diseases found in other countries that could harm our agricultural industries and environment.

Since the first detection of Asian honey bees in Queensland in 2007, the Australian Government has worked closely with the Queensland Government, other states and territories and the Australian Honey Bee Industry Council to prevent their establishment and spread.

The Asian Honeybee Eradication Program was funded by the Commonwealth government, the states and territories and the Australian Honey Bee Industry Council at a cost of approximately $3 million until March 31, 2011. Other industries that rely on bees and bee pollination were approached through their peak representative bodies, but declined to be involved.

Despite the Queensland Government's efforts to eradicate the pest, on January 31, 2011, the Asian Hon-

eybee National Management Group formed the majority view that eradication was no longer technically feasible. The group comprises representatives of government at both federal and state level, and the Australian Honey Bee Industry Council.

This decision reflected a scientific assessment of the possibility of eradicating the bees based on a number of factors, including their breeding rate, tendency to swarm and cover long distances and the difficulties this presented in detecting and destroying nests.

Following an inquiry by the senate Rural Affairs and Transport Refeences Committee into the science underpinning the inability to eradicate the Asian honey bee, the committee of government plant health managers and industry representatives, which provided technical advice to the National Management Group, was asked to reconvene to confirm its position on the technical feasibility of eradicating the bees. While the committee could not reach consensus, the majority view was that it would not be possible to locate and destroy all nests.

However, this does not mean that all activities against the bees will cease.

On May 20, 2011, the Australian Government committed a further $2 million to support a national pilot program aimed at creating an ongoing solution to the management of Asian honey bees.

*Federal and state/territory governments continue to work with representatives from the honey bee industry and some pollination-reliant industries to coordinate actions against the bees as part of the program. This Coordination Group will be publishing information about these actions on the Department of Agriculture, Fisheries and Forestry's website – **www.daff.gov.au**.*

The Department of Agriculture, Fisheries and Forestry will continue to provide information to the United States on Australia's bee health status and press for trade to be allowed to resume.

Thank you again for your correspondence.

Robyn Martin
General Manager, Partnerships
Biosecurity Strategic Projects Div.
Australian Government

Missing Bugs?

Hello! Just a little personal anecdote from a beginning hobby beekeeper:

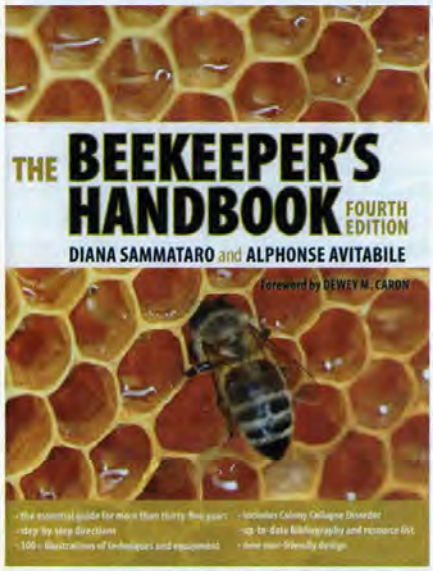
I managed to break my leg in April and spent several weeks looking out my front window from the couch. I was amazed at the number of lawn chemical trucks visiting my neighborhood. Usually I am at work during the time they visit, so I never noticed them in the past. Our lot is an oasis compared to the neighbors. And they don't even put the little warning signs in the areas they've treated.

Moving along, in the past few years I have noticed a huge reduction in the number of lightning bugs that come out on warm Summer evenings. The only time I see them in the numbers I recall from childhood is when I am vacationing far away from home. Since a lightning bug is a beetle, and I assume the goal of "Chemlawn" (and other companies – pretty clever how they include the word green in their appelations) is to eradicate dandelions and Japanese beetles, might fireflies be a type of collateral damage?

Is there any way beekeepers could perhaps educate the public about the negative effects of those lush lawns? Maybe a little one-page fact sheet that we could offer to our honey customers? I am thinking that lawn chemicals have to be bad for the bees as well as everything "bad" that they're supposed to control. Sometimes when you kill off the lesser of two evils, you just create a nice little ecological niche for something way worse. MRSA comes to mind on a human scale, and resistant *Varroa* on the bee level. Let me know if you have any information that I can use and avoid lawsuits from these companies, because I don't think they'll be too fond of me once I start talking.

Jackie Conrad

New Summer Reading –

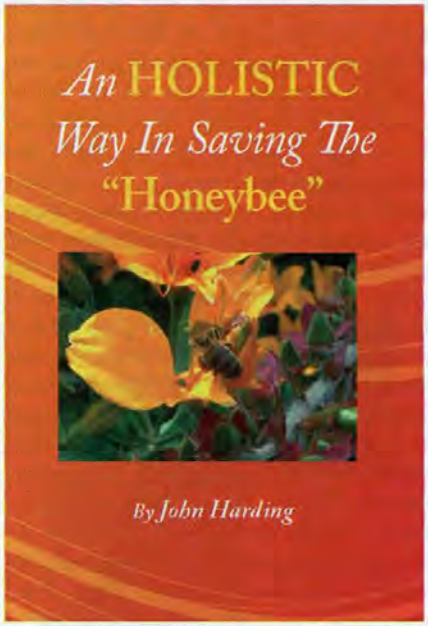


The Beekeeper's Handbook, Fourth Edition. Diana Sammataro and Alphonse Avitabile. 8.5" x 11", 308 pages, 100+ black and white drawings. Available from Cornell University Press, Ithaca NY. ISBN 978-8014-7694-5 for the $29.95 paper back. A hardback edition is available. Forward by Dewey Caron.

From the Publisher: Since 1973, tens of thousands of first-time and experienced beekeepers alike have relied on The Beekeeper's Handbook as the best single-volume guide to the hobby and profession of beekeeping. Featuring clear descriptions and authoritative content, this handbook provides step-by-step directions accompanied by more than 100 illustrations for setting up an apiary, handling bees, and working throughout the season to maintain a healthy colony of bees and a generous supply of honey. This book explains the various colony care options and techniques, noting advantages and disadvantages, so that beekeepers can make the best choices for their own hives.

This updated fourth edition (the Third Edition was released in 1998) has been thoroughly redesigned (the book now sits tall, instead of long on your bookshelf), expanded, updated, and revised to incorporate the latest information on Colony Collapse Disorder, green IPM methods, and procedures for handling bees and managing diseases and pests such as African honey bees and bee mites.

Colony Collapse Disorder has renewed the recognition of the importance of small-scale beekeeping and the critical role of bees in the production of our food supply. For the growing number of beekeepers looking to set up hives for either a rewarding hobby or a profitable commercial enterprise, this how-to guide includes a short Extreme Urban Beekeeping section by James Fischer, a desert southwest beekeeping guide by Gordon Waller and Gerald Loper, and southern beekeeping info drawn from Dean Breaux. An extensive glossary and reference section, plus several appendices round out the book.



An Holistic Way In Saving The Honeybee. John Harding, 77 pages, black and white illustrations. Order direct for £9.95 from Northern Bee Books at **www.beedata.com/bee-books**. Retails for $16.90 in U.S. book stores.

John Harding writes in the way that one would associate with a bible basher preaching in the high street, a quack at a country fair selling cure all medicines, or a middle-ranking Amway salesman, trying to up himself on the hierachial ladder by gaining new recruits on which he can download a multitude of cleaning

Continued on Next Page

Louisiana Honey Plants, by Dale Pollet, LSU AgCenter Entomology Professor (retired). Published by the Louisiana State University Cooperative Extension Service. $10 plus tax and shipping. You can order this book through our online store by using the Order Publication link **www.lsuagcenter.com/en/communications/publications/Publications+Catalog/Environment/Bees/**.

This 5½" x 8½" Extension publication contains an incredible amount of information about 53 Louisiana plants that can serve as nectar sources for honey bees. Illustrated by stunning color photos of each plant, the 32-page guide includes descriptions of the plants and the honey produced from each source. This inexpensive and well done booklet would be valuable for anyone living in the south or southeast, and really, would be beneficial for any beekeeper. It also includes a handy chart showing the blooming season for each plant in Louisiana, which, of course will change where you live, but it's a good place to start. This is a great example of good things come in small packages.

products. After pages of repeating over and over again that he has the solution for all beekeeping ills - and how lucky the beekeeping world is to have him as their saviour - we find in a few words where we have all been going wrong: we unknowingly placed our apiaries in areas which were unsuitable for them. We should all have been aware that the earth vibrates at a frequency of 7.83 htz but bees, given the choice, would nest in an area where the vibration of the earth has increased to between 190 - 250 htz. This increase in vibration is caused by the breaking up of the normal pattern by watercourses etc beneath the earth's surface - and where these lines occur (criss-crossing the whole of our planet) are the high htz Electromagnetic Geopathic Stress Curtain Lines. Bees automatically swarm to these locations and, if a beekeeper places his colonies on them - ensuring that the frames in the hive run from north to south - then varroa will be eradicated without any chemicals (much to the chagrin of the chemical companies and all those who have worked for so long trying to solve the problems we have with our bees) and "aren't I clever for finding this out and don't I therefore deserve acknowledgement and praise from the beekeeping community?", he asks.

And how do we find these Lines?: in the time honoured way of dowsing using a couple of bic biro pen holders and bits of metal coat hangers! Find such a line, place your colonies on it and after eight weeks you'll hardly find one mite in the hive. A further proof that his assumptions are true - next time you have a swarm, get out your divining rods and lo and behold, they will be jumping around in your hands where the swarm has landed.

Whilst apparently these lines are important for bees and oak and elder trees, they can be bad for human health - babies in cots will sense and try and move away from them; cancer might be caused by them as well as other illnesses - and as his bed was crossed by two of these lines, John is not surprised that his marriage failed. He suffered from bad headaches due to the position of his bed and his wife had 'abominable' (read abdominal) problems which led to a miscarriage.

Apart from the above, there is at least some common sense advice at the beginning of the book for those who aim to take up beekeeping. Likewise, his hive floor to get rid of varroa is of practical interest, though his two-queen system of queen rearing I have seen before, but with full size boxes rather than the system of tower nucs he employs - the bees, he says, preferring a chimney type of brood nest.

Design-wise the book shouts out at you with single sentences sometimes filling a full page. Read the book and make of it what you will, but I bet you anything there are going to be a few wardrobes short of a wire coat hanger. I already have a couple of colleagues who are willing to give it a try. – *John Phipps*

Baby Beetle Blasters

Bee Ranchers Supply announces the introduction of the Baby Beetle Blaster, a beetle trap that will fit in the smallest baby nuc as well as a full size hive. It is a quarter of an inch deeper than the larger trap which will make it easier to install and remove without spilling oil. Although designhned for baby nucs, it will also work very well in full size hives. It will cost about the same as the larger trap. Check with your local bee supply dealers for availability.

INNER COVER

The top bar hive we have this season seems to be perking along quite nicely. By the middle of July it had 12 top bars with comb on about half of the bar . . . some a bit more though only a few went to the bottom or other side, but all had brood, honey, nectar or pollen. The population was moderate, and the temperament docile and quite. There hasn't been any trouble with comb being attached to the sides yet, but the combs are small and still very fragile. We've moved the divider (the top bar with a piece of plastic attached below that is the shape of the inside of the hive) back three times so far . . . we started with a six frame space, then moved it two back to eight, then four back to twelve. Three of those four were still untouched the first day of Summer. This package was fed minimally on introduction and quit taking syrup altogether a couple weeks after introduction. It was a two pound package so there weren't a lot of bees, but still, they managed to make comb, collect nectar and pollen and keep the queen going.

We haven't found mite one on them so far – touch wood – but with a dozen colonies within 50 yards I suspect they will show up there sooner or later. Interestingly, there isn't a 'natural' way to deal with mites in this hive as far as I can tell. You can't put in drone comb to capture mites because they put drone comb wherever they please, and dusting with powdered sugar is a no-go really – possible but not practical. The screened bottom board is there, but it's only a fraction of the area of the top bars, so most mites that fall will land on the side and easily hop on another bee nearby. The essential oil treatments won't work because if you put them on the top bars – well – you'd never have a bee remove the stuff because they don't go up there. And none of the strips would work because you can't loop them over the top bar since the top bars don't have spaces between them, though the combs below them do.

There is the natural cell size argument, and when looking at any one comb, and different combs, the differences in cells and between combs are quite obvious. Where pollen, honey, brood, workers and drones go is not the same on every comb, though they are similarly designed. I don't know if this is because combs are constructed more to the demands or limitations of the environment at the time of construction, or the bees make design decisions based on a greater plan. I don't have enough experience with this yet to say one way or another.

I suspect the 'all natural' claim made for these hives is derived from the fact that there's no good – maybe easy is a better term - way to use a conventional mite treatment. And, as they say, no treatment is natural. How does one deal with a hive of this type that becomes overcome with Varroa? Or maybe they don't? After only three months observing one hive it's too early to tell and the sample size is way too small to say anything definitive. And besides, the weather so far this year has been way beyond explaining, so that enters into the equation too. We'll let you know how Summer shapes up.

The other hive . . . the Beehaus from the UK seems to be on track . . . like most of the other packages started this Spring it started well, then slowed right down and had to be fed to finish the foundation. Feeding was problematic because even though a honey super was part of the kit, no feeder we had would fit in it except the plastic bags, and I dislike using those. So I managed to prune a few medium frames full of honey to fit in the box. This hive has the dimensions of a British National...the frames are narrower by a bit, and much deeper, even than our deep. The lugs are very, very long and sit on a wide ledge inside the box. Because this box is plastic that ledge isn't flat, but has a groove in it – a perfect place for small hive beetles. I don't have them in this hive yet, but I anticipate that they will arrive sometime soon. We get them every time a load of bees comes up from the southeast, but none did this year so we are OK, so far.

As I said, the honey supers are the same width as the rest of the hive, but are much shorter.

The frames that fit in these are even shorter than a shallow frame. The Beehaus is really two hives in one – with exits on either end and a sturdy divider in between and each side has two of these honey supers on top. The kit came with frames for only one though, but as of the first day of summer they had not even entered the one super with frames and foundation. The rush is a bit slow.

The frames below are by now nearly drawn and filled, but I keep replacing the modified honey frames with more modified honey frames and they keep eating it. There is

Hives And Mud

more brood and there are more bees in these two hives than the topbar hive, and even in the eight framer we put another three pound packages in so they are growing, but eating me out of house, home and frames in the meantime.

Other than the somewhat different shape, and the moderate difficulty in getting UK equipment this hive, or I should say these hives are not at all unpleasant. Two hives have one footprint in the backyard, they are easy to look at, are at an easy height to work, and easy to assemble when they first arrive. With the exception of the frames and foundation that have to be argued with (these surely need to be attended to with assembled frames with plastic foundation) this is pretty much a straight shot at becoming a beekeeper right out of the box.

Of course harvest is going to be interesting. Those little frames may, or may not work in the extractor I use (not mine actually, Buzz does this for me) so we'll see there, if we end up with enough to extract. Might be able to double or triple up these frames since they are so small.

Otherwise, this hive is a non-event. Which is exactly what you want with a beehive. You want it to be simple to get, simple to use, and handy to have. So far, so good.

•

I still get the newspaper from the town in Wisconsin I grew up in. My youngest brother lives there and when his kids were in school his wife was active on the school board and he was on the town council and a member of the local Lions Club. It was fun to read about their exploits on occasion.

Anyway. One of the people I graduated from high school with spent his growing up years helping on the family farm. After graduation we lost touch and he spent much of his life away from Wisconsin and over the nearly 50 years we've been out of that school we've only run into each other two or three times. He's returned home since he's retired and in his spare time writes an occasional short and to the point letter to the editor of that weekly paper. He writes about politics, family, community, the old guys he has coffee with and other topics, but with a dry, almost biting but still amusing sense of humor. He had that same touch when we were young. I'm glad to see he hasn't lost it.

Toward the end of June he offered a short piece that really hit home. He tells of crawling out from under a very large, and very stuck in the mud piece of farm equipment one Spring while still in school – stuck up to the axels it was because it had been a spring like this one – rain, more rain and still more rain. Before he could say a word though his father looked him straight in the eye and said "Boy, curse the mud. Bless the rain." Farmers know the value of the rain.

I have been close to cursing the rain this year, as have many – farmers, beekeepers, everybody and anybody who has to get things done outside. But those words . . . curse the mud, bless the rain kind of put things in perspective don't they. The beekeepers and farmers and firefighters and homeowners and anybody and everybody who needs that rain in the south and southwest would certainly welcome even the mud this year, and the rain would be even more of a blessing. But the tornadoes and storms and floods and rain that happen in the central U.S. where the hot, dry southern weather meets the cool, moist northern weather have been devastating and deadly. I can't imagine losing my home to a storm, my farm to a flood, or my family to a tornado. I can't begin to imagine.

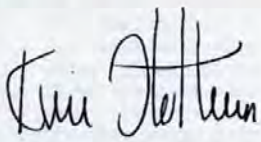
The weather people who make predictions – yeah, bet on the weather why don't you – tell us this weird and awful weather isn't over for the year. The hot dry weather in the south may be reduced by – you guessed it – hurricane season. There's a not so pleasant thought. And the cool, wet weather up here may eventually play itself out as the cause - La Niña – finally withers away.When that happens though it is replaced by hot, hot, dry, dry conditions. La Niña is nobody's friend.

But the mud is still here and it's going to rain again tonight so the mud'll just get better. But we still have rain and everything is green and growing and the bees are making honey and the world isn't on fire and hasn't blown away. But I am troubled and saddened by the conditions good people are suffering through no fault of their own. I can't begin to imagine.

Here, nobody has died, the crops haven't dried out and the forests haven't burned up. It's not perfect and we've have been lucky so far.

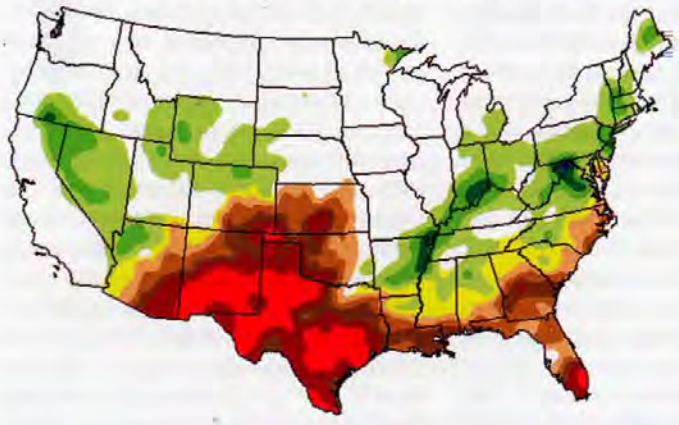
So, for now, curse the mud. Bless the rain.

No matter the rain, or the mud or the heat it's Summer time. Keep your smoker lit, your hive tool handy and your veil tight – it might stop raining long enough to get some work done. And, it might rain where you are so you'll have to get some work done.



AUGUST – REGIONAL HONEY PRICE REPORT

September 28, 2010 - June 7, 2011 (Water Year)



We surveyed our reporters this month asking about spring and summer weather, their crops so far, and how their bees were looking. The results are in the table. For rain we scored too much = 1, just right = 2 and too dry = 3. The rest of the questions and their scores are in the same vein. For the condition of their bees we went from terrible = 1 to boomers = 4. At the bottom we averaged these conditions across all regions, which should prove useful when looking at the overall crop this Fall. So, what do you think the U.S. honey crop, will be this year? 140 million or less? 140 - 175 million? 175 - 200 million? 200+?

Average Score Each Region

Region	Rain Too wet - 1, OK - 2 Too Dry - 3	Temperature Too Cold - 1, OK - 2 Too Warm - 3	Spring Crop Less - 1, Avg - 2 Avg+ - 3	Summer Crop Less - 1, Avg - 2 Avg+ - 3	Bees Terrible - 1, Avg- -2, Avg - 3, Avg+ - 4
1	1.5	1.0	3.0	1.5	3.0
2	1.7	1.8	1.5	1.7	3.5
3	2.0	2.3	1.5	1.5	3.0
4	1.8	2.2	1.8	1.4	2.6
5	3.0	2.9	1.5	1.3	2.9
6	3.0	2.7	1.8	1.5	2.9
7	1.0	1.4	1.2	1.4	2.2
8	2.0	2.3	2.7	2.0	3.5
9	3.0	3.0	2.0	1.0	2.0
10	1.5	1.0	1.2	1.8	3.0
11	2.4	1.9	1.3	1.5	2.3
12	1.4	1.2	1.5	1.8	3.2
Avg.	**2.0**	**1.2**	**1.8**	**1.5**	**2.8**
% For Each Value	**1 - 38% 2 - 26% 3 - 36%**	**1 - 38% 2 - 29% 3 - 34%**	**1 - 59% 2 - 29% 3 - 18%**	**1 - 54% 2 - 39% 3 - 6%**	**1 - 89% 2 - 41% 3 - 28% 4 - 24%**

REPORTING REGIONS

	1	2	3	4	5	6	7	8	9	10	11	12	SUMMARY Range	SUMMARY Avg.	History Last Month	History Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																
55 Gal. Drum, Light	1.69	1.85	1.69	1.54	1.80	1.68	1.65	1.65	1.69	1.70	1.60	1.80	1.54-1.85	1.69	1.67	1.65
55 Gal. Drum, Ambr	1.67	1.75	1.67	1.51	1.75	1.57	1.73	1.60	1.67	1.67	1.48	1.70	1.48-1.75	1.65	1.60	1.53
60# Light (retail)	145.00	161.00	140.00	141.67	142.00	148.33	138.00	147.00	150.89	139.80	129.00	178.50	129.00-178.50	146.77	145.40	139.28
60# Amber (retail)	145.00	151.00	140.00	145.75	140.00	142.50	139.33	140.00	150.00	143.35	125.00	168.00	125.00-168.00	144.16	142.80	131.13
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	63.36	71.48	48.00	56.07	70.42	53.75	59.00	70.42	70.42	68.00	75.00	97.50	48.00-97.50	66.95	61.04	56.37
1# 24/case	91.20	99.23	81.60	74.22	74.00	87.31	80.47	96.00	72.00	108.90	94.80	114.13	72.00-114.13	89.49	85.44	78.84
2# 12/case	84.60	81.85	75.90	75.50	78.00	90.65	72.13	87.20	63.00	81.00	72.00	90.67	63.00-90.67	79.37	77.95	73.41
12.oz. Plas. 24/cs	78.24	94.78	61.80	74.32	67.00	74.68	64.00	84.00	66.00	61.20	70.80	76.87	61.20-94.78	72.81	72.44	67.59
5# 6/case	99.25	98.98	81.25	74.57	96.00	91.25	78.83	105.00	82.00	85.20	66.00	89.50	66.00-105.00	87.32	87.21	81.21
Quarts 12/case	113.48	168.73	142.80	112.75	96.00	100.09	120.00	100.50	113.48	133.76	95.70	126.50	95.70-168.73	118.65	107.71	102.45
Pints 12/case	78.21	88.98	81.60	74.00	68.00	79.14	102.50	80.00	78.21	105.00	72.00	78.00	68.00-105.00	82.14	71.99	69.39
RETAIL SHELF PRICES																
1/2#	3.00	3.93	2.55	3.57	3.63	3.50	3.16	3.63	3.63	3.15	2.94	4.00	2.55-4.00	3.39	3.62	3.46
12 oz. Plastic	3.75	4.74	3.29	3.98	3.99	4.75	3.79	3.93	3.99	4.00	4.06	4.83	3.29-4.83	4.09	4.07	3.97
1# Glass/Plastic	4.88	5.49	5.10	5.26	5.50	5.70	5.13	5.44	4.99	6.13	4.78	6.21	4.78-6.21	5.38	5.38	5.12
2# Glass/Plastic	8.88	8.19	8.90	8.03	9.50	8.99	7.91	9.50	8.99	9.40	6.64	9.33	6.64-9.50	8.69	8.62	8.27
Pint	8.12	7.68	8.25	6.54	6.50	6.37	10.70	6.20	8.12	10.00	6.59	10.25	6.20-10.70	7.94	7.93	7.81
Quart	12.86	12.18	14.00	10.93	12.00	10.59	10.28	11.87	12.86	14.93	10.83	16.00	10.28-16.00	12.44	13.28	12.08
5# Glass/Plastic	19.75	18.99	18.95	19.50	18.14	22.00	18.49	22.00	21.00	19.90	14.72	19.50	14.72-22.00	19.41	19.07	18.72
1# Cream	6.24	6.61	7.80	5.92	6.24	5.75	6.04	5.39	6.24	5.55	6.19	6.50	5.39-7.80	6.20	5.80	8.04
1# Cut Comb	7.50	7.15	7.80	5.90	7.85	6.75	6.71	6.00	7.85	10.50	9.00	9.75	5.90-10.50	7.73	7.22	6.73
Ross Round	6.90	6.95	7.80	6.50	6.90	6.50	6.00	6.90	6.90	6.90	7.50	8.99	6.00-8.99	7.06	7.50	6.56
Wholesale Wax (Lt)	3.25	4.83	3.75	3.88	3.20	4.88	5.71	4.00	5.00	5.00	3.32	3.60	3.20-5.71	4.20	4.20	3.65
Wholesale Wax (Dk)	2.25	4.32	2.75	3.59	2.15	4.50	4.91	4.00	4.74	4.74	2.50	2.90	2.15-4.91	3.61	3.26	3.13
Pollination Fee/Col.	90.00	105.00	72.50	53.60	55.00	66.67	55.00	75.00	15.00	81.71	75.00	105.00	15.00-105.00	70.79	79.41	80.63

How Much Beeswax?

Kim **Flottum**

Somebody recently asked how much beeswax is used in the U.S. each year, and is it changing up, or down? It turns out that question isn't easily answered. But my curiosity got the best of me and I went looking.

You have to make a few assumptions to start with. The first was how much bees wax is produced annually in this country. That's something nobody measures directly. It's not reported to a central Wax clearing house, so you have to guess. But you can make an educated guess based on some existing data. The data is how much honey is produced – the guess is how much wax is harvested from that much honey. So we asked a bunch of beekeepers – how much beeswax do you harvest from every 1,000 pounds of honey you produce each season. Obviously, if you don't produce thousands of pounds of honey your beeswax probably isn't going to get into this system. It's going to be a lot like the honey report that comes out in February – if you have fewer than five colonies you don't get counted.

After asking a lot of beekeepers – those with flail uncappers that remove hardly any cappings, to those that use vibrating knife uncappers that remove a fair amount, we came up with an average of 20 pounds of harvested beeswax for every 1,000 pounds of harvested honey. You can quibble with that if you like, but our range was everywhere from 45 pounds to six or seven pounds – the average was about 20.

With that figure then you can calculate about how much wax is produced in the U.S. each year, which you can see on the table – just a bit over three million pounds a year.

But that isn't the whole story you know. We import beeswax too, both unbleached beeswax . . . by far the greater amount, and bleached beeswax, a much smaller amount. For convenience I combined the two types and over the past five years you can see what comes in from off shore. The average is 5.2 million pounds of beeswax imported each year . . . not quite double what we produce. An interesting corollary here is honey produced and honey imported – the last five years we have produced in the U.S. on average 157.3 million pounds, and imported on average 241.8 million pounds. We could produce a lot more honey in this country and import less. It's a market lost, for sure.

But, interestingly, we export beeswax too. On average we export 2.59 million pounds – almost as much as we make. I suspect that we are actually brokering some of the wax we import, turning it around and exporting it somewhere else, but I can't put my finger on that.

Once you put all these numbers in the grinder and shake them up a bit you come up with a figure of how much wax is used in the U.S. each year – kind of, about. That figure is 5.78 million pounds of beeswax used on average – or at least that much is measured as used...in the U.S. each year. That's not quite double what we produce, so there, too, is a market lost.

One interesting note at the bottom of the graph is the amount of wax imported and exported for January through April so far this year compared to last year. Imports are down so far this year – down 11% or about 15,000 pounds. Exports, however are up 12%, or 14,000 pounds. Like I said, interesting. BC

	# U.S. Colonies	U.S. Honey Produced	Imported Honey	U.S. Wax	Imported Wax	U.S. Wax Exported	Beeswax Used In U.S.
Year	x 1 Million	x 1 Million lbs.	x 1 Million lbs.	x 1 Million lbs.	x 1 Million lbs.	x 1 Million lbs.	x 1 Million lbs.
2006	2.39	154.8	279.5	3.1	6.30	1.78	7.62
2007	2.44	148.4	233.7	3.0	4.73	2.75	4.97
2008	2.30	160.9	232.4	3.2	4.80	3.25	4.75
2009	2.50	146.5	211.0	2.9	4.89	2.02	5.77
2010	2.68	175.9	252.4	3.5	5.47	3.16	5.81
Jan - April 2010	–	–	–	–	1.39	1.16	–
Jan - April	–	–	–	–	1.24	1.30	–
% Change	–	–	–	–	-11%	+12%	–

A Closer LOOK

IMPACT OF VARROA

Clarence **Collison**
Audrey **Sheridan**

A positive relationship was found between increasing numbers of mites on individual bees and the incidence of morphological deformity and death.

The ectoparasitic honey bee mite, *Varroa destructor* Anderson and Trueman, feeds on the hemolymph of honey bee larvae, pupae and adults of the western honey bee, *Apis mellifera*, causing serious damage to colonies. Within three to five years of becoming infested, colonies normally die. *Varroa* mite parasitism involves several different mechanisms of weakening and obliterating of the honey bee colony (Garedew et al. 2004). A colony's collapse is the result of many inter-related factors that act detrimentally either on individual bees or cumulatively on the whole colony. The extent of harm is directly proportional to the degree of infestation. Drone brood is preferred over worker brood and up to 20 *Varroa* females may invade a drone brood cell (Duay et al. 2002).

After invading a honey bee brood cell shortly before capping, adult female mites perforate the integument of bee larvae/pupae in such a way that they and their progeny can feed on hemolymph. During the initial feeding of a single founder female mite, the host larva is punctured at various positions. These small short-term feeding sites are difficult to localize and may close up rapidly because the larval integument is covered by a very thin elastic cuticle. As the host bee continues development, the size of the feeding wounds increase in size but the number of feeding punctures decline (Kanbar and Engels 2003, 2004, 2005). Perforations by the chelicerae (mouthparts) of the mite causes damage to host tissue in and around the wound. These perforations are used repeatedly as feeding sites by these hemolymph-sucking mites and by their progeny. On average, the mites made two integumental perforations for feeding on prepupae and one on the pupae, even when a brood cell was multiply infested with mites. On the prepupa these perforations normally occurred on the sixth abdominal segment and were repeatedly used by the feeding female mite. The final perforation made by the female mite during the host's pupal molt was usually on the ventral side of the second abdominal segment of the host bee and was kept open for several days, until the end of the pupal phase (Kanbar and Engels 2003). This holds for 98-99% of the drones and ca. 75% of the workers which alternatively may have perforations in a more lateral position on the thorax (Kanbar and Engles 2004). Shortly after the pupal molt, the central hole of these perforations measured about 50-60 µm in diameter. In brownish pigmented pupae, the perforations may reach a diameter of 80-100 µm, or more.

Factors associated with *Varroa* mite saliva are believed to be responsible for keeping the wounds open for feeding and observed aberrant wound healing. Richards et al. (2011) collected salivary gland secretions from the mite and electrophoretically ana-

"Drone brood is preferred over worker brood and up to 20 Varroa females may invade a drone brood cell (Duay et al, 2002)."

lyzed them. At least 15 distinct protein bands, with molecular weights ranging from 130 kDa to <17 kDa were found. Serial titration of the mite salivary secretions in TC-100 followed by an 18-hr incubation with haemocytes from the caterpillar, *Lacanobia oleracea*, indicated that the saliva secretions damage the haemocytes and suppress their ability to extend pseudopods and form aggregates. They concluded that these salivary secretions facilitate the ability of *Varroa* mites to feed repeatedly off their bee hosts by suppressing haemocyte-mediated wound healing and plugging responses in the host.

Towards the end of the pupal phase, the wounds become increasingly scarred and begin to heal (Kanbar and Engels 2005). After scarring takes place, the adult bee is protected from microbial infection after it has emerged from the protected environment of the sealed brood cell (Kanbar and Engels 2003). Complete closure of the integument was usually observed by the time of the imaginal molt (last stage of development in an insect) in pupae infested by a single mite. In brood cells containing four or five invading female mites and their progeny, healing of the wound is delayed. The large wounds observed in drones suffering from a heavy parasitic load do not heal perfectly, as normally occurs before adult eclosin (Kanbar and Engels 2003). This means that the remaining openings will allow pathogens to enter the host's body. These feeding wounds are subject to microbial infections during pupal development. Large colonies of bacteria often develop in the thoracic wounds of worker pupae as well as the abdominal punctures of drone pupae. From 15-30% of the pupal wounds investigated contained bacterial colonies with abundance dependent on the level of mite infestation but no corresponding rate of mortality was observed (Kanbar and Engels 2003).

The physical and physiological effects of *V. destructor* on individual bees have been extensively investigated and the mites have been shown to cause considerable pathological effects (De Jong et al. 1982). Wet weight, dry weight and water contents of emerging honey bees infested with mites were all negatively correlated with increasing numbers of mites. It was estimated that for every female mite present during the bees' development, the host will lose three percent of its body water (Bowen-Walker and Gunn 2001). Parasitized bees also emerge with lower head and abdomen concentrations of protein and with lower abdominal carbohydrate concentrations. Lipid concentrations were not detectably affected by mite infestation. The losses of metabolic reserves were not, however, judged to be serious enough to be directly responsible for the high bee mortality and ultimate colony collapse that are associated with the arrival of mites in the hive. Some 8.5% of the emerging bees exhibited morphological deformities and deformity was positively correlated with increasing numbers of mites in brood cells. Deformed bees were, however, found in all levels of infestation studied, suggesting that other factors, such as infectious agents may be involved. Mites that fed on either alive or dead U^{14}C-labelled bees acquired the label within 24 hours and it was calculated that an adult female mite consumes 0.67 µl hemolymph/24 hour period. It was also demonstrated that ^{14}C was transmitted to a previously non-radiolabeled bee when a mite that had been feeding on a labeled bee changed hosts. The level of transfer was above that which could have arisen through contamination of the mite's mouthparts and supports the suggestion that it is an important vector of pathogens such as viruses.

The chemical composition of hemolymph of pupae infested with *Varroa* mites had lower protein concentration compared to unparasitized pupae (De Jong et al. 1982, Weinberg and Madel 1985, Kovac and Crailsheim 1988, Bailey and Ball 1991). The reduced protein concentration in the hemolymph may indicate why some organs of honey bees infested in the brood stage are malformed or underdeveloped, since proteins are generally important in organ formation during ontogenesis (development of an individual organism). Bees that were not infested with mites during brood development but were artificially infested immediately after hatching showed less developed hypopharyngeal glands than non-infested bees (Schneider and Drescher 1987), demonstrating the energy and nutritional demand the parasite imposes on the immature adult host, which leads to underdevelopment.

Comparison of the effect of infestation of *Varroa* mites on drone- and worker pupae with equal numbers of mites on the weight at emergence demonstrated a similar weight loss in both sexes indicating that the nutritional value of the hemolymph from workers and drones is the same for the mites (Schneider and Drescher 1987, De Jong et al. 1982). It has also been demonstrated that, apart from the lower weight at hatching, honey bees parasitized with *Varroa* mites during their pupal stages have reduced life spans compared to unparasitized bees (De Jong et al. 1982, De Jong and De Jong 1983, Schneider and Drescher 1987).

The energy metabolism and nutritional demand of the mite was investigated by calorimetry, respirometry and resource utilization rate (Garedew et al 2004). Mites from different sexes and developmental stages of the honey bee were monitored in the absence of the host. Energy metabolism of the mites, calculated from the rate of heat production, was an insignificant factor in the cause of colony death. The metabolic rates of mites ranged from 1.1% to 2.4 % of that of the bee pupa depending on the infestation level. But the nutritional demand of the mites was very high, owing to their inefficient metabolic machinery, utilizing up to 25% of the nutritional reserves of the pupae accumulated in tissues during the larval stage. The feeding of the mites contributes to the malformation and weakening of the bees and eventually of the colony.

The role of *V. destructor* as a vector of bacterial and fungal disease (Wiegers 1986, Glinski and Jarosz 1988, 1992, Ball 1994, Liu 1996) and as a vector and inducer of latent viral infections (Ball and Allen 1986, Wiegers 1986, Ball 1996) has been demonstrated. Destruction of host tissue and impairment of the host immune system by the parasite can also induce the development of latent viral infections by releasing infectious agents from damaged tissues and stimulating replication of the viral infectious agent (Wiegers 1986, Glinski and Jarosz 1984, 1988).

Virus-like particles, 27 nm in diameter, were observed in extracts of individual *Varroa destructor* mites and in sections of mite tissue (Zhang et al. 2007). Application of a purification procedure resulted in virus preparations that were used to prepare an antiserum to detect the virus in individual

mites. Immunohistology studies showed that the gastric caecae were heavily infected, whereas no immunostaining could be detected in other mite tissues or organs, like the salivary glands, brain, rectum or reproductive organs. By electron microscopy large aggregates of virus-like particles in para-crystalline lattices were found in cells of the gastric caecae. The particles, reminiscent to picorna-like viruses, occurred mainly in the cytoplasm, whereas some virus particles were sparsely scattered in vacuoles. Occasionally, particles were observed in membrane-bound vesicles or in long tubular membrane structures in the cytoplasm. The accumulation of the picorna-like virus particles in the cytoplasm and the presence of the virus in membrane structures give a strong indication that the virus replicates in the mite.

Under field conditions, *Varroa* mites have been shown to be highly effective vectors of deformed wing virus (DWV) between bees (Bowen-Walker et al. 1999). Adult female mites obtained from honey bee pupae naturally infected with DWV contained virus titers many times in excess of those found in their hosts and, beyond that, which might be expected from a concentration effect. A positive relationship was found between increasing numbers of mites on individual bees and the incidence of morphological deformity and death. This reflects the large number of viral particles transmitted by the mites which results in many infested bees dying before emergence. BC

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The Not-So-Lazy Drones

There's much to be said about the male of the species.

Jennifer **Berry**

The drone, a.k.a. the "idler" or "lazy worker," with his large eyes (all the better to see her with), robust thorax (all the better to fly to her with) and stout abdomen (all the better to mate with) is nothing more than flying gametes (sperm cells). Developed from an unfertilized egg, the drone has only 16 chromosomes, half of what the queen mother and each of the workers have. The drone's only mission in life is to mate with a queen and pass on those alleles. But, back at the hive, the drone is basically a lazy, no good for nuthin', ne'er-do-well. He doesn't forage, clean, help in the nursery, build comb, polish cells, make honey or defend the hive. Hence, many beekeepers don't want them around and even take actions to keep their numbers down. Yet drones are an integral piece of the equation for the queen producer, specifically, as well as the health and perpetuation of the species, on the grand scale. Before we explore the wonderful world of the drone, let me first tell you about a funny thing that happened on the way to the apiary . . .

This Spring our lab set up a research project consisting of 200 full-sized colonies. The lab's existing bees were already involved in other projects. So, thanks to Bob Binnie and Ron Kirkland, we purchased 200 additional top-notch nucs. To pick them up, we had to drive about 2.5 hours south of the Bee Lab to the small town of Unadilla, GA. It's no big deal, (insert sarcastic tone here), really! I love to move bees, especially at night. Here you are with trucks and trailers, loaded down with thousands of pounds of bees and equipment driving down a windy, dark, two-lane country road, void of cell phone signals yet littered with deer, raccoons, ground hogs, foxes, bobcat, squirrels, unidentifiable critters, and possums, just waiting to jump out into the road at every turn. Did I mention deer? By 2:00 a.m., you start jerking the wheel ever so slightly as you approach a tan-colored mailbox or clump of grass illuminated by the headlights, which, in your exhausted state, you see as a 400-pound buck about to leap out in front of your overloaded truck.

But before this wonderful journey began, and the trucks loaded, the crew needed sustenance. After much debate, and several calls back and forth between the two trucks, it was decided that Chic-fil-A was the place to go. Oh, joy! I have nothing against the cows holding up the "Eat More Chicken" signs, but I was hoping for something not in the fast food category. So, we pull in, get out, and begin to trek across the parking lot when someone sees a dead drone on the ground. "Isn't it strange to see a drone out here in the middle of this over grown, crowded, noisy, polluted, no-tree-in-sight interstate exit." You know the kind, peppered with fast food joints, gas stations, over-priced hotels and the proverbial Cracker Barrel.

As we took additional steps, more drones were discovered. "Oh look. There's one. And here's another one right here. They're all over the parking lot!" We look at each other wanting to say, "what the????" When all together, we looked up, scanning the skies, and noticed the black, buzzing mass just to the right of the Chic-fil-A sign. And this is no normal side of the road sign either, but one of those, really tall, huge signs that you can see for a mile away while driving down the interstate. It's our first drone congregation area, a.k.a. DCA. Since we were ill equipped (in other words no high powered telephoto lens just our iPhone cameras), there were no pictures to document our claim of the first DCA next to a Chic-fil-A sign, but there were five witnesses. And "How did we determine it was not a swarm without the aid of binoculars," you ask? We determined this by the fact that there were only dead drones on the ground, (no workers), and some of the drones had expelled their endophallus, (evidence they had mated).

Mating in the honey bee world is not a simple task and is even down right deadly. At about a week old, virgin queens fly from the protection of their hive into the air in search of DCAs. That's right. It's the drones that congregate together in large numbers and not the queens. The queens seek out the drones. This makes sense, proportionally speaking, since there are more drones present in a hive than queens. Hence "he" is not as "precious."

One way to make sure you have enough drones is to use drone comb. This green plastic drone comb frame makes it easy to see drone production.

A colony will put drones wherever they please, making it difficult to measure drone production.

A normal colony will produce 5,000 to 20,000 drones as compared to around 10 queens, which roughly works out to be about 1,000 drones per queen. And, out of those thousands of drones, only a dozen or so will actually have the privilege of passing on their inheritance. So the drones are, shall we say, more expendable than the queen and drones flying in DCAs are extremely vulnerable to a number of predators. Just imagine being a bird and stumbling into a DCA. It would be like hitting the jackpot; all those tasty little morsels buzzing about just beggin' to be dinner.

DCAs are aerial zones, which remain geographically constant day to day and year to year. Why these areas are chosen and how they orientate to them year after year, no one completely understands. However, there are theories. One idea is physical characteristics such as an open field lined with trees, which provide a contrasting horizon next to a bright sky. It has been suggested that flowing water above or below ground may be an attractant as well. It is also believed that pheromones play an important role in assembling drones in an area and keeping them cohesive.

Drones take off from their hive in the afternoon, locate a DCA, fly around, and wait for the illustrious virgin queen to arrive. But, all that flying wears them out. So, occasionally they will take breaks and have been observed resting on vegetation in the vicinity of a DCA. However, once their energy stores have been completely depleted, they must return home in order to refuel. Depending on the weather, drones will make several trips a day, back and forth to the DCA. Anywhere from a few hundred to thousands of drones from different colonies will gather together. The boundaries of a DCA range from around 30-200 m in diameter and 10-40 m above the ground. Now for those rebellious queens, who won't soar inside these DCA parameters will be ignored by the drones. Similar behavior is witnessed inside the colony as virgin queens and drones rub elbows, but mating never takes place. Only in flight will mating occur, which again in the grand Darwinian scheme of things, makes sense.

Virgin queens and drones from the same colony are closely related, so mating in the hive would quickly amplify inbreeding. By leaving the hive and traveling a distance away the chance of encountering different drones from different lineages is increased. Hence, increasing the fitness and survival probability of the species. Plus physically, it would be impossible for the drone to mate while on a solid surface.

As the virgin flies into a DCA she releases pheromones that attract the drones to her. And as she flies through the air with the greatest of ease, drones form a "drone comet" consisting of a multitude of eager males flying at top speed closely behind. One by one drones will catch the queen from behind, mount her and copulate while they streak through a DCA. Queens do this over several days or even weeks. When mating occurs, the drone everts his endophallus into the queen's sting chamber and then flips backward forcing the semen into this chamber ending up in her oviduct. The drone's abdomen literally explodes during this five-second mating process resulting in his sacrificial death.

Virgin queens will continue to mate until their spermatheca has reached the maximum capacity, which is roughly 5.3-5.7 million sperm. Given that each drone ejaculate contains anywhere from 87 to 200 million sperm, only a small percentage of the sperm from each drone actually makes it to the spermatheca. Most is passed back out into the sting chamber and lost. Yet, due to sperm migration and mixing, each drone mating with the queen (17-24 on average) has a fairly equal representation of its genetic contribution in the spermatheca.

The term "polyandry" comes to mind at this point. Polyandry, in the bee world, means multiple matings. Polyandry in the human world is defined as a woman with many husbands. But that's another topic for a different time and magazine (wink!). So why is polyandry important to bees?

Due to the fact that sperm from a variety of drones is readily mixed, there are different patrilines simultaneously represented in a single colony. Recent studies have found these multiple patrilines within colonies do indeed vary in their response to certain pests and pathogens, each of which may catastrophically affect the colony. Much like throwing out a wide net as opposed to a single line and hook, the more drones with whom a queen has mated, the greater chances are that she may capture

Continued on Page 26

those rare alleles that may just provide resistance to pests or diseases.

By mating with numerous drones the collective sperm is genetically more diverse, which offers variation among the female progeny, which in turn may increase the overall fitness of the hive or ability to survive. With genetic variation, organisms are better adapted to changes in their environment. The ability to tolerate certain infections or infestations for instance reduces the potential, for catastrophic threats posed by pests or pathogens to the colony's survival and reproduction.

Good queen producers (and feral colonies) need a vast number along with genetically different drones during the mating season to ensure queens are not only properly mated but are carrying as many of those different patrilines as possible.

So the next time you look upon that drone lazing about with disdain, try not to be too judgmental of the little guy. He plays an important role, and will lay down his life for that rare possibility that his legacy will carry on, from generation to generation, into the future.

Side note. As I sit here writing this article I'm closing on the sale of my house tomorrow, and have just started building a barn/apartment (it's been a four-year process). So I want to thank Philip Quinn, our lab technician, for his superb editing of my grammatically incorrect article. Something he has helped me with numerous times in the past.

See ya! BC

Jennifer Berry is the research director at the University of Georgia Honey Bee Research Lab.

Pay Attention, Ask The Right Questions

Learning What Is Going On Requires A Lot Of Observation

Larry **Connor**

Hosta is a popular garden planting, but few of us realize that honey bees find the pollen very attractive.

We expect newer beekeepers to lack a comprehensive depth of knowledge of bee behavior and bee biology, but it is particularly unsettling when a person who has kept bees for a number of years reports on something they have seen in a hive, and their conclusion is just wrong. This discussion focuses on the need for beekeepers to Look and Observe what the bees are doing both inside and outside the nest, and then asking the Right Questions about what they see. From this Observation/Questioning behavior beekeepers can become much more confident in their beekeeping.

Landing Board Observations

Watching the bees at the entrance of a hive is an excellent way to learn a great deal about bee behavior if you take the time to make good observations and then look inside the boxes to correlate outside activity with inside observations. Whole books have been written on making observations at the landing board and drawing conclusions based on what is seen at the entrance, so consider this an introduction to the subject. So it carries a huge CAUTION label – make sure that what you think you see IS correlated with what is actually happening inside the box! Just because you see bees flying at the entrance of the hive in large numbers does not mean that the colony is swarming!

So many new beekeepers are terribly impatient with their bees, hustling around the hives and going snap, snap with their fingers as if the bees were paying attention to our need to understand what is happening in the hive. So let's take a block of time, many 30 minutes, maybe an hour, and watch what is going on at the hive entrance. And let's do it at different times of the day, from early morning, mid-day to late afternoon and evening. California friends have afternoon drinks on the deck with a colony of bees they keep there. They can observe what the bees are doing at the same time of day as the season progresses while relaxing after a busy day.

Imagine it is August in the Northern Hemisphere, and, holding that fact in mind, what might we see at the entrance. We find a comfortable place to sit off to the side of the hive, in a chair or on the ground. Position yourself so you are not in the flight of the foragers. Bring along a mat, a drink of choice, and a good camera with a macro option if you have one. Pretend you are the person you watched in a beekeeping documentary, and you are going to meditate in front of the hive. Be that person. Relax, follow your breathing, breath out a few demons as you watch what is happening as the bees fly in and out of the hive. Let the bee activity replace your laundry list of issues, and let's meditate on the workings of the bees.

Now focus on what the bees are doing. Can you tell if the bees are collecting pollen and nectar? The pollen should be pretty easy to determine, since they carry the evidence of pollen foraging on their hind legs in the pollen baskets, or corbiculae. If the bees are flying back into the hive a bit too fast for you, lean a queen excluder at the entrance so the bees are slowed in their return to the hive. You will quickly see how many hundreds of bees are leaving and returning to the hive in just a few minutes. This will give you a chance to see the color of the pollen loads, and even put a small dab of paint to mark certain bees. Use a small paintbrush or a paint marker. Bees usually collect pollen of several colors reflecting different plant species in bloom at one time. There is often one dominant color. In my early August apiary a white-ish pollen indicates that the spotted knapweed (star thistle) is still in bloom and providing pollen for the bees. A friend of mind is a environmental goodie two-shoes and wants this invasive plant to be eradicated, but for me it is a valuable nectar source for the bees in the Great Lakes area and its loss would have a direct impact on the state's honey production and thus beekeeper income and sap colony strength for crop pollination needs. Decisions are never easy. ***We need more diversity of bee forage, not less – so don't remove a valuable plant without having several in line to replace it!*** (My friend passionately pulls the knapweed out of her 'natives only' gardens, while I scatter knapweed seed wherever I am able).

If there is whitish pollen from spotted knapweed, it probably means that the bees should also find some nectar from the flowers as well, and there will be bees that fly into the hive deliberately with a full load of knapweed nectar to process into honey, with a distinctive flavor that is slow to granulate. Of course, not all pollen producers are also nectar producers. As you grow in your beekeeping experience you may carefully capture a few returning forages and gently squeeze the abdomen so the nectar in the honey stomach is regurgitated onto the plate of a nectar refractometer, and you can measure

the sugar content of the nectar the bees are gathering.

Debris removal

What are the bees removing from the hive? Are they carrying out the trash you added when you added combs from dead-out colonies? Are they removing brood that was killed when you separated the boxes and the burr comb filled (usually with drone larvae) were torn apart? Or are there small grey and white mummies of bee larvae, a certain indication of chalk brood (a fungus) inside the hive? If the bees are pulling adult drones out of the colony you have been notified that the nectar flow is over, at least for now, and the bees are slowing down their season.

Drone activity

In fact, you can use drone brood and drone activity as a means of estimating colony conditions:

1. Bees are removing drone larvae and pupae: There is a shortage of food in the hive, and the bees are trimming the brood nest.

2. Drones are flying at the entrance, but don't seem to be going anywhere: this is cleansing and orientation flight of the drones.

3. Drones are leaving the landing board and returning unrestricted: The boy bees are actively flying to drone congregation areas, and those unsuccessful in finding queens have returned. This is in the afternoon of sunny days.

4. There is a huddle of drones at the entrance: The flow is over and the workers have locked their brothers out of the hive. Workers may tug at returning drones and pull them away from the hive.

5. One colony has drone flight and the rest of the colonies in the apiary have none: This is a good indication that the colony with flight is either queenless or undergoing queen replacement. Early in the year this may be the only colony that has plenty of food and bees able to produce a large brood nest and early, abundant drones. Watch for swarming if you see this – it may be just a few days away

Inside the Hive

This is always where beekeepers should put their full attention. So many beekeepers focus on finding the queen when they visit their hives – one mark of an experienced beekeeper is the ability to sort out the different messages a colony provides to tell you that the queen is present and all is well inside the hive without finding the leading lady every time you open the colony. The presence of eggs in worker cells, normally laid eggs, one in the center of each cell, is the best indicator that the queen is both present and performing her duties.

Honey bee at twilight, waiting for the Moonflower to open and expose it's rich pollen to the bee. Bees of various species will push the petals apart and crawl into the flower before it opens. Bees are not patient when it comes to food gathering.

Other observations

1. Swarming is predicted by drone development in the spring and a strong buildup. Then there may be a reduction in foraging a day or two before swarming, with a large number of bees at the entrance.

But this may also be directly related to crowded conditions when swarming is not yet on the bees' behavioral radar.

2. Heat management is a critical issue at the entrance of a hive, especially if there is no other ventilation for the colony. Large numbers of bees will be fanning at the entrance to cool the hive, and help with nectar moisture removal during the nectar flow.

3. Robbing can take place anytime of the year but is usually associated to conditions when the flow is not underway. But many of us have watched bees rob out empty frames or hives early in the day (or late) during the nectar flow.

Field Observations

How do you know what plant produces a particular pollen color? You need to take a walk in the fields and woodlots and find where the bees

Inside the newly opened moonflower, the forager collects pollen and rapidly packs the white pollen onto her hind legs.

Rose of Sharon flowers are attractive for their pollen production. Considered a weed by the USDA, this hibiscus species is popular with urban and suburban gardners. Some sterile varieties are available, and will not overtake the garden with seedlings!

are gathering food and recording the color of the pollen. Dorothy Hodges, a British woman wrote a lovely book called the *Pollen Loads of the Honeybee* and she spent hours in the field carefully mixing and matching her watercolor paint to the pollen colors of the bees. The watercolor sheets were used in the book as small pieces of paper hand glued into position to match the pollen. We do not all have to become as focused as Dorothy Hodges, but we can certainly learn from her passion and interests. The first edition of her book has become highly collectable because of the hand labor involved in its production.

There may be other plants in bloom, depending on where you live. Texas beekeepers may see pollen from some of the many composite flowers that flower in the Fall but only if there has been adequate rain. In cities and suburban beekeeping settings you are likely to discover bees gathering pollen from plants usually not listed in the beekeeping books – flowers like the ever popular Hostas, or Rose of Sharon (*Hibiscus syriancus*) or *Datura inoxia* (Moonflower, thorn-apple, Indian-apple).

For the Moonflower (thought to be native to Central America and South Florida), you will need to be at the flowers just as the sun is setting and the flowers open and the bees, attracted to the strong floral scent and the reward of the rich pollen loaded on the anthers, will struggle to break into the flowers as they rapidly expand (rapid for a flower anyway) and crawl to the waiting pollen inside the flowers. Bees amaze me by having a great sense of time regarding floral development (phenology, the study of life cycles as influenced by the seasons, time of day and/or climate), as they will fly to the flowers just a minute or two before the flowers expand so they can open. It is important that they be the first bees on the site since other bees can quickly remove the pollen before it is too dark to forage. The window of opportunity for the bees to collect this pollen each Summer evening is about 30 minutes, not a very important pollen source! Some folks get excited about these flowers because someone might eat the seeds and get sick and die. To do so they will have to get past the nasty seedpods the flowers produce after all that pollination. I guess that some night flying and tropical pollinator is the natural pollinator of these flowers, and honey bees are filling a void, or rushing to finish first! The number of seeds these plants produce is amazing, and I have to be pretty careful to pick the seed pods before they mature or plan on a lot of weeding the next Spring!

The Rose of Sharon is native to Asia-China to India. It is a weedy bush that produces several colors of pink, white and lavender flowers in the Summer. The bloom extends over several weeks, and adds color to my garden when other plants have finished their cycle. These attractive temperate hibiscus flowers produce pollen attractive to many bee species. I have not observed nectaries or nectar gathering. My house had these planted as a hedge, and if I did nothing in my back yard it would become a Rose of Sharon forest. The plants are considered weeds by the USDA Forest Service.

Hostas are from Japan, China, and Korea. They are planted for their attractive leaf display, but produce long stems of blossoms. The flowers have long flower tubes, and that tells us that these are not honey bee pollinated flowers. But the attractive pollen-laden anthers are very attractive to honey bees, in part because they bloom form mid to late Summer when other pollen sources are more difficult for the bees to find.

Variations

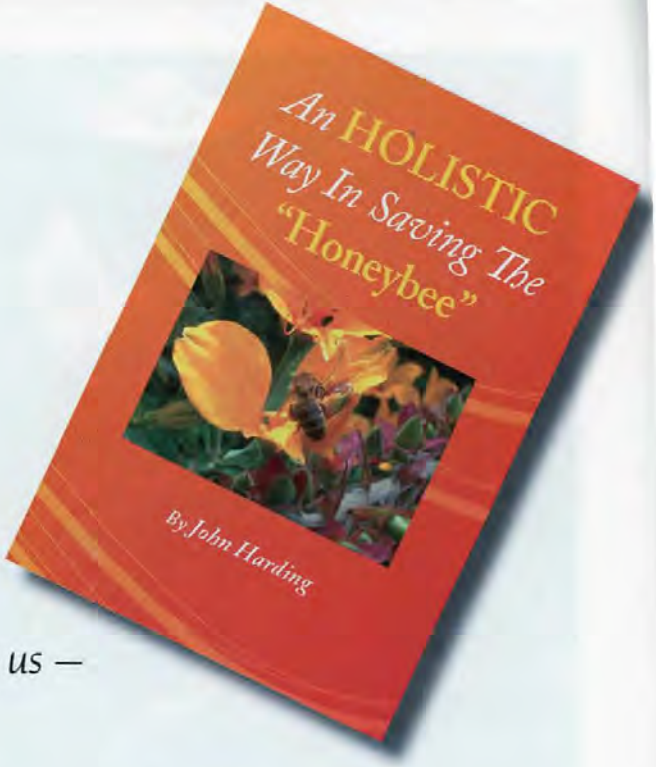
In many parts of the country there will be a different set of behaviors at the hive entrance. There will be a number of bees sitting on the landing board or entrance of the hive with their front legs up against their bodies and their hind legs firmly holding down a section of the entrance. These guard bees are waiting for intruders, perhaps a forager that has miscalcuted the entrance (she will be allowed in), but more likely a pesky robber bee, a forager from another colony that is attracted to the honey odor of the hive and will attempt to enter the hive if not challenged by the guards.

The mark of 'experienced' beekeepers exists in their ability to look at a particular bee behavior or colony condition and correctly determine the behavioral cause of the event underway. Further to their well-honed skill set is the ability to admit that they do not recognize the problem, but know something is not right. It is pretty amazing to see beekeepers who think they are experienced but have absolutely no clue what is happening with their bees. It is commonly seen during buildup and swarming seasons, but also during the later times of the year, when the forage is limited or over, and hive conditions have changed drastically. BC

Going to Hawaii for the Western Apicultural Society meeting? Plan to stay one more day for the Master Class Dr. Connor will teach just north of the WAS meeting site. For registration and program information go to www.wicwas.com.

And Now For Something Completely Different

John **Phipps**



We looked at what this book was telling us – and strange things happened.

Hive Number One.

Gate post.

A beekeeping friend came round to my house as he wanted to use my electric embedder to fix wax foundation into some frames. When we finished the job, for a bit of fun, we made a set of dowsing sticks out of Bic biro holders and a wire coat hanger. We went into my garden apiary holding out the dowsing rods all the way from the house and, immediately we reached a bait hive in which a swarm had made its home, the rods went crazy, swinging backwards and forwards and then remaining in the crossed state (supposedly indicating an Electromagnetic Geopathic Stress Curtain Line). We then went to the top of the gate post where I had also placed a bait hive, the rods crossed, but not with the same amount of activity as on the previous site. Lastly, we went to a site where a swarm had landed and which was then shaken into hive two: yes, the rods crossed once again.

There is an interesting story about these two bait hives. Hive One is a conventional Kenyan type Top Bar Hive. Last year the colony succumbed to hornets in autumn. The combs that were left were in a pretty poor state, but knowing that bees are good at comb repair I used 10 of the 20 in the hive and closed up the far end of the hive with a dummy board. The remaining 10 frames I put into my modified Langstroth Top Bar Hive (Hive Two) – this is the hive that was put on the gate post. Both hives were sprayed with the swarm attractant, Bee Charm.

Within a short time both hives were being investigated by bees - the main activity was around Hive One - about 20 bees, with half a dozen or so investigating Hive Two. I spent a lot of time near the apiary, hoping to see a swarm arrive and every now and then taking a look at the hive entrances. I was surprised to see that several bees seemed to guarding the entrance to Hive One and checked out, chased off, or fought with some of the bees wishing to enter.

Knowing that Thomas Seeley has done an enormous amount of research work on nesting behavior of honey bees, I contacted him and received an very interesting

Very little activity.

Dousers gone wild!!

reply. He wrote that in a preliminary study that they did on Appledore Island they used a yellow swarm and a black swarm to investigate what happened when two swarms favored one particular nesting site. His team noticed "that there was fierce competition between the scouts of different swarms, with fights to the death and posting of guards during the night" (an abstract of the research paper can be viewed on the web: **http://onlinelibrary.wiley.com/doi/10.1111/j.1439-0310.2010.01777.x/abstract)**. Well, I missed the arrival of the first swarm which took up residence in Hive One, and after which no aggression was seen at the hive entrance. Swarm Two arrived a couple of days later about three metres away from Hive Two. I moved the hive under the swarm and left the bees on that site.

The question is were bees attracted to the site by:

(a) the size of the hive (NB Hive One has twice the volume usually preferred by bees)

(b) the hives together with suitable amounts of old comb

(c) the swarm attractant

(d) the Electromagnetic Geopathic Stress Curtain Lines (EGSCL)?

Lots of variables, but there were several empty hives which could have been made use of by the bees in the car port on the side of the house. I am a skeptic when it comes to anything psychic or metaphysical, I always look for more rational explanations. However, it is interesting that John Harding states that as humans we benefit by being in places where the normal earth's vibrations are 7.83 htz and states that in their first missions astronauts felt unwell in zero gravity until their spacecraft were adapted to give them the same vibrations as they would receive on earth.

A crazy book in many ways, but for those searching for answers that science still hasn't provided, and who have an interest in the sort of thing John Harding writes about, then **An Holistic Way In Saving the "Honeybee",** may well be worth a peep at. BC

John Phipps is the Editor of Beekeepers Quarterly *and lives in Greece.*

The swarm!

August In The Northeast

The only way to be sure that a colony has enough honey stored within the hive and has it organized appropriately for Winter is to open the hive and look.

Ross **Conrad**

August could well be the most important month for beekeepers in the Northeast. The conditions inside the hive by the end of August play a large role in determining if the colony will survive the Winter and how strong it will be in the Spring. Of all the times of the year to procrastinate, August is NOT the time to do so.

If you harvest your honey crop in August you will have the opportunity to inspect each hive and evaluate the amount of honey they contain. The month of August is also a good time to inspect all hives from which no honey is expected to be harvested to be sure they have enough honey stored away to provide the colony with the energy needed to survive the coming Winter months. I wish I had a nickel for every time I have heard a first-year beekeeper tell me that they didn't take any honey from their bees during their first year and yet they don't understand why their bees starved over the Winter. Just because no honey is harvested from a hive does not necessarily mean that the colony will have enough honey to survive the Winter.

It is tempting to look into a hive that is a little light on honey stores and figure that they will gather enough honey during the rest of August and the month of September to get them through the Winter, and . . . they may . . . but then again, they may not. These days more than ever, nature and her weather patterns are unpredictable. When we gamble on the probability of a late nectar flow, we gamble with the lives of the bees we are entrusted with.

There are many factors that influence the ability of the bees to procure enough nectar to process into honey and survive the Winter. These include when the hive was established, the health of the colony during the year, the amount and quality of the available forage during the season, the way the hive has been managed, and the weather during the season. The only way to be sure that a colony has enough honey stored within the hive and has it organized appropriately for Winter is to open the hive and look. This may sound obvious, but it is amazing how many beekeepers simply don't do this.

Giving a hive the old "heft" test by lifting up on the bottom super to see how heavy the hive is can tell you if there is enough honey stored in total, but it is no substitute for looking under the inner cover to ensure that the combs in the top super are fully drawn out, filled with honey and are mostly capped and sealed. Unless you are leaving a deep hive body (or its equivalent) full of honey on top, the bees are likely to need significant amounts of honey stored below the top super in order to have enough for Winter. As I've pointed out in these pages in the past, organizing the hive so that the majority of the honey is stored above the brood area is critical. By insuring that the super above the brood nest is full of capped honey for Winter, we simply emulate the way the bees naturally like to organize their hive themselves.

One of the reasons given by folks who do not carefully inspect their hives for food stores before Winter is that they don't want to disturb the bees more than necessary. Generally speaking, I support this attitude but when it comes to making sure that the bees have enough honey for Winter, opening up the hive and disturbing the bees becomes necessary.

By the end of August I like to see 95 percent or more of the hive full of brood, pollen and honey that is capped. At this time of year I am not concerned that the bees may have too much honey in the hive causing the queen to be-

Take only the honey the bees don't need.

If there's not enough you have to feed, and you won't know if there's enough if you don't look.

August Checklist for healthy Spring bees in the Northeast:

- If the bees have stored more than they will need for Winter (more than a full hive body of honey above the brood nest) then harvest this excess.
- Make sure mite levels are low. If not, apply a non-toxic/non-chemical treatment to bring *Varroa* levels down.
- Be sure there is enough honey stored in the hive for Winter and there is somewhere between a shallow and a deep super full of honey *above* the brood nest.
- Not enough honey on the hive? If you have a hive that doesn't have even a partially filled super of honey above the brood area, give them a shallow or deep super (depending on the size of the hive's cluster) filled with honey from anther hive that has excess when possible.

come "honey bound" without enough room to lay. Queens are beginning to taper off their egg laying in preparation for Winter and the bees will backfill the brood nest with any late season nectar that is gathered.

To allow frames of foundation that are only partially drawn out, or frames of comb that are only partially filled with honey to go into Winter increases the chances that the hive in question will eat itself into a corner. As the cluster of bee's eats its way through the hive during the Winter months, it leaves empty comb behind. This often spells disaster for a hive that moves onto combs that are already empty, or partially so, since the cold temperatures prevent easy movement of the cluster. Bees in such a situation may find themselves running out of food and unable to access the carbohydrates that are required in order to keep the temperature of the cluster elevated appropriately, even though adequate amounts of honey may be a couple frames, or in some cases only several inches away.

By checking on the level of honey stored in the hive in mid-late August the beekeeper has enough time to adequately feed colonies that have not filled out their pantry adequately. (See feeding information on Rudolph Steiner's "Bee Tea" recipe published in the August 2010 issue of *Bee Culture*). By the same token, if the colony seems to have plenty of honey stored in supers above the brood nest and the last super that was placed on top of the hive in the hope of being harvested is only a quarter of the way full, it is not a good idea to leave it on the colony as "insurance". Leaving a partially filled super of honey on the hive only increases the likelihood that the bees will eat themselves into a corner should they be unable to finish filling it up before the Winter season sets in. Better to either feed the bees until they finish filling the super, or remove the partially filled super and either extract the honey for your own use, or leave the super out for the bees to rob out. Just be sure to locate the supers well away from your beeyard if you leave them out to be cleaned out by the bees or you may be encouraging the hives to start robbing from each other!

How much honey should be left on a hive to get them through a Winter without the need for artificial feeding? The quick typical answer is somewhere in the range of 60-100 pounds. Much depends on whether you are located

The nurse bees that raise the Winter bees must not be suffering from mite infestation.

in Southern regions of the country or in Northern regions and how severe your Winters are, as well as the size of the colony to be overwintered. Historically here in the Northeast, the general rule of thumb for overwintering an older established hive, or a hive that was started early in the season, has been to use two deeps or its equivalent (one deep full of mostly brood and pollen and two shallows of honey). Nucs or swarms caught late in the season could often be successfully overwintered on just a deep and a shallow super, or its equivalent (three mediums) without having to be fed during the Winter or Spring.

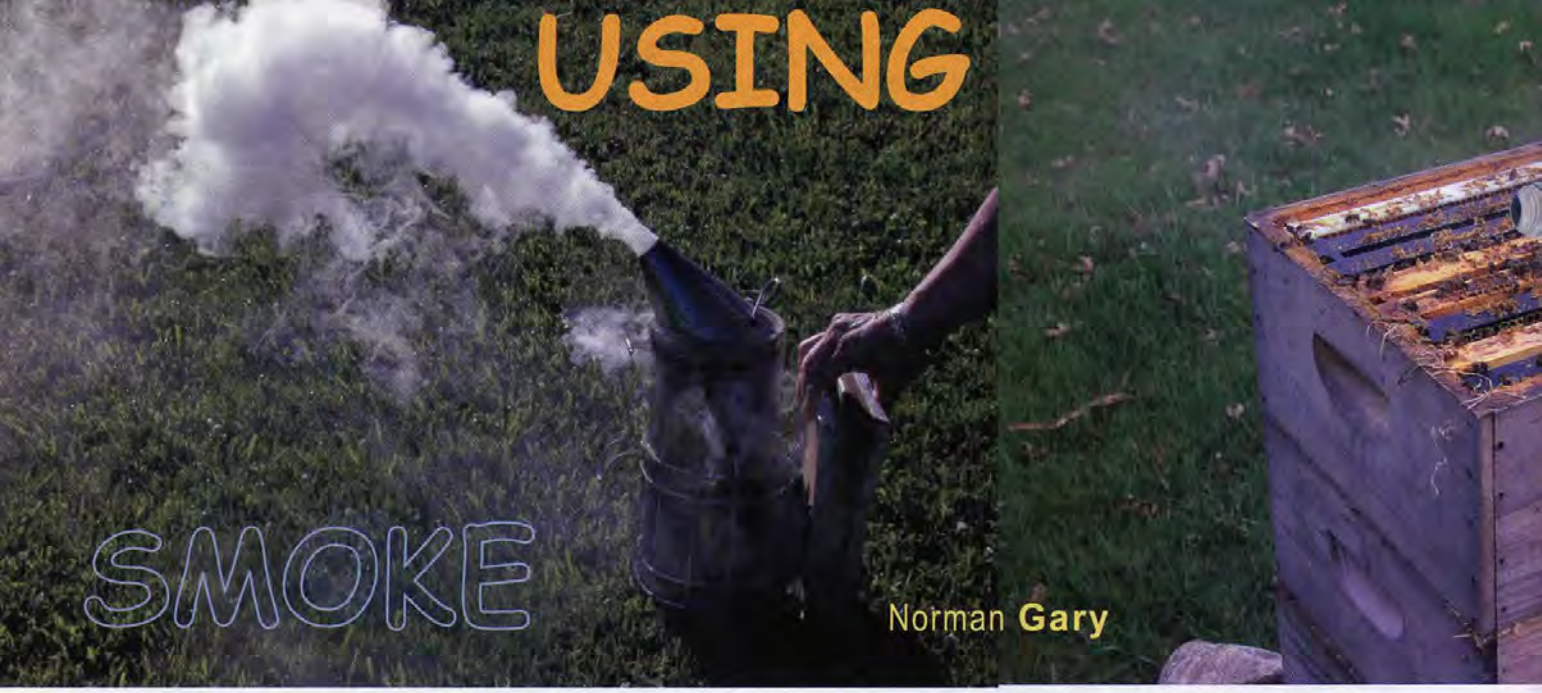
Times however, may be changing. With weather patterns becoming more unpredictable and the Winter season becoming less consistent, the "usual" amount of honey that a hive needs to survive Winter without running out is often not enough. These days if you want extra insurance that your colonies will not starve during Winter and are strong in the Spring without the need to feed sugar syrup, an additional shallow or medium super of honey in the Autumn is called for. For commercial operations who make much of their income on honey production this will be a tall order, but at some point the cost of dead and weak hives in Spring outweighs the benefits of that additional honey harvested in the Fall.

In Northern climates there is often a single harvest for the year and it must come early enough in the season so that the *Varroa* mite level can be reduced to the point where the mite population will not adversely effect the health of the Winter bees. This means that the nurse bees that raise the Winter bees must not be suffering from Parasitic Mite Syndrome (PMS).

Summer is coming to a close and school will be starting soon so there is always plenty to do during this time of year. Just don't let your busy schedule prevent you from checking on the bees and make sure they filled the hive to near capacity for Winter. Much of what will happen, or not happen, next year depends on what you do this month.

If the hive only has a partially filled super of honey above the brood nest, there is empty comb or undrawn foundation in the hive and it will be left in place through the Winter, or the hive is in need and you don't have excess honey from another colony you can give it, start feeding now and keep feeding the hive until the combs above the brood area are all full. BC

Ross Conrad is the author of Natural Beekeeping. *You can reach him at* ***dancingbeegardens@hotmail.com.***



USING SMOKE

Norman **Gary**

Smoke has been used to control the defensive behavior of bees since primitive man learned how to rob honey from wild bee nests. Despite modern technology, smoke remains the primary tool of contemporary beekeepers. Some progress has been made regarding the design of tools used to generate smoke and to deliver it to colonies efficiently. However, there are residual problems regarding smoke generation and application. These problems need to be addressed for the safety of beekeepers and bees. There is a great shortage of research on the efficacy of smoker fuels that are being used. We need to learn more about the possible deleterious effects on man and bees.

The chemistry of smoke is very complex and dynamic. Basically, smoke is a mass of tiny particles in the air that is produced by burning something. These particles are composed of hundreds of chemicals. Many people assume that bees react and feel the same as humans exposed to smoke. There are still a few beekeepers who claim that smoke – any kind of smoke applied in any manner – harms bees. I am not aware of any research that supports this belief. Given the great array of weird smoker fuels that are used, it is possible that some harmful chemicals in smoke could compromise the bee's health. But it's just as possible that there are some kinds of smoke that are perfectly safe to use on bees. Blanket condemnation of all kinds of smoke isn't warranted when the research has not been done. Whenever research data generated by well-designed experiments is absent or scarce, then imagination, beliefs, and traditions become substitutes for reality.

The first responsibility of beekeepers is to protect animals and people from stings. All beekeepers suffer when this responsibility is not met. For approximately 1% of people a bee sting can be fatal unless treated immediately with an injection of epinephrine (synthetic adrenalin). The image of beekeeping, whether hobby or professional, is defaced when there is a stinging incident that could have been prevented.

All smoke generated by burning conventional smoker fuels is an extremely complex mixture of several hundred identifiable chemicals. The risk to humans and bees depends not only upon the kinds of chemicals but upon the concentration, duration of exposure, and natural susceptibility. Another complication is that the chemical composition of smoke changes as the smoker temperature changes. A smoker that is not full of fuel tends to burn faster and it becomes very hot. Thin, bluish, hot smoke generated by an excessively hot smoker certainly is different in chemical composition from the dense, white, cool smoke generated when the smoker is first lit. "Hot smoke" is more likely when (a) a small smoker is used, (b) the smoker is not sufficiently full of fuel, and (c) the column of fuel is too porous – permitting too much air to pass through the fuel so that the increase in oxygen greatly accelerates the rate of burning. Considering the dynamics of smoke generation, scientific testing of all these chemicals, individually and in various combinations, seems impossible.

Are there natural or "organic" smoker fuels that are less risky than burning manufactured materials, such as burlap, that may contain unknown toxic materials? Probably so. But some are likely to be more toxic. I have

Here is a true story – a recent incident in my life. I encouraged a friend to try hobby beekeeping and equipped him with a populous colony along with most of the information he would need. I also made several hive manipulation demonstrations to show the correct use of smoke. Because I live far from his home I encouraged him to find a local beekeeping mentor to provide occasional help.

Next time I visited him he had a horror story. The mentor had told him that smoke is bad for the bees so he manipulated the hive without using smoke. Everyone within a hundred feet or so was stung badly and a few bees were still on the warpath the following day in his back yard. Fortunately there were no neighbors or confined animals nearby. A week or so earlier I had manipulated the same colony easily and safely while using smoke – without wearing a veil. Now, instead of looking forward to the joys of hobby beekeeping, his confidence was badly shaken. His future as a hobby beekeeper was jeopardized.

Is this how we should treat a beginning hobby beekeeper? If his mentor believes that smoke hurts the bees and wants to manipulate his own colonies in a remote apiary away from people and animals, then that's his business – if he enjoys stings that much. But punishing a beginning beekeeper like this is unforgiveable!

Cool, white smoke generated from burning safe and non-toxic fuel is the goal. Using that smoke in the right amount, in the right place, at the right time is an art every beekeeper should learn.

heard that bees react adversely to smoke generated from cedar shavings. For more than 60 years I have had great success using pine products such as pure pine shavings made for animal bedding or finely chopped pine needles (leaves). Pine products are rich in resinous materials that produce a dense, white, cool smoke (if the smoker is kept full – very important!) that causes an instant response by bees. Pure pine shavings are economical, commercially packaged in bales, and widely available at animal feed supply stores. They are most frequently used for horse bedding. An internet search for "pure pine shavings" should help you find a source in your area. The shavings can also be mixed with pure pine pellets.

Recently I recommended pine shavings to a beginning beekeeper. There was no nearby animal feed supply store so he shopped at a pet store. The bag of wood shavings that he purchased was not pure pine shavings. It was a mixture of pine and cedar shavings plus other ingredients. We lit the smoker and smoked the hive entrance. Much to our amazement, the bees on the hive entrance, including returning foragers loaded with pollen, ***instantly*** became paralyzed – lying on their backs on the hive entrance and quivering. Fortunately we observed the reaction after several puffs and stopped smoking before the smoke – apparently toxic – caused serious damage. I provided some ***pure*** pine shavings (no additives of any kind) and we proceeded without further problems.

During my long career that exceeds 63 years I have seen an amazing array of smoker fuels, including oil-soaked rags, shredded paper, burlap bags, shredded bark, rolled cardboard, dried animal dung, wood pellets, dried leaves and grass, chipped wood from tree trimmers, compressed cotton, and even cigarettes. And this is only a partial list!

Here is something to consider. You are not just smoking the bees. You are also smoking yourself. Despite your best efforts to escape smoke inhalation, you are being exposed repeatedly unless you are wearing a gas mask. It is highly likely that these smokes contain carcinogenic chemicals. But you should not conclude that the bees are at risk for lung cancer. After all, they don't have lungs and they live only a few weeks. Also, consider that bees are exposed infrequently and for a very short time – compared to you. Prolonged and frequent exposures are usually required for low toxicity materials to express adverse effects. Consequently, it seems very unlikely that bees are going to be adversely affected by brief exposure to smoke from most natural products.

Many years ago I conducted an interesting experiment to determine if smoke adversely affected the foraging activity of treated colonies. I anticipated that colonies severely disturbed by smoking would require a few hours, perhaps even a day, to resume normal foraging activity. Ten colonies were smoked heavily, much more than necessary to control defensive behavior during a normal colony inspection, and an additional 10 colonies were not smoked. We considered that foraging activity would be affected if the smoke seriously interfered with internal organization and functioning of colonies. I developed a funnel-like device made of eight-mesh screen that could be placed over the hive entrance so we could accurately count the number of bees leaving the entrance during 30-second samples. Surprisingly, the smoked colonies quickly resumed normal foraging activity after exposure. There is a good chance that disturbing the colony without using smoke – setting the defensive behavior in motion – is more disruptive than distracting the bees momentarily with smoke.

I wonder if beekeepers who say they don't use smoke have given careful consideration to the science of smoke use. Or do they arbitrarily assume that bees don't "like" smoke, or even are harmed by smoke. The burden of proof is on these beekeepers to determine if the bees are harmed in any way. What kind of harm are we talking about? How serious is the harm? How long do the harmful effects last? Does smoke treatment affect some races or ages of bees more than others? What are the symptoms of such harm that can be recognized by the practicing beekeeper? If these questions can't be answered then how can one conclude that smoke exposure is harmful to bees during typical colony inspections?

There are so many rituals and traditions that are passed down from beekeeper to beekeeper. Sometimes the information is incorrect. Nevertheless, information from mentor beekeepers is taken as gospel by many beginners. Please don't discourage the use of smoke to prevent stings. Don't lead them down the pathway to be punished by unnecessary stings. Also, consider the liability exposure when neighbors, kids, and animals get stung. Perhaps the manipulation of colonies without using smoke could be considered as negligence if there are litigation issues.

Certainly we need more information concerning the possible effects of brief exposures of bees to various kinds of smoke. But this research is not likely to happen in the near future. Many other problems have higher priority. The best you can do now is to make sure the smoke you generate is dense, white, and cool – whatever your choice of smoker fuel. And don't forget this important tip – introduce the smoke ***inside*** the hive entrance, then wait at least three minutes before you open the hive. You'll be surprised how much this minimizes the sting risk. BC

Dr. Gary's knowledge is based on a 63-year career that included experiences as a hobby beekeeper, commercial beekeeper, and honey bee research scientist at the University of California, Davis (32 years). He is the author of a new beekeeping book, The Honey Bee Hobbyist, *an entertaining, authoritative, easy-to-understand, practical guide for hobby beekeeping – published by BowTie Press. It provides fresh, new insights based more on science rather than tradition.*

All The Buzzz in...

Hello Friends,

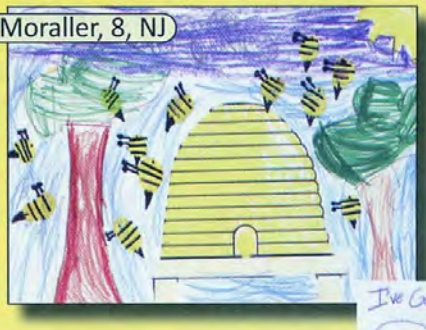
Here is a special bouquet just for you!

Bee B·Queen

Send me a photo of your garden.

Johnny Shetler, 9, OH

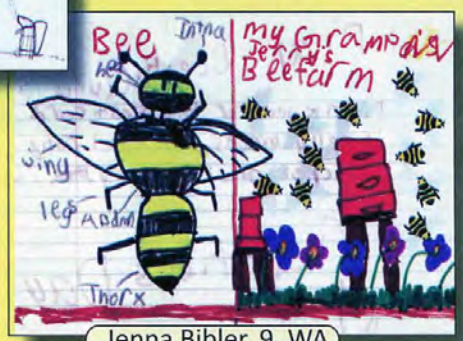
Matthew Moraller, 8, NJ



What did the flower say to th Buzzy Bee?

Buzz off!

Dixie Coleman, M



Jenna Bibler, 9, WA

Honey Bees

Honey Bees
buzzing freely,

On the flowers
nectar stays.

Honey bees peering
in every flower
searching for nectar.

Bees fly
to fill their hives
with honey
to save for winter.

Every bee
has a job.

Queen bees
lay eggs in cells
for baby bees to work well.

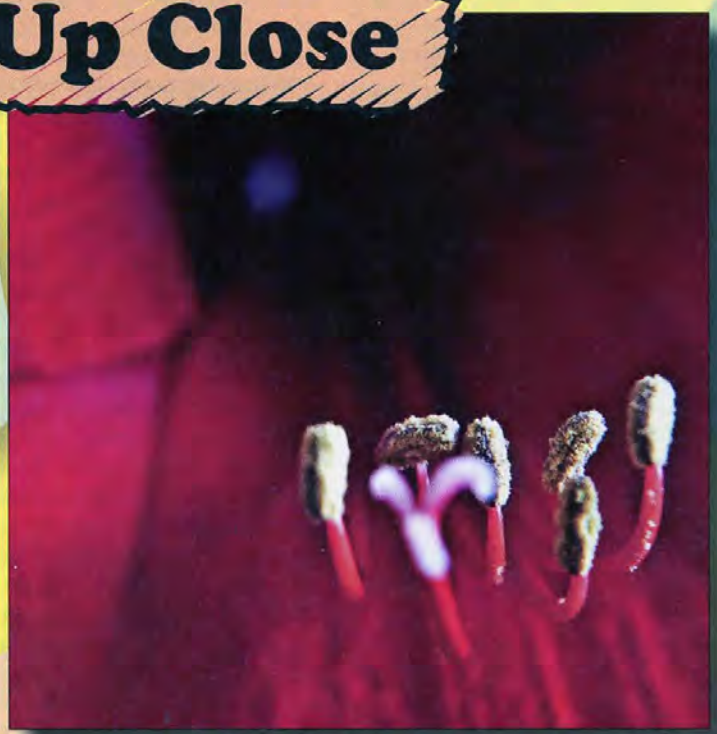
Every bee is good
just like it should.

Sam Svengsouk, 9, NY

Bees, Bees,
Some live in trees,
Others live in hives,
By fives.

Amanda, 10, OH

Up Close



This amazing photo of a flower was taken by Geerd-Olaf Freyer from Germany. Look at the stamen, the male part of this flower. Do you see the anthers covered with pollen? The anthers develop and contain the pollen. The filament is holding up the anther. To see more of Freyer's work go to http://www.flickr.com/photos/go_freyer/

Jo Plett, 7, MB, Canada

3 flowers, 4 bees

Bee Brain Teaser

In a field are some bees a some flowers. Your jo figure out how many bee and flowers there are. Thi what we know.

If each bee lands on a flo one bee does not get a flower.

If two bees share each flower there is one lonely flower without bees.
How many flowers?____
How many bees?_____

Bees are humble.
Bees are tumble.
They are very careful.
They tumble in any way.

By Morgan Dunbar, 9, OH

What kind of flow you give to King Tut

Chrysanthemummie

Bee kid's corner

Produced by Kim Lehman -www.kim.lehman.com
www.beeculture.com
August 2011

How Happy is the Honey Bee

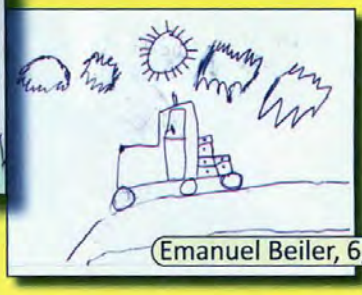
How happy is the honey bee
Flying to a tree
A flower on a tree
She is happy to see.

The nectar she finds
She says, "It's mine!"
"Let me tell the others,
Where this nectar they can find."

She takes off with a fling
Buzzing with her wings
In the hive she does the dance thing
While the hive sings.

Elizabeth Burns, 9, KY

Leslie Howe 10, ON, Canada



Emanuel Beiler, 6, PA

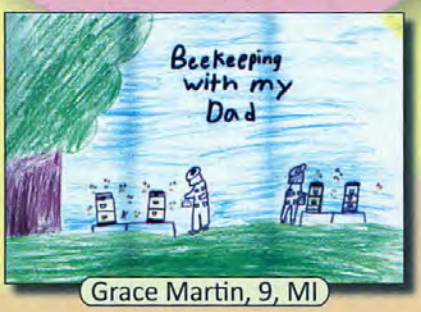
British Bee Buddy

Meet our first Bee Buddy from overseas. Kiarra Lindsey-Cooke is 7 years old and lives in the United Kingdom in the small town of Calne in Wiltshire. Her Dad is a commercial bee keeper, one of only 240 in the UK.

Kiarra (center) and her friends Harrison and Alexie.

Kiarra is a big help to her dad. In the bee yard she helps feed nucs and checks to see if the queen is laying eggs. At the honey booth she helps sell honey and talks to other kids about bees.

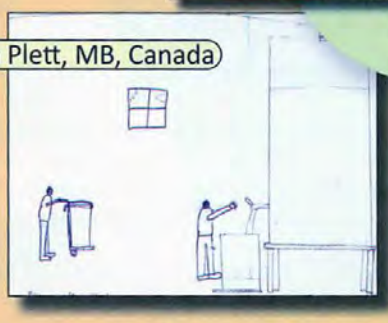
Apart from the bees, Kiarra has a dozen chickens, does tae-kwon do and is proud to be a Bee Buddy.



Grace Martin, 9, MI

Easy Honey Muffins

Makes 12 muffins



Tanya Plett, MB, Canada

1/2 cup milk
1/4 cup honey
1 egg, beaten
2-1/2 cups buttermilk baking mix

Combine milk, honey and egg; mix well. Add baking mix and stir only until moistened. Portion into greased muffin tins. Bake at 400°F for 18 to 20 minutes or until wooden pick inserted near center comes out clean. Variation: Cinnamon Apple Muffins: Add 2 cups pared, chopped apples and 1 teaspoon ground cinnamon to basic recipe. Bake about 5 minutes longer than basic recipe.

Thanks to the National Honey Board for this recipe. Go to www.honey.com for more recipes.

Beecome a Bee Buddy

Send two self addressed stamped envelopes and the following information to: Bee Buddies, PO Box 2743, Austin, TX 78768. We will send you a membership card, a prize and a

Name: _____

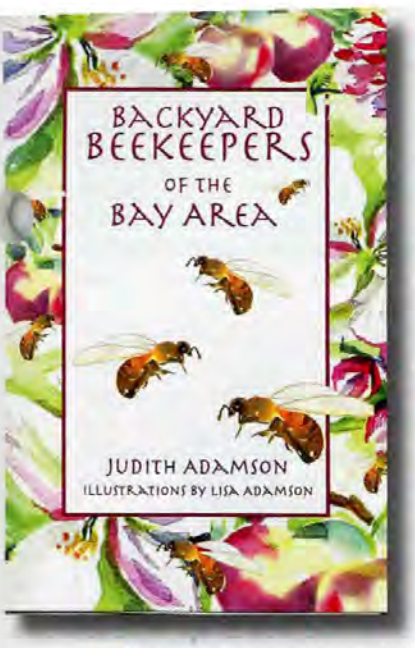
Address: _____

City, State, Zip Code _____

Age: _____ **Birthday:** _____

E-mail (optional)

Send all questions, photos and artwork to: beebuddies@hotmail.com or mail to the above address.



Bay Area Beekeepers

Judith **Adamson**

I live in Kensington, California where beekeeping is unfashionably illegal. Luckily, however, that doesn't mean people don't do it. Kensington is a lush, one-little-square-mile community that clings to the slopes of the East Bay Hills and looks across the Bay to the Golden Gate Bridge and a spectacular view of San Francisco. Beekeepers here keep a low profile but provide their neighbors a great service; gardens thrive, and fruit trees produce more fruit than can possibly be made into pies, cobblers and crisps for the entire year. Close to twenty different kinds of fruit trees grow here; I've counted them on my walks in the hills. Having grown up on the East Coast, I had only seen apple and pear trees, so I was thrilled to come across persimmons – which I'd never even heard of – apricots, plums and pluots (also never heard of) dangling where I could just reach over my neighbor's fence and pluck one.

Several years ago, a friend who has a small publishing company that supports local writers suggested I write about the "rogue" beekeepers of Kensington. Judy's originally from Texas and has the outlaw gene, so I wasn't surprised at her focus. She told me about Colony Collapse Disorder and the terrible trouble honey bees were in – all news to me. She felt it was outrageous for beekeeping to be illegal *anywhere* at this crucial time when the honey bee is in peril.

I told her I knew nothing about honey bees. As a child, I remember devouring chunks of honeycomb my mother got at the local farm stand and the occasional Summer sting, softened by a blob of wet baking soda, but that was the extent of my knowledge. If someone had asked me what pollination was I wouldn't have been able to explain it, although I'm sure I had it in Biology 50 years ago. I had never even *thought* about the connection between a honey bee and an apple, much less been concerned. When Judy told me that there wouldn't even *be* any apples (or hundreds of other foods) if there weren't honey bees, I was not only shocked but intrigued – the honey bee is that important? – And agreed to write the book.

The more I researched, the more riveted I became by honey bee behavior. One idea took me on at least 20 tangents and I thought, if I know so little and find them so fascinating, I bet there are other people out there like me who aren't beekeepers who'd like to know more. Like a honey bee fanning the hive to distill nectar into honey, I wanted to present the "sweetest," most essential information about the dazzling world of the honey bee in a non-scientific way that shared my awe with my readers: how honey bees create those perfect hexagons; how their huge faceted eyes catch the delicate flutter of petals to alert them to a nectar source; how they dance on the comb to communicate with their sisters; how a few bees, using very specific criteria, scout out a new home for their waiting swarm family; how they work tirelessly and selflessly for the good of the colony.

I wanted the personal stories of small-scale beekeepers. There was an obvious problem interviewing the rogue beekeepers of Kensington, however; only one agreed to be in the book. The others didn't want to risk being told by the county to remove their hives. Fine. I'd expand from the one little square mile that's Kensington to the entire Bay Area where the urban apiary movement is in full bloom in backyards and on rooftops; in most places it's legal and even encouraged.

My one rogue, David, who's been keeping bees in his backyard for over 40 years wasn't daunted. His neighbors wouldn't even *think* of reporting him because they're delighted at what his bees do for their fruit trees and gardens. Plus he wants to get the word out that keeping bees does *not* put everyone in danger of lethal stings. David's inspiring. After so many years of beekeeping, he's still learning and still fascinated by honey bees. He not only keeps bees, but mentors neophyte beekeepers and removes swarms.

David told me about Laurie who found a swarm in her tomato plant and called him to remove it. As he was preparing to put the big wad of bees in a box, he was saying things like, "these are foraging bees returning to the hive with their pollen pockets ready to be unloaded; these are fanning the hive . . ." When he mentioned bees tend to swarm to a place that's an ideal environment for them, that's all Laurie needed to hear. Laurie's a total soft touch for any creature and knew she wanted the bees to stay in her gorgeous garden if that's where they had decided to be. Not only did she beg him to leave the bees after he

warned her beekeeping was a lot of work, but retained him to mentor her on every aspect of the ancient craft.

I heard about Leah who runs an after school program for kids in Oakland. She started keeping bees on her roof because her yard is too tiny for boxes. She learned beekeeping completely by trial and error. One major error was that she and her children couldn't resist going to the roof and opening the box several times a day to see what the bees were up to. Apparently the bees didn't appreciate being spied on so much and took off for more peaceful gardens. That didn't discourage Leah; she just found other places to put her hives and learned it wasn't necessary to go into the boxes very much. I interviewed her at her friend's extensive garden where we sat in a compost pile near two of her now-thriving hives and talked while exotic chickens with feathered pantaloons climbed into our laps.

Leah took me to her friends Pia and Jim who had discovered a huge feral hive in a willow tree when they were clearing out some brambles in order to give their old fruit trees some breathing room. I was mesmerized. The undulating comb hung from a branch, dropping two feet into a U shape and was a mass of busy-bee-ness. Leah, Jim and I crouched nearby out of their flight path and silently watched them come and go for over an hour. Having exposed the hive by clearing the cover of brambles, they tell in the book about the challenge of getting the entire comb into a double deep box to protect the colony over Winter.

When I interviewed Chef Foster of the Fairmont Hotel, the beloved San Francisco landmark that barely survived the earthquake of 1906, we talked on the roof where he had cordially invited 80,000 bees to take up residence at the best address in the city. As streetcars clanged and bees buzzed in the background, he told me about his passion for feeding people's newfound desire to connect with what they're eating and educating them about the importance of honey bees. Guests love to accompany Chef Foster in his tall white hat when he goes to the roof to cut the rosemary, thyme, basil and cilantro, which the bees have pollinated, to use in that evening's meals. His admiring entourage is eager to talk to him about local and sustainable food and meet the bees. How he got the bees to the Fairmount and how they fit in with his philosophy of cooking is fascinating.

Then there's the New Jersey police sergeant who had always wanted to keep bees and finally had the time and space when he and his wife moved to California after he retired. They created the Marin Bee Company, which manages colonies for other people and is dedicated to educating people (especially children) about the honey bee. Bill calls himself the Johnny Appleseed of honey bees, making a difference one bee and one person at a time.

Bill tells me about the hives he was asked to set up at the sprawling Google campus in Mountain View. So, I set off to interview the engineer and the chef who told me why the "Hiveplex" fits in so well at this corporation filled with some of the most technologically savvy young minds in the country.

I talked with Michael of Gaiabees for hours one Sunday morning and another whole aspect of beekeeping opened up. He sees a colony as a "being," and his alternative hives – much closer to a natural shape as found in the wild – support the life force of that colony rather than focus on honey production. He never uses a bee suit or gloves and talks about capturing a swarm with his bare hands; how entering a swarm cluster with his hand feels like being embraced by two warm hands.

Those and more stories make up a large portion of the book. The beekeepers I interviewed were an exceptionally generous lot, eager to share their passion for what they do. I wonder if that's a common predisposition of backyard beekeepers. As they talked about their wide range of experiences in beekeeping, each with a different angle or nuance, it was like slowly peeling back a piece of wax cloth on one of Michael's alternative Golden Hives to peer into another world. I felt like I was getting a crash course in beekeeping.

I had a hunch, so always asked why they got into beekeeping. Just as I expected, not one said solely for the honey. Honey was a delicious, nutritious, miraculous postscript to what emerged as a unanimous and more compelling reason: the sense of wonder and respect for the honeybee and desire to support the tiny creature who in her short life flies her wings to tatters in service to her colony and in turn, humans. After all, honeybees have been on the earth around 35 million more years than humans. In our short time on the planet we've managed to put them in extreme jeopardy and therefore ourselves. How stupid can we get? The beekeepers I interviewed and the many more I've heard about are taking individual action, which often seems the only way to make a difference.

I asked my sister who's an abstract artist to paint a few watercolors for the book. Loose and wistful, they have a mystical quality and people love how they complement the voice of the book. They ask me all the time if they can buy reproductions.

Next on my writing list, *Backyard Beekeepers of the Big Apple.* I imagine there are some very interesting stories of immigrants who kept bees in the old country and brought their skills to the New World. Keeping bees, (along with grizzly bears and other wild animals), has for a long time been illegal in New York City, but in the past year has been legalized. At last, all those rogue beekeepers of the Big Apple don't need to hide their hives anymore. They still need to hide their grizzly bears, however. BC

Any great beekeeping stories from NYC or ideas for other regional books? Contact me at **info@backyardbeekeepers.com**.

Backyard Beekeepers of the Bay Area *and reproductions of the paintings can be purchased at* ***www.BackyardBeekeepersBayArea.com***.

See excerpts of my interview with Chef Foster (professionally videoed by Catherine Butler of Butler Films, Inc.) on the website.

Judith Adamson is a free-lance writer and owner of Recollections, a personal history business.

BEEKEEPING IN TRINIDAD & TOBAGO 1901-2012

Gladstone **Solomon**

Government Turnover And African Bees Have Changed Beekeeping Significantly In This Twin Island Nation

Beekeeping in the twin-island Republic of Trinidad and Tobago has grown into a thriving business since it was pioneered in the early 1900s. However, like their counterparts in North America, beekeepers there have faced challenges related to pests and diseases, depletion of habitat and insufficient institutional support.This article describes the milestones that have influenced beekeeping in that Caribbean country and highlights some survival strategies.

The Early Years

Two strains of honey bees, the Black bee (*Apis mellifera mellifera)* and the Italian bee *(Apis mellifera linguistica),* have been managed in Trinidad and Tobago from the beginning of the twentieth century. The first government apiary was established in Port of Spain, Trinidad, in 1902 and a private apiary is known to have existed in Scarborough, Tobago, in 1918.The Director of Agriculture's reports since 1908 indicate that beekeeping was encouraged up to the time of administrative upheavals in 1988. Innovative activities and events include:

- Honey was exported between 1914 and 1958. Thereafter, exports stopped altogether because of low prices for honey in Europe.
- Passing the Beekeeping and Bee Products Act 1935.
- Establishing five demonstration apiaries in Trinidad and two in Tobago for instructions and demonstrations on beekeeping.
- Importing queen bees from the United States in 1947, 1953, 1954 and 1959.
- Distributing queens and three-frame nuclei to beekeepers and purchasing honey extracting equipment for beekeepers.
- The establishment of apiaries in four elementary schools by 1958.
- Preparatory arrangement for the arrival of Africanised bees and post arrival activities.

The twin-island Republic of Trinidad and Tobago is located seven miles northeast of Venezuela, South America.

The impact of legislative and governmental frameworks

Beekeeping was perhaps the earliest agricultural subsector to be regulated in Trinidad and Tobago. The Beekeeping and Bee Products Act, 1935, amended in 1949, is the main policy statement on the subsector and was the first major landmark in the subsector's history. That such an Act was passed by the Legislative Council is indicative of the status of the subsector at that time, and the recognition afforded it by the colonial administration. The Act sought to control beekeeping through the appointment of an Inspector of Apiaries, the registration of apiaries, provisions for the extraction, preparation and packing of honey and other bee products, and restrictions on the importation of bees, bee supplies and bee products. Under this Act, the first Trinidad apiary was registered on January 30, 1937, and by May 31, 2010, 1,534 apiaries were registered in Trinidad and Tobago.

Such welcome foresight was lacking when, in the process of decentralising the Ministry of Agriculture in 1988, the Ministry's Apiaries Unit was dismantled and extension services were reduced. Although the post of Inspector of Apiaries was retained, other duties were added so that the inspector has been unable to function to the extent required by the Act. This for two fundamental reasons: there is not the necessary administrative and

The author with a frame of honey comb from one of his top bar hives in Tobago.

technical support framework, and there are excessive competing demands on time. Beekeeping in Tobago was not impacted by this move to the same extent, because the Tobago House of Assembly (THA) has had responsibility for beekeeping since 1980. However, no other government policy has impacted beekeeping in the country so negatively, and this reduction of governmental support is viewed as a major challenge in the subsector's history.

Africanized Bees

The first established colonies of Africanized honey bees were found in south Trinidad in July 1979 and a succession of swarms have arrived from Venezuela for extended periods thereafter. All honey bees in Trinidad became Africanized in a few years, and beekeeping in Trinidad as it was previously known, was irreversibly changed.

In Trinidad, the number of Africanized bee swarm removal increased exponentially from 12 in 1979, to 3773 in 1984. By August 1992, over 28,107 swarms had been removed by the Ministry's Bee Abatement Unit, more than 5,300 persons and over 800 animals had been stung by these bees. By May 2010, 21 people have died as a result of being stung by Africanized bees.

Beekeepers from the UK examining African bee colonies in southern Trinidad.

There was a serious decline in the number of beekeepers and colonies after the arrival of Africanized bees. More than half of the beekeepers on Trinidad in 1978 had given up beekeeping by 1984 because of the high swarm frequency and extreme defensive nature of Africanized bees. By 1987 there was a decline of 14.6% in the number of beekeepers, 30.1% in the number of colonies, and 48.4% in estimated honey production. The relatively small percentage decline in the number of beekeepers was due in part to new entrants to the subsector.

This decline of beekeeping in Trinidad was exacerbated by the subsequent disruptions in governmental support. The steady reduction in the number of beekeepers continued from 1978 to 2008, from 407 to 300, and the number of colonies declined from 7,060 to 6,000, over the 30-year period. There was also a steady decline in the number of new apiaries registered over the period, from 263 in the 1970s, to 229 in the 1980s, to 154 in the 1990s, and 78 in the first decade of this century

Up to 1979, the subsector's development in Trinidad and Tobago paralleled each other. The bee stock was rooted from the same source and genetic material, and beekeeping practices on both islands were similar. There was unrestricted movement of bees between both islands, subject to an application for a permit from the Inspector of Apiaries. After the arrival of the Africanized bees, the Inspector imposed a *de facto* ban on the transportation of bees from Trinidad to Tobago. This is responsible, in part, for Tobago remaining free of Africanized colonies to date, perhaps surprisingly so, given the proximity of the islands, the extent of inter-island sea traffic, the period of time since these bees arrived in Trinidad, and their innate migratory tendencies.

***Varroa* Mite and Other Pests and Diseases**

An outbreak of Sac Brood disease in 1989, and several outbreaks of European Foul Brood disease during the 1990s in Trinidad, are the only documented instances of honey bee disease occurrences in Trinidad and Tobago prior to the identification of the honey bee mite, *Varroa destructor* in Trinidad in July 1996. Varroa was identified in Tobago in August 2000.

The mite has been the major problem experienced by beekeepers on both islands, but moreso by beekeepers in Tobago, where the European bees seem more susceptible to its exploits. There have been mixed reports on the impact of the mite on Africanized bees in Trinidad, where it seems that after the initial fall-out following the mite's arrival, the impact has leveled out. The impact of the mite's arrival in Tobago was decisively pronounced. An estimated 35% of the island's 649 colonies were lost within three months of the mite's identification, even though they were detected relatively early. By November 2003, Tobago beekeepers had to treat with the disease complex; 'parasitic mite syndrome' (PMS) associated with the *Varroa* mite, which further threatened to wipe out all beekeeping on the island. The net impact of the PMS outbreak was a 52% reduction in the number of colonies between November 2003 and November 2004: from 672 to 322 colonies. The Tobago Apicultural Society (TAS) promptly responded to both setbacks by importing appropriate treatments of all colonies on the island, and then subsequently imported two batches of 150 '*Varroa* resistant' queens from Hawaii in 2004 and 2006.

The overall impact of *Varroa* and PMS on Tobago's beekeeping is also reflected in apiary registration data and the number of active beekeepers. Unlike the situation in Trinidad, there had been a marked upsurge in the number of registered apiaries in Tobago during the 1980s, when 33 new apiaries were registered compared to four in the 1970s, and in the 1990s when an additional 25 apiaries were registered. In 1990 there were 29 active beekeepers on the island, while in 2000 the number stood at an all time high of 40, seven of whom were women. However, only seven apiaries were registered during the first decade of this century and the number of beekeepers has fallen to 16.

All the evidence supports the view that the 1980s was the pinnacle decade for Tobago's beekeeping. The subsector remained steady during the first half of the 1990s, then realised an upswing to peak in 2000, when the mite was identified, before declining steadily thereafter for the next eight years. Given its impact, the identification of Varroa in Trinidad and Tobago represented another turning point in the subsector's history.

Other Subsector Developments

National Honey Show, London

Trinidad and Tobago participated successfully in the prestigious National Honey Show (NHS), held annually in London. Between 1987 and 2000 Trinidad and Tobago beekeepers won 58 awards (Trinidad, 26; Tobago 32) at the NHS, including the coveted Hender Cup on two occasions. This participation ended in 2001 when European Union (EU) regulations requiring the submission of a Residue Monitoring Plan for honey entering the EU from non-EU countries, 'kicked in'. Trinidad and Tobago were not able to comply and entries already packaged for the NHS had to be returned to beekeepers.

The Caribbean Beekeeping Congresses

Amongst the most significant development in regional beekeeping was the conceptualisation and staging of the First Caribbean Beekeeping Congress in Tobago in November, 1998. The congress, an initiative of TAS, marked the beginning of a series of regional beekeeping congresses and the institutionalisation of the Caribbean beekeeping community. Subsequent congresses were held in Nevis in 2000, Jamaica in 2002, Trinidad in 2005, and Guyana in 2008. A sixth congress, scheduled for Grenada in November 2010, had to be postponed. The Association of Caribbean Beekeepers' Organisations, formed at the third congress, emerged from a need for a regional representative body.

Beekeepers' Safaris

Since 2000, Trinidad and Tobago beekeepers have been involved in hosting beekeepers from Europe on 'Beekeepers' Safaris': personalised, exotic, beekeeping holiday/study tours. The package includes participation in beekeeping sessions and soft ecotourism activities, opportunities to experience authentic local culture and cuisine, and to engage in mutually enriching information exchange during which new relationships have often been seeded. Forty-six 'safarians' participated in eight safaris to date. A ninth safari is planned for January 2011. These safaris have proven to be a unique offering. They are the only known exclusive beekeepers' holiday to the Caribbean and have added a new dimension to the regional tourism product, and possibly a new word to the tourism lexicon: 'api-tourism'.

Production European bee colonies in Tobago.

Stingless Bees

Stingless bees are indigenous to Trinidad and Tobago. Meliponiculture (keeping stingless bees) has been practiced by indigenous dwellers for centuries before the management of European honey bees. One of the four species of stingless bees in Tobago was discovered to be new to science in 2003 and was accordingly given a scientific name, *Plebeia tobagoensis*, to reflect the island on which the bee was located. Two other species are reared by several beekeepers in Tobago, more for pleasure than for economic benefits. There are fifteen species of stingless bees in Trinidad, however, only two species are domesticated by Trinidad beekeepers, one of which was reared by 65 beekeepers in 2000.

There is significant potential for the development of meliponiculture in Trinidad and Tobago, particularly so, given the availability of relevant information on the nest architecture, biology, colony multiplication, and honey harvesting procedure as a result of a collaborative exercise with Utrecht University, the Netherlands, out of which emerged a number of published papers and the design of a new type of hive developed in Tobago by the University; the UTOB - HIVE (Utrecht University; Tobago Hive).

Looking Ahead

Available data indicates that in 2008 there were 300 beekeepers and 6,000 colonies in Trinidad, while there are currently16 beekeepers and approximately 450 colonies in Tobago. The extended decline in beekeeping in both islands clearly suggests that new strategies must be urgently found to secure the future of Trinidad and Tobago's beekeeping subsector and to ensure that it realises its full potential.

It has been well established that stingless bees' honey is characterised by properties that validates its use amongst locals for medical purposes. As such, the commercial viability of rearing stingless bees for revenue generation must be fully explored as well as the bees' economic value as contributors to food security through pollination of indigenous crops.

Since 1997, the government has agreed to beekeepers using designated areas of forest reserve lands for

Beekeepers 'breezing out' on Manzanilla beach on Trinidad's east coast after visiting an adjacent Africanized bee apiary .

beekeeping activities, but to date the agreement remains unfilled. This potentially fruitful policy decision could, if implemented, impact the subsector's viability to the extent that it warrants classification as a positive milestone in the subsectors history, since beekeepers on both islands identified 'suitable apiary sites' as their major constraint to enterprise development, in a subsector survey earlier this year. The current government's policy, as reflected in statements by the new Minister of Agriculture is one of support for the resurgence of the beekeeping subsector. Local beekeepers are hopeful that he will recognise that unless a structured, institutional mechanism for support of beekeeping, that is appropriately resourced, mobilised and mandated to implement a sustainable development plan, is put in place, attempts at developing the subsector are likely to be short lived.

Due consideration must also be given to the fragility of the national beekeeping environment, which is threatened by new and exotic pests and diseases, subjected to denudation by untamed bush fires, slash and burn agriculture, creeping urbanisation, 'fogging' for mosquitoes, and the establishment of large-scale industrial sites in rural communities.

There is also a complementarity between beekeeping on the two islands that can be explored. A significant market exists for European queen bees in Trinidad, which could be satisfied by developing commercial queen rearing capacity in Tobago. Of course there is the concomitant need to ensure that Tobago remains Africanized bee free. Given the high probability that Africanized bees will eventually arrive in Tobago, action must be taken, both to forestall that eventuality and to treat with the reality. Unless pre-arrival measures are instituted, the prospect for sustainable beekeeping in Tobago will be gloomy once Africanised bees arrive.

Moreover, beekeepers must embrace and exploit to the fullest, their collective potential as a 'cluster' of socio-economic interests, and the benefits of cooperating rather than competing within their community. Further, there is significant scope to expand and diversify the production and marketing of hive products. The bottom line is that 'api-culture' must be tweaked to place emphasis on its 'api-business' component.

Finally, and of critical importance is the need to recognise that 21st century beekeeping is not a simplistic vocation. The perception by aspiring beekeepers, investors, advisors, policy analysts, and planners, that there is 'money in honey' and that the transformation process is as figuratively straightforward as changing the 'h' in honey to the 'm' in money, must be finally and permanently dispelled. BC

Gladstone Solomon is the President of the Tobago Apicultural Society, and a frequent attendee of beekeeping conferences in the U.S.

Producing Honey Bee Queens, II

James E. **Tew**

A Reminder

Last month, I presented Part I, using natural cells to produce honey bee queens. In Part II I discuss using larvae (and occasionally eggs) to produce queens and next month (in Part III); I discuss plastic queen production devices and the famed Doolittle procedure.

Using Larvae – Miller, Alley, Hopkins, Punch

Manipulation of brood to produce honey bee queens

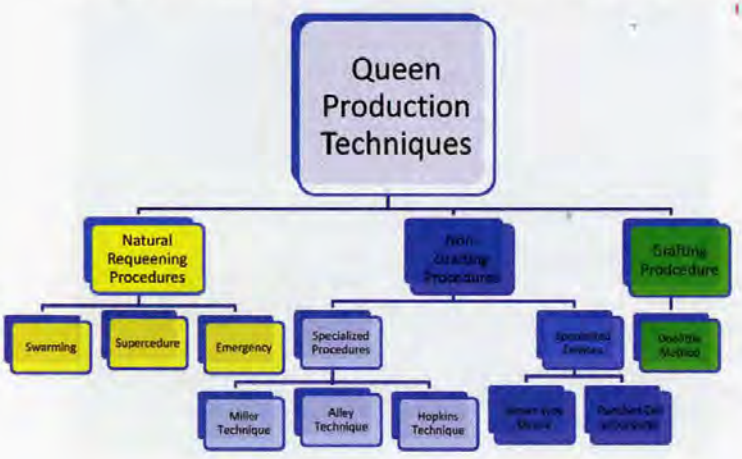
It is a daunting task to begin to introduce the various ways one could produce honey bee queens. If I enter the simple Google search command, *raising honey bee queens*, I get nearly 300,000 responses. At first flush, beginning this process can feel overwhelming. As I wrote last month, queen production is not really a complicated procedure, but the perpetual interest in queen production has resulted in a vast number of production techniques. In this morass of information, cling to this – nurse bees produce queens when swarming, superseding, or for an emergency. Everything else is just details.

Grafting vs. non-grafting

The basic process of commercially producing queens is *"grafting larvae."* Grafting was not the best choice of terms. *Transferring larvae* would have been more descriptive, but alas, grafting is entrenched in the literature. The process of grafting larvae requires keen eyesight and a steady hand. Consequently, procedures that do not require grafting are of interest to many beekeepers. In summary, grafting techniques require moving just the larvae, while non-grafting techniques require moving larvae in something – probably a queen cell or queen cup, but they are never individually picked up.

Grafting eggs

In the matrix I have presented, I loosely divided the various techniques into three categories: natural cells, non-grafted cells and grafted cells. There is one little-used technique that should be acknowledged – using eggs for producing queens. Essentially all queen raising procedures require larvae three days old or younger to produce queens. Eggs can be used for queen production, but the process is tedious and specialized. The cell punch technique, which will be discussed in the non-grafting section, could be used to produce queens from eggs.

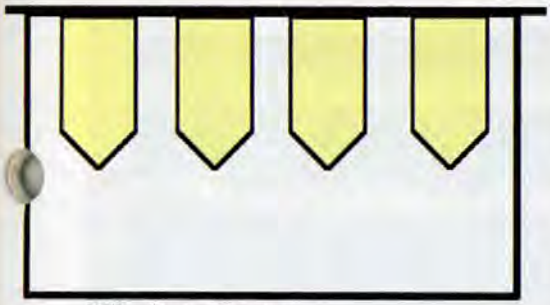


Mr. Steve Taber was for many years a well-known honey bee researcher at the USDA lab in Tucson, AZ. He was a proponent of using eggs for queen production and frequently presented discussions on the subject. He devised a modified pair of micro-forceps and would pluck an egg and relocate it into a prepared queen cup. The forceps were unique in that the egg was only gripped and not crushed by the process. Mr. Taber liked using eggs because they are hardy and do not dry out during the initiation process. Additionally, if nurse bees are slow to visit the egg after being moved to the queen cup, no harm is done, while a larva that is ignored can die, or be set back.

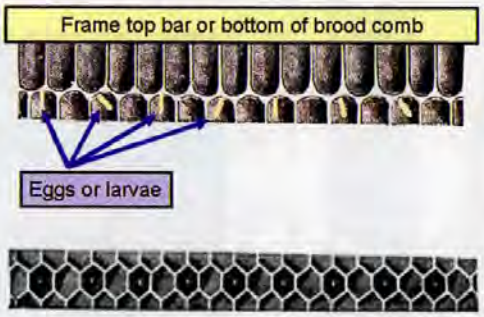
In the January 1997, issue of *Bee Culture*, I published an article entitled, *The Secret Life of the Honey Bee Egg*. In that piece, I stated:

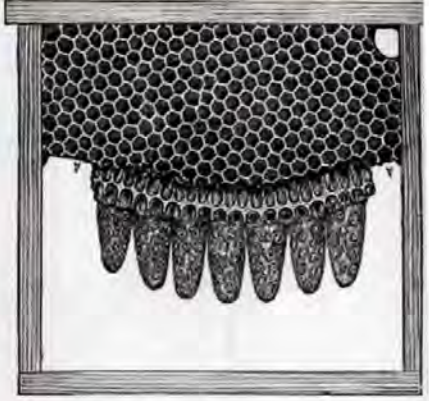
The egg is a hardy developmental stage of the bee's growth. It is attached with a secreted glue-like substance by its small end. It's an iridescent white with a gentle bend. The egg is positioned with the larger head-end up. After about three days, the egg gradually leans over until it lies on its side on the cell base. The egg's outer membranous covering (the chorion) slowly dissolves and the larva emerges. It's a slow, quiet process. Nurse bees soon begin to place hypopharyngeal gland secretions (brood food) around and under the larva which has a voracious appetite. Beekeepers frequently say that an egg hatches when referring to a larva emerging. As such, the bee egg does not "hatch" though the word transfers the concept. However, due to the membrane dissolution, don't ever expect to see tiny bee-egg shells drop from cells containing new larvae.

Though the egg normally develops within three days, the development range is two to six days. Temperature appears to play a role in the duration of the development. Eggs can commonly withstand room temperature for several hours without ill effects shown by larvae and pupae under the same conditions.



Miller frame diagram.





The Alley Method, above and right.

I never had much luck trying to move eggs, but I wanted to present this possibility here for anyone interested in producing queens in unorthodox ways.

Non-grafting procedures

At this point, I will unintentionally offend some of you. There is simply no way I can discuss all of the non-grafting techniques that have been named and published. The methods described here are simply intended to show various techniques that don't require handling very small larvae.

The Miller Method

In 1912, Dr. C.C. Miller[1] described a easy technique for producing queens. Two to four strips of foundation measuring two to three inches wide and three to four inches long (smaller dimensions for shallower frames) are attached in an empty frame. The strips should come to a blunt point.

After the foundation is attached, the specialized frame is put into the breeder colony – in other words – your best colony. Any colony that is producing queens should be fed 50/50 sugar syrup. This technique is no exception. Only two frames of uncapped brood should remain in the breeder and the modified frames should go between these two frames. If all the colony's brood is allowed to remain during the comb construction process, too much drone comb would be produced on the special frame. In about a week, the combs will be built and eggs will be laid in the new, white combs. This unwired, virgin comb is very fragile and should be handled carefully.

Lay the Miller frame on its side and cut away the lower, unfinished parts of the combs so that young larvae and eggs are along the cut edge. This frame is then placed in a populous, queenless colony that has no young brood. Queen cells will be built along the cut edge and should be removed on day 13 or 14. Cells will be of slightly different ages so queens will emerge at slightly different times. Don't wait too late to remove the Miller frame.

The cells are then cut from the Miller frame and placed in nucs or in other queenless colonies. The new, white wax is easily cut and manipulated. Cut large pieces and stay completely away from the cell. Nurse bees will readily destroy a cell that is even slightly damaged.[2]

The Alley Method[3]

The Alley method is similar to the Miller method in that larvae are not relocated. Alley cut strips of comb, turned these strips sideways and presented them to queenless bees in this position. An overview of the procedure follows.

1. Place a new frame of drawn comb in the breeder colony. About four days later, eggs and new larvae should be present.
2. Cut strips of brood from the comb. With a warm, sharp knife, cut away about one-half of the cells on one side and destroy every other larvae or egg.
3. This strip is attached to the bottom of a brood comb or to the top bar in a smaller colony and is oriented in a downward position. It is attached to the brood comb with warm beeswax.

In the early 1900s, Jay Smith[4] published an updated version of the Alley method. Smith was adamant that the queens produced by the then popular Doolittle grafting method were inferior to the queens produced by methods such as the Alley method. Did Smith have a point?

The Hopkins Method

Due to naming confusion, I considered calling this procedure the "flat comb" technique, but yet another name would only add to the citation confusion. At times, this system is called the Hopkins method or the Case[5] method in the U.S. A very similar variation of this procedure is the B.H.S (Barbeau, Hiller, Snelgrove) method. Essentially, an empty comb was placed in the breeder colony for the requisite four days. After eggs and larvae were present, the comb was laid comb-side-down atop a populous, queenless, broodless colony. The laterally positioned frame was raised approximately one inch above the frame top bars in the queenless colony with wooden spacers. The nurse bees – searching for larvae of the proper age – would select larvae and begin to build queen cells in the normal downward position from the laterally-positioned comb. Some of the authors above suggested systemically destroying surrounding brood in order to allow enough room for the cell to develop without "webbing" with surrounding cells. After cells have been

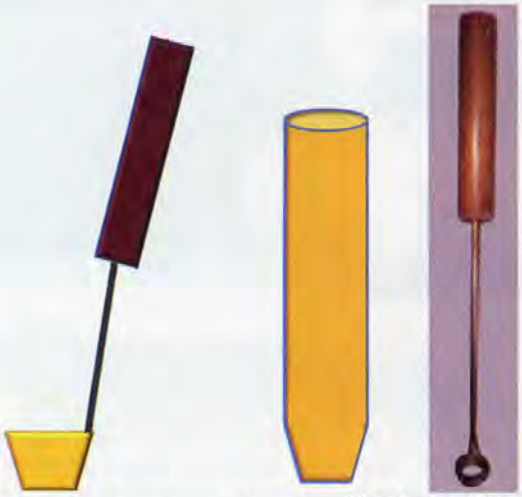
[1]Laidlaw, Jr., Harry H. and Robert E. Page, Jr. 1997. *Queen Rearing and Bee Breeding*. Wicwas Press, Cheshire, CT. 06410-0817. 224 pp.

[2]For more photos, see PowerPoint program at: **www.ohiostatebeekeepers.org/wp-content/ppt/OSBA_Hobby_Queen_Production.ppt**

[3]Alley Method diagrams are from his book: Alley, Henry. 1883. *The Beekeepers' Handy Book containing the New Method of Queen-Rearing*. Published by the author, Wenham, MA. 184pp.

[4]Smith, Jay. 1923. *Queen Rearing Simplified*. The A.I. Root Company, Medina, OH. 121 pp.

[5]Apparently, the Case method was originally described by Hans Pechaczek, from Vienna.



Two types of cell punch devices. *The device offered by W. Montgomery.*

Queen cells produced by the punched method (R. Mullet photo).

capped, the comb could be removed and cells cut out and pressed into the brood comb of a queenless colony.

For all of the claims made concerning its use and history, this is a simple procedure. Increasingly, plastic foundation or even plastic centered foundation would prevent the use of many of these techniques including this one. Many years ago, when I used this technique, I found that I had to devise a larger outer cover with narrow rims on the front and back. Laterally lay a frame on top of a colony and you will quickly see what I mean. In a way, it would have been easier to cut the brood comb from the frame before laying sideways on the colony top. With a much smaller piece of brood comb, I could simply use a feeder shell and common covers to protect the comb and colony from the elements. Maybe, I could get my name on this procedure in some way.

A Non-grafting method of producing queens

The "Cell Punch" method

The concept of boring a single cell containing a young larva is a procedure that lurks in the back of all queen production discussions. Since the late 1800s, the Doolittle method of grafting (to be reviewed in Part III next month), has reigned supreme so the punch method has lived in the shadows. It would be impractical for a commercial queen producer to use such a method, but as an easier procedure for both experienced and inexperienced, the cell punch method is really trying.

E. Barbeau, a French Canadian published his version of the punch procedure in 1918. The required equipment is straightforward.

1. A punch, either cylindrical or otherwise, about three to four inches long with a 3/8" inside diameter.
2. A dowel rod for pushing punched cells from the tube.
3. Some type of cell holder apparatus.

The frame taken from the breeder colony and containing eggs and young larvae, is laid on one side and selected cells are punched out. In past years, the cell side opposite the larvae intended to become a queen was cut down to approximately 1/8" with a razor. You may or may not require this step. Some queen producers cut a large square from the comb and lay it on its side rather than the entire frame.

Punched cells are then attached to a cell bar with warm wax. Gabe Blatt[6] and Dan O'Hanlon, both West Virginia Beekeepers, use techniques that include modern plastic cell bases along with warm beeswax for attaching punched cells to the cell bar. Regardless of how they are attached to cell bars, afterwards, as usual, the cells will go into a populous colony having no young brood. Continue to feed a 50/50 syrup mix as long as cells are being built.

The punch, heated in warm water before each use, can be a simple 3/8" ID tube with a knife edge on one end. Many years ago, I used a 9.5 mm cork borer that I had from my chemistry classes to punch the cells, but now a punch that is easier to use is available. Wil Montgomery[7] hand-makes these devices and offers them to beekeepers interested in using this technique. His kit includes instructions and photos.

Yes, this punch procedure does result in a comb full of holes. The bees will repair it and maybe more drone comb that usual would be included, but the comb is sacrificed for a good cause. Potentially, a substantial number of quality queens will be the result of the sacrificed comb.

A recent student in an Ohio State Beekeepers' Association queen class took information provided by instructors Blatt and O'Hanlon and successfully produced queens on the first try. The cells have the typical look of punched cells rather than grafted cells. Regardless of the system used, producing queen bees is a demanding but exciting aspect of beekeeping.

Next month

Part III will include information on the Jenter styled devices and an overview of the famous Doolittle queen production method. If you have made it through these two articles, you can certainly produce a few (even many) queens. Thanks for reading. BC

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http://www.facebook.com/beelab facebook

twitter ***osuhoneybeelab***

I have posted a captured PowerPoint program on generalized honey bee queen production at: http://go.osu.edu/CPJ.

[6]President, Cabell Wayne Beekeepers Association, sites.google.com/site/cabellwaynebeekeepers2/home

[7]Cell Punch Method Kits. $15.00 + shipping. Wil Montgomery, 1401 Lakemont Dr. S. Southside, Alabama 35907. Email: **n4wm@bellsouth.net**.

Managed Pollinator CAP
Coordinated Agricultural Project

Pesticides & CCD

Jim **Frazier**, Chris **Mullin**
Maryann **Frazier**, Sara **Ashcraft**

We Do Not Have An Accurate Picture Of What Pesticides Are Used, Where And In What Amounts, Nor Do We Have Accurate Meassures Of Just What The Maximum Exposure Is In Agricultural Or Urban Settings On Blooming Plants.

Introduction

Do pesticides cause CCD? A question that beekeepers have been asking ever since CCD hit the national scene in 2007. In a series of articles Randy Oliver has done an exceptional job of distilling much of the recent research results into a meaningful update for beekeepers relative to this question (Oliver, R. 2010; See also **ScientificBeekeeping.com**). Researchers too have been asking this question and the CAPS project has specific objectives to investigate the factors responsible for CCD. In a 2008 article we gave our initial results of the first 108 samples analyzed for pesticide levels in pollen, beebread, and wax and indicated that the levels found were reason for concern about pesticide interactions, sub-lethal impacts, and interactions with other stressors (Frazier et al, 2008). Here we report some of our more recent progress on these topics and include results from not only the CAPS project efforts, but also from other researchers in addressing these questions.

What can we say about honey bee exposure to pesticides?

One of the first responses to the CCD eruption in 2007 was the immediate sampling of collapsing colonies across the U.S. by the first cooperating group of researchers from university, state departments of Ag and the USDA. Soon afterwards a migratory beekeeper study was initiated to follow selected migratory beekeepers from Florida through Maine and to sample their colonies after each stop along the way. It was from these studies that over 800 samples of bees, pollen, and wax have been analyzed for the presence of 171 different pesticides. We found that the 350 pollen samples collected contained at least one systemic insecticide 60% of the time and nearly half had the miticides fluvalinate and coumaphos as well as the fungicide chlorothalonil. In bee collected pollen we found chlorothalonil at levels up to 99 ppm and the insecticides aldicarb, carbaryl, chlorpyrifos and imidacloprid; the fungicides boscalid, captan and myclobutanil; and the herbicide pendimethalin at 1 ppm levels along with chlorothalonil. The pollen samples contained an average of six different pesticides each with one sample containing 39 different pesticides. Almost all comb and foundation wax samples (98%) were contaminated with up to 204 and 94 ppm, respectively, of fluvalinate and coumaphos, and lower amounts of amitraz degradates. We concluded that the 98 pesticides and metabolites detected in mixtures up to 214 ppm in bee pollen alone represented a remarkably high level for toxicants in the food of brood and adults. While exposure to many of these neurotoxicants elicits acute and sublethal reductions in honey bee fitness, the effects of these materials *in combinations* and their direct involvement in CCD remain to be determined.

Two other studies have measured multiple factors associated with CCD and non-CCD colonies across the U.S. to see what risk factors were predictive of CCD (vanEnglesdorp, et al, 2009, 2010). The first study looked at one factor at a time among 61 variables as potential causes of CCD and found that no one factor could account for CCD. The second study borrowed from a proven approach used in epidemiological studies for unknown diseases, incorporating all types of factors that might be associated with the phenomenon and then subjecting them to a statistical approach of classification and regression tree analysis known as CART (Saegerman, et al., 2004). Using 55 different variables and determiing their relationships and interactions to CCD indicated that factors measuring colony stress (e.g., adult bee physiological measures, such as fluctuating asymmetry or mass of head) were important discriminating values, while six of the 19 variables having the greatest discriminatory value were pesticide levels in different hive matrices. These pesticide levels included coumpahos in brood, esfenvalerate in wax, coumaphos in wax, iprodione in wax, docofol in beebread, and chlorothalonil in wax. Coumaphos levels in brood had the highest discriminatory value of 100% and was highest in control (healthy) colonies. This may seem surprising, yet we do not know the timeliness of treatments for *Varroa* in these colonies, or if the bees have been selected for increased pesticide tolerance, either one of which could account for this outcome. While this study used an unbiased analysis of multiple factors that might be associated with CCD, the results certainly indicate that pesticides are very likely involved and that ⇨

"We chose an analysis that incorporates hive miticides and their metabolites in addition to a large number of potential pesticides from their foraging area as a better way to measure potential sources of risk for honey bees."

interactions with other stressors are very likely factors contributing to CCD and the decline of honey bee health.

Although our work represents the largest data set of pesticides in honey bee colonies to date, and was drawn from samples collected across 23 states and a Canadian province, it was not the product of a well designed systematic survey of honey bee colonies in the U.S. It thus does not give us a clear picture of the current state of pesticide residues in honey bee colonies. Such a study is critically needed yet we know of no current plans to accomplish this expensive task. In addition, the number of pesticides registered for use in the U.S. is over 1200 active ingredients distributed among some 18,000 products, which makes the chemical use landscape for U.S. beekeepers very different from those in other countries such as France, where some 500 chemicals are registered or in England where fewer than 300 are registered (Chauzat et al. 2010: Thompson, personal communication). Studies of pesticide contamination in bee colonies in other countries such as France, Germany, the Netherlands, or Belgium, thus may not tell us much about the likelihood of contamination of bee colonies in the U.S. (Chauzat et al, 2010; Genersch et al. 2010; Tennekes, 2010; Nguyen, et al. 2010). Pesticide exposure for migratory colonies is likely very different from that of stationary colonies, and perhaps also very different from that of colonies keep by organic beekeepers, yet this also is not well documented. Pesticide use records are complete only for the state of California, in other states data are currently unavailable, or vary limited in scope (Grube et al, 2011). There are thus many unanswered questions regarding pollinator exposure to pesticides. We do not currently have an accurate picture of what pesticides are used, where and in what amounts, nor do we have accurate measures of just what the maximum exposure is in agricultural or urban settings on blooming plants. Once contaminated pollen is collected, the potential transformations of pesticides in bee bread and royal jelly are also currently unknown. Clearly the potential for pesticide involvement in declining honey bee health is far from being understood, and it is clearly too early to discount them as key factors associated with CCD.

What can we say about the risk assessment of pesticides on bee health?

There is much truth in the adage 'you are what you eat.' A parallel in pesticide analysis is 'you only find what you look for.' Our approach in documenting pesticides in apiary samples (Mullin et al., 2010) has been to search for a wide sweep of pesticides (> 200) that are used frequently in hives and around bees where they forage. For many published studies that document pesticide residues, this has not been the case, and more emphasis has been placed on the neonicotinoid imidacloprid and other systemic insecticides with high bee toxicity. A focused study on one pesticide or a single class of chemicals allows for use of a more sensitive method of analysis, while an affordable method that detects many pesticides from widely different chemical classes is compromised by not attaining the lowest limit of detection (LOD) for every pesticide analyzed. We desired a more complete assessment of the toxic pesticide burden that bees encounter instead of a biased approach to search for only chemicals renowned for their bee toxicity. A caveat of this approach is that the attainable LOD for a focused method will generally be lower; the more chemically variable and greater number of pesticides in the screen increases costs of analysis while reducing, at least for some pesticides, the sensitivity of their detection (increasing LOD). Nevertheless, we chose an analysis that incorporates hive miticides and their metabolites in addition to a large number of potential pesticides from their foraging arena as a better way to measure potential sources of risk for honey bees.

Assessing the risk of pesticides and their metabolites requires a sensitive method for their analysis. However, is the most sensitive LOD the primary criteria for choosing a method of analysis? It may be if your major goal is to find a particular chemical. The lower the LOD, the more frequently it is detected in the samples analyzed. Thus the percentage of samples with detections for a given pesticide increases with a LOD at parts per trillion (ppt) > parts per billion (ppb) > parts per million (ppm). However, risk assessors are more concerned about choosing methods that allow you to predict hazards and risks of exposure at levels above the no observable effect level (NOEL) or lowest observed effect level (LOEL). For bee foods of known acute toxicity or behavioral effects, and chronic sublethal effects on longevity and reproduction, generally a LOD greater than 1ppb is used which is sufficient even for the most toxic pesticides such as imidacloprid.

Assessing the risk of a pesticide to bees uses the effects after exposure such as the acute LD50 (lethal dose for 50% of treated bees) and long-term chronic or sub-lethal EC50 (effective concentration that reduces by 50% the growth, learning, longevity etc. of treated bees). The risk of exposure is predicted by both frequency and mean residue amounts in pollen, nectar, water and wax, and the persistence (time to remove 50% = half-life) and fate (degradation and metabolism rates) of the pesticide in the hive or an exposed bee. Knowing the physicochemical properties of a pesticide's active ingredient (octanol (oil)/water partition coefficient, water solubility, vapor pressure) will aid in predicting routes of exposure and the potential for bioconcentration. For example, the systemic imidacloprid in comparison to the miticide fluvalinate is about 10,000,000 times less soluble in oil than in water and greater than 700,000 times more water soluble. Thus fluvalinate would be predicted to persist in the beeswax and fat tissues of bees, while imidacloprid would be 'washed' more readily out of the hive or be excreted by the bees.

Are neonicotinods the major pesticide risk for bees?

Systemic neonicotinoid use has greatly increased recently through transgenic seed treatments and use on many other major crops, ornamentals, turf and in structural pest control. Bee kills in France, Germany and the U.S. have been associated with imidacloprid- and clothianidin-treated seeds (Minister of Ag, 2008). Acute LD50s average 28 and 24 ng/bee respectively, for imidacloprid and clothianidin, although sublethal effects have been reported at much lower levels (Decoutrye et al. 2004). Generally the lowest observed sublethal effects for imidacloprid in the lab are at 1 ng/bee which is equivalent to 10 ppb for an average 100 mg bee. Achieving a 10 ppb dose would require consuming pollen with residues of 250 ppb imidacloprid at a consumption rate of 4 mg pollen/day (4% of bee's body weight). This high residue level is never found when label-rates of Gaucho are used as a seed treatment (generally 1-5 ppb in pollen). Nectar residues of imidacloprid are usually less than in pollen, although more is consumed over the bee's life. However, even if a forager ingests 10% of their body weight in nectar per day, it would require 100 ppb of imidacloprid in the nectar to achieve a 10 ppb dose per day, regardless of the high turnover rate of this water-soluble insecticide in the bee. Imidacloprid is known to be rapidly metabolized and is excreted by adult bees with a half-life of about five hours (Suchail et al., 2004). This means that more than double the above dose of imidacloprid in the food is required to maintain a body level that keeps up with its rapid clearance from the bee. It is unlikely that doses of neonicotinoids from routine systemic seed treatments will attain the necessary > 100 ppb levels in pollen or nectar to acutely impair honey bees. Dusts from improperly formulated or applied seed treatments, however, (Minister of Ag, 2008) or guttation water from glandular exudations on treated plants (Girolami et al, 2009) do have the necessary high residues levels to directly kill bees (Wallner, 2009).

Our residue results based on 1120 samples which include Mullin et al. (2010) and subsequently more than 230 additional samples do not support sufficient amounts and frequency of imidacloprid in pollen to broadly impact bees. For all samples, only 41 (3.7%) contained imidacloprid above the 2 ppb LOD with a mean residue of 12.3 ppb (scoring non-detects at 0 ppb). Among the other neonicotinoids, 66 detections (5.9%) were found for acetamiprid, 59 (5.3%) for thiacloprid, 3 (0.3%) for thiamethoxam, 2 (0.2%) for clothianidin and 0 for dinotefuran, and 9.9% of samples contained at least one neonicotinoid, mostly the less toxic acetamiprid and thiacloprid. This is in contrast to pyrethroids which were found in 79.4% of samples at 36-times higher amounts than the neonicotinoids, on average. For the 503 pollen samples that included some mixtures such as pollen with some nectar, wax etc, or whole anthers, which would maximize neonicotinoid levels, only 15.3% contained any neonicotinoid (Figure 1). The mean neonicotinoid residue was 37 ppb (scoring non-detects as 0 ppb), of which only 6.7 ppb was imidacloprid. Pyrethroids, by comparison, were present at a mean residue of 106 ppb and a frequency of 80.3% in pollen samples (Figure 1). These included fenpropathrin (LD50 = 50 ng/bee), cyhalothrin (79 ng/bee), cyfluthrin (22 ng/bee), bifenthrin (15 ng/bee), deltamethrin (50 ng/bee) and prallethrin (28 ng/bee); all of which are similar in acute bee toxicity to imidacloprid (LD50 = 28 ng/bee) and clothianidin (24 ng/bee). Indeed, if a relative hazard to honey bees is calculated as the product of mean residue times frequency detected divided by the LD50, the hazard due to pyrethroid residues is three-times greater than that of neonicotinoids detected in pollen samples (Figure 2).

The LOD has great bearing on the frequency of detections for a particular pesticide, with frequency increasing with decreasing LOD. If the most important factor for risk assessment is the mean residue level, this only slightly increases for an increase in LOD. For example, our 503 pollen samples had only 30 imidacloprid detections (mean of 6.7 ppb overall with non-detects scored 0 ppb). If our non-detects are scored as 0.1 ppb anticipated to be detected with a highly sensitive analysis, the mean ppb for the 503 samples would be < 6.8 ppb. Scoring non-detects at our LOD of 2 ppb would only increase the mean detection to < 8.6 ppb imidacloprid overall. These modest residue increases would not be significant for a consideration of the exposure of bees to imidacloprid.

What about pyrethroids as major bee toxicants?

Pyrethroids bioaccumulate in wax and bees due to their high fat solubility in contrast to neonicotinoids. In wax, 312 of 340 samples contained pyrethroids versus two with imidacloprid and four with thiacloprid, with the average pyrethroid residue content > 64,000 times higher than the total neonicotinoid. While fluvalin-

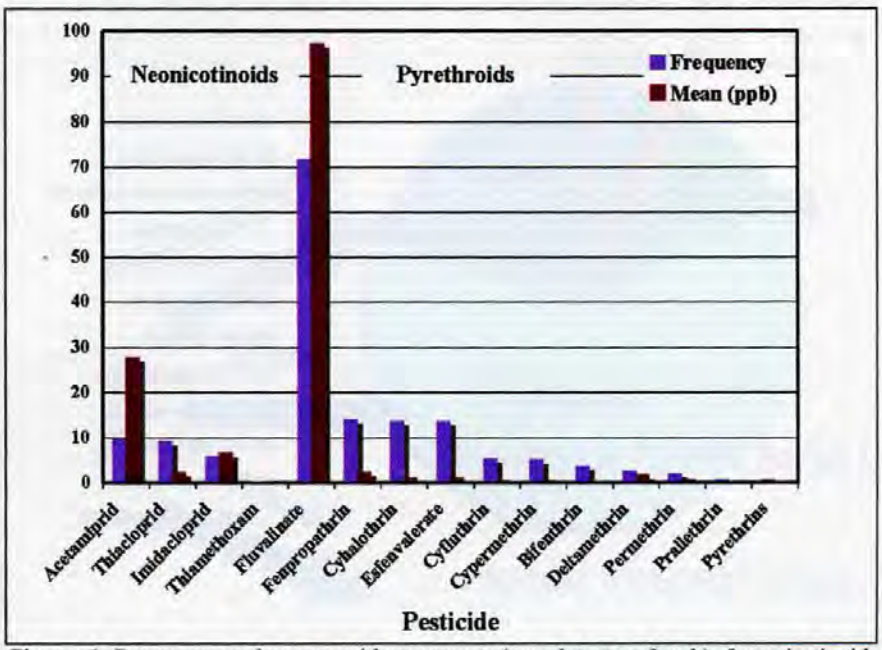


***Figure 1**. Frequency and mean residue amounts (non-detects = 0 ppb) of neonicotinoids and pyrethroids in 503 pollen samples.*

"Almost all studies to date have focused on the action of a single pesticide so that very few combinations have been studied. We feel that this is a major limitation to our current level of understanding of pesticide impacts on bees."

ate prevailed (307 detections), many other detections of esfenvalerate (50), fenpropathrin (43), bifenthrin (37), cypermethrin (28), cyfluthrin (26), pyrethrins (16), cyhalothrin (13), deltamethrin (8) and permethrin (8) were found. A similar analysis for residues in 241 bee, brood and queen samples showed only four samples with neonicotinoids, two from bee kill incidences correlated with imidacloprid and thiamethoxam/clothianidin, respectively. The two other samples contained low amounts acetamiprid and thiamethoxam. Even with the higher neonicotinoid residues due to bee kills, a dozen pyrethroids distributed within 70% of our bee samples had a mean residue (non-detects = 0 ppb) of 357 ppb, 178 times greater than the 2 ppb for the neonicotinoids. Pyrethroid prevalence and persistence in the hive thus likely has more consequences for colony survival than the water-soluble neonicotinoids. The only other major insecticide detected in our hive samples with high toxicity was the organophosphate chlorpyrifos (LD50 = 122 ng/bee) in 42.6% of samples with an average detection of 36.3 ppb. This OP degrades more rapidly and is less persistent than pyrethroids. However, higher residues of the less toxic neonicotinoids acetamiprid and thiacloprid (Iwasa et al., 2004) or of pyrethroids (Pilling and Jepson, 1993; Johnson et al., 2011) in pollens with even higher amounts of fungicides may have considerable impact on bee health via their synergistic combinations. Pyrethroids disable foraging of bees at levels of 9 ng permethrin per bee (90 ppb) Cox et al. 1984) and 2.5 ng deltamethrin per bee (vanDame et al. 1995), which is of a potency similar to that of imidacloprid.

The in-hive miticide fluvalinate is one of the most fat-soluble or lipophilic of pyrethroids, with a water solubility less than 12 ppb or 12 µg/liter (EPA-OPP 2005), and is functionally insoluble in water or sucrose solutions without added solvents, surfactants or other formulation aids. Many acute toxicity bioassay results have been reported for this pesticide, with LD50s ranging from 65.85 down to 0.2 µg/bee for honey bees (Atkins et al. 1981, EPA-OPP 2005). To our knowledge, this is the most variable LD50 result noted among pesticide bioassays on bees, and most likely indicates that some of these bioassays were conducted, particular those for oral toxicity, without this pyrethroid being truly in solution. This highly non-polar chemical can adsorb to plastic or even glass walls of solution containers or application vessels in lieu of sufficient solubilizer additions, leading to extraneous results.

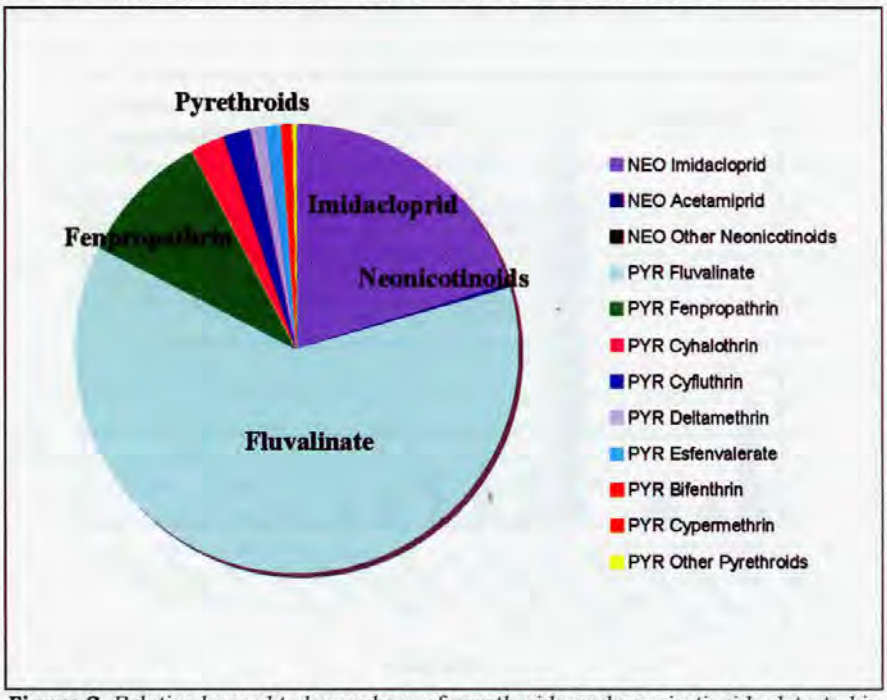


Figure 2. *Relative hazard to honey bees of pyrethroids and neonicotinoids detected in 503 pollen samples estimated by (mean detection X frequency)/LD50.*

Sub-Lethal impacts of pesticides; a new arena of research

If we acknowledge that multiple pesticide residues in bee collected pollen are "typical", and consider the number of possible impacts of ingesting this pollen, first by nurse bees, then by brood and finally by the queen, it is not surprising that we have not yet determined all of the possible outcomes. Almost all studies to date have focused on the action of a single pesticide so that very few combinations have been studied. We feel that this is a major limitation to our current level of understanding of pesticide impacts on bees.

When bees are exposed to a toxic dose of pesticides, dead bees surrounding the hive entrance are an obvious result. What is not so obvious are the consequences of lower doses of one or more pesticides that may be encountered while foraging, or from collected pollen and nectar brought back to the hive. It is these sub-lethal impacts that have become the focus of much of the current research on pesticides. Many studies have documented impacts of low levels of pesticide exposure that when ingested for longer periods of time result in more chronic impacts. Such actions have been reviewed for many beneficial insects as well as for pollinators (Desneux, et al, 2007). The impacts of such consequences have been many and varied and have led to the loss of many kinds of beneficial insects, not just pollinators. One such example is the loss of important insect biocontrol agents in apple orchards, which has allowed the emergence of new pests in the absence of their natural enemies; all unintended outcomes

of sub-lethal effects on different insects with different sensitivities (Agnelo et al, 2009). What are the parallel kinds of impacts on honey bees and other native pollinators? The answers are only beginning to emerge, but current research is finding some surprising results. For honey bees low levels of pesticides have been shown to reduce associative learning of individual bees in laboratory studies using the proboscis extension response (Decourtye et al, 2004). Altering maze learning performance in free flying bees (Decourtye, et al. 2010) and the loss of foraging efficiency in radio tagged bees, (Decourtye, et al. 2011). The precocious foraging of nurse bees from IGR insecticides is also documented (Thompson et al. 2007). These changes in learning and behavior can potentially alter normal colony level functions, yet colony-level impacts have remain to be verified.

Honey bee larvae reared in cells contaminated with the miticides fluvalenate or coumaphos show a reduced developmental rate and delayed adult emergence along with reduced adult longevity (Wu et al, 2011). These effects can have multiple consequences for the colony including increased developmental time for *Varroa* mites, reduced colony population dynamics and build up, as well as potential shifts in worker division of labor. Whether or not the pesticides associated with wax in the CART study (above) have similar impacts on larvae remains to be determined. Fungicides have long been known to synergize with some pesticides in laboratory toxicity bioassays (Iwasi et al, 2004). More recently, we have determined that combinations of formulated pesticides and fungicides fed to either adult worker bees or to larvae can have synergistic effects on mortality. What happens when three or four or five different pesticide mixtures are ingested by honey bee larvae or adults for substantial periods of time? Studies to determine some of these impacts have been completed and will be published later this year.

What can beekeepers do to decrease the potential pesticide exposure and/or respond to a pesticide incident?

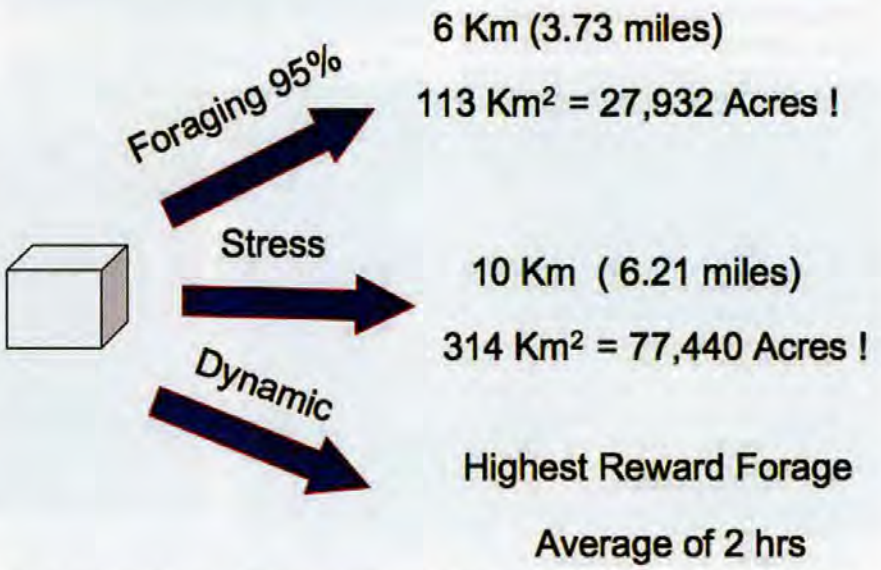
Honey bees are supremely good at finding pollen and nectar sources in their environments. The average foraging range of a single colony is thought to be a 3.75 mile radius most of the time with trips up to 6.75 miles in times of great need (Figure 3). In a typical U.S. setting this range includes 28,000 + acres with a lot of different plants, some of which are in bloom at any given time, and some of which may have been treated with pesticides. If the average colony can find the most nutritious nectar source within a two hour window, then the incoming flow of nectar and pollen is very dynamic indeed (Seeley, 1995). How much of this foraging range do you normally consider as the pollen and nectar sources for your colony? If this includes areas beyond your direct control, then this is an important dynamic for you to consider in your colony's potential health. Pesticide applications are made by many people for lots of reasons, but with these beyond your control, the typical colony is at the mercy of these events in their foraging environment most of the time.

In Adams county Pennsylvania in April, apples are in need of pollinators. Contiguous acres of apple orchards are all blooming, yet colonies placed in orchards with five acre blocks in full bloom collect anywhere from two – 70% of their total pollen from these apples on any given day. The pesticide history in this orchard is thus not a very good predictor of the potential pollen pesticide residues that are likely to wind up in the colonies placed there for pollination. Thus commercial beekeepers and local beekeepers alike may be surprised by the mixed sources of pollen in their colonies and the ranges from which they have been gathered. This has important implications for the pesticide residues to be found in any given colony at any given time. Having a landscape level appreciation for the foraging range of your colonies will help give you a realistic perspective on potential sources of pesticide contamination. Drive around your area and take a look at the possible places where pesticides may be used and talk to the people involved.

1. Communicate with individuals/facilities that are likely users of pesticides in your foraging area and encourage them not to spray insecticides or fungicides during bloom on any plants.
2. Encourage growers of bee pollinated crops to plant buffers of blooming plants for pollinators and home owners to "plant for pollinators"
3. Replace combs often to prevent pesticide build-up.
4. If you have a pesticide poisoning incident report it. Verified pesticide levels in your dead bees make this a much stronger incident report.

Pesticides with known toxicity to honey bees have a warning on the label that must be followed by anyone who applies the material.

"This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area."



The dynamic foraging of a typical honey bee colony includes a range of 3.73 miles radius 95% of the time, with a range up to 6.21 miles in times of limited sources, with the ability to detect the maximum rewarding nectar within a two-hour period (Modified from Seeley, 1995).

While these are explicit warnings, it is far too easy to ignore the presence of honey bees and especially native species of bees when spraying during bloom. The important point is that if pesticides are applied anytime during bloom, bees will be killed; even the shortest duration pesticides like pyrethroids are not disappearing overnight, so spraying late one day does not guarantee that bees will not receive a toxic dose the following day. Not following these restrictions constitutes not following the law, and bee kills resulting from such uses should be reported as a bee kill incident. To do this, each beekeeper must be vigilant about the health of their colonies and if pesticide exposure and resulting bee kills are suspected, then an immediate response is best. Collect bees and keep them in a freezer until they can be sent for analysis. We have been able to support a beekeeper cost share program to help offset the high costs of pesticide analyses, so samples may be submitted to us by contacting Maryann Frazier at **mfrazier@psu.edu**. Bee incidents should also be reported to your state department of agriculture or regulatory authority overseeing pesticide use in your state, as well as to the manufacturer of the pesticide involved. Along with contacting these agencies, we would also recommend that you make an incident report to the Environmental Protection Agency by visiting the website and completing the form as completely as you can. Without such reporting, the regulatory agencies have no information to indicate that anything is of concern about current pesticides or the manner in which they are being used or misused. The experiences of our migratory beekeepers indicates that pesticide misuse is a widespread occurrence and incident reporting is the best method of countering these actions. BC

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Bee Calm

Going Gloveless Is A Journey

Kim **Flottum**

Start here. Protetive gear on while watching the bees. Everybody is calm

You've heard it a hundred times – learn to work your bees without gloves. It's so much easier because you have a better feel for where your fingers are and you crush and injure far, far fewer bees. You know it's true, but maybe next time . . .

And then you watch the instructor or that experienced beekeeper work that colony without even a veil on – not even a veil! And they almost never have a sting to deal with, and when they do, they just whisk it away without missing a beat. How do they do that?

The truth of the matter is that when you are working your bees, the first thing is, you have to have confidence in yourself. That confidence comes in part from having reached a comfort level when you have a colony open because you kind of know what to expect. And that comes from being there so many times – it's like riding a bike. Let's look at getting that confidence level up to where you want it.

For most folks it takes a bit of doing to get used to insects buzzing around your face and walking on your hands. Most of us grew up shooing away buzzers – mosquitoes on the patio, horse and deer flies at the beach, wasps and hornets when mowing the lawn. All of these can cause harm and early on most of us develop a survival response – we wave, slap, swat, spray or run. So to invite a bunch of similar insects into our backyard may seem to go against the grain. It usually takes some getting used to.

A closer look. Where's your little finger, really?

Here's a good starter to help build confidence, even if you've been working your bees a bit already this season and have checked them a few times.

Noonish on a warm, sunny day put on the protective gear you normally wear, light your smoker (practice, practice, practice that skill), grab your hive tool and head out to your hive(s). Approach from the back if you can but it's not necessary. Stand by the side, maybe between two hives if you have more than one, and – stand there. Puff

You can see how awkward these gloves are. Fingers too long, wrinkles in the palms. Handling frames is messy and hard on the bees.

There are all sots of gloves available. Find one that fits you, and fits the job.

Measure your hand for a good fit. Don't guess.

The right size means the difference between crushing bees and being in control.

your smoker once in awhile, just to make sure it is still lit (if it goes out now it won't be a problem, but a lesson in lighting you still need to learn), and stand there or maybe lean on the top, just to be comfortable. Touching the hive is good.

But don't waste your time day dreaming. After a bit, squat down and watch the bees on the landing board leave and arrive, look for pollen on the back legs, watch the guards, see the drones, look for other insects trying to gain entrance, watch bees land on you...your suit, your hands or gloves, even on your veil, inches from your face. Listen to the buzz the bees make, the zipping away when they leave empty and ready to load and watch where they go...what direction, how fast? Listen too for the lower buzz as they return, laden with nectar, propolis, water or pollen – it's a different sound if you listen carefully and note where they are coming from. Can't hear them? You're not listening closely enough. While you're there note the smell coming from the hive you're closeest to. It's the nectar being processed, the pollen being stored and the pheromones from the bees. Every hive is similar, but different. Breath deep.

Cover on the ground, inner cover askew, ready for supers.

Do this for about 15 minutes if you can, maybe 20 if you have the time. Just stand, squat or kneel there, watch and listen. What happens? Most likely, nothing. Nothing at all. Do this three or four or 10 times. You will get to the point where you don't even notice all the bees...just the ones you are watching. That's where you want to be – that's a comfort level to seek.

OK, time to move on. Let's remove the cover. Here's how that works.

Again, put on your protective gear and get your smoker going. You should have that down now – that smoker thing. Make sure you do. With your gear on and your smoker lit, and some time getting used to all those

The plastic coated canvas gloves are a bit less bulky, but finger length can be an issue.

Some beekeepers use smooth (not fuzzy, but maybe ribbed) cotton gloves. Sometimes with a rubber/plastic coating on the palm. These are mostly to keep propolis off their hands. They offer minimal protection.

Dishwashing gloves are the most versatile of all gloves, and with just the tips of two fingers removed are nearly perfect.

harmless bees just buzzing by, you should begin to have some sense of calm, and even control. Not complete control, but intimidation shouldn't be part of the experience anymore. If it is, go back and do the standing and squatting for a few more times.

Before you start . . . do this. Standing by the side of the colony you wish to open, put a couple of small, light puffs in the front door. Hardly any at all, but a little. You don't want to overpower the guards at the front, and you don't want to drive all the bees just inside further inside, but you do want to get a little smoke into the colony from top to bottom. It takes a couple of minutes for this to happen, but when the smoke is everywhere everybody is a bit confused and messages don't flow as fast, or as far – you've engineered a bit of confusion into the works – and that's what you wanted to do. Some beekeepers feel it's like knocking on the door, letting the bees know you're coming in.

Now . . . begin. Here's a simple five-step process to remove a cover – you can count it out every time you do this – sometimes that helps.

1. Pry up the back end of the cover just an inch or so and blow in a couple of small puffs of smoke and gently replace the cover. Wait a minute.

1. Cover - Lift, puff, replace, wait

2. Lift again, puff, remove the cover, setting in place on the ground or hive stand to receive the inner cover and boxes to come. Wait a minute

2. Cover - Lift , puff, remove, set down

3. Puff a couple of times in the inner cover hole. Wait a minute and let the bees retreat.

3. Inner cover – puff, leave in place, wait

4. Lift the back end of the inner cover, puff a couple of times and remove the inner cover, setting on the cover at a bit of a cross angle to hold boxes to come.

4. Inner cover – Lift, puff, remove, set down

5. Waft a couple of light puffs across the top bars, just so the bees retreat an inch or so below the top.

5. Puff, puff

This may seem over simplified, but it is a good way to imagine getting into the colony . . . count it out each time, and after only a very few times it will become second nature . . . and you won't have to think about it again – it is a good habit to have.

Helpful Advice

By the way, don't wear your watch when working bees. Sweat and smell build up there, especially if you have a leather band, and it's an instant honey bee irritant – one you don't need. Jewelry? If you still tend to swell even a little, leave the rings at home – it's a lot more painful later when that ring is really tight – take it off – take it all off.

But why are you in the hive? Practice? Good. Close it up and go home, or practice on another colony. But if you have a job to do – and you should already know what it is you came to do – go ahead and get to work.

But let's go back to those gloves . . .

Away from the bees but outside, try this. Take a frame, any frame. Put your *gloves on* and manipulate the frame, as if you were examining it. About waist high or so, turning it so it's at about a 30 degree angle flat so you can see the whole of one side. Make sure to turn so the sun is coming in over your shoulder and shining down into the cells to make seeing eggs easier. Sometimes, when the light is right, you'll see the egg's shadow move as you carefully tilt the frame. Some see that easier than the egg especially on new, light-colored wax. Slowly turn the frame so you are holding it so you can examine the other side just as well. Now, do the same *without your gloves* – see how much easier it is? Note that you have complete control of the frame because you know exactly where your fingers are on the lugs of the top bar – with bulky gloves you can't tell exactly where your fingers are inside the gloves, and sometimes what you see your gloved fingers doing isn't what your fingers are doing inside those gloves. And that's especially true when the gloves are too big, or the fingers too long – a very common problem with beekeeping gloves. That inexactness can lead to a dropped frame, a lost queen, a flight of really disturbed bees.

If your gloves are too big get gloves that fit. There are safe and better alternatives to those heavy-duty ill fitting leather or canvas gloves, you know. You can size your hand to get just the right size glove. S, M, L, XL and XXL exist but you have to know how big your hand is to choose the right one (guys, don't let your ego get in the way here) here's how that works according to Tom Thornton, who's been in the glove business for 30+ years. Tom's business, Bucko Gloves, sells gloves to beekeepers and a lot of other glove users, and a good fitting glove is

This is the long term goal – you'll get there. Be patient.

When you are comfortable doing this both you and your bees will be just fine, but . . .

. . . when you're comfortable doing this, you're ready for anything.

important for everybody.

To get the right size glove hold your hand as the photo shows, and using a tape measure, wrap it around the widest part of you palm, including your thumb base. If your hand measures 6", you need an XS size, and for each additional inch it goes S, M, L, XL and XXL. Thornton says that about 80% of his women customers wear an XS glove. It's a real plus when you get a glove that fits your wrist and palm, but sometimes the fingers are too long and after awhile they bend and roll and make handling frames more difficult, and more dangerous for the bees than necessary. But if you size it right fingers will be much, much shorter than that too-big pair you just got rid of.

An alternative to those big, heavy leather gloves are the rubber coated canvas gloves available. They are much more flexible, but for reasons I don't know seem to have hand size to finger length problems, because the fingers seem to always be too long. No matter what size you get. But they are cooler, easier to use and clean, and give you better control when handling the frame than those heavy leather models. Because they are thinner and lighter weight you have a better feel for your hive tool also when it's in your hand which is always a plus. So maybe try a pair of these on your journey to gloveless beekeeping.

Another style is those snug fitting dishwashing or cleaning gloves available at most grocery stores. Yes, they are thinner and yes, bees **can** sting through them, but barely, and seldom. Here's a secret – no matter what gloves you are wearing, smoke your gloved hands just a little before opening the hive to mask the odor of your hands and any lingering venom from previous visits. This will help immensely every time no matter what you are wearing. Of course you will always wear the beekeeper brand of smelling like a forest fire. It goes with the territory. But washing your gloves and your beesuit on a regular basis is always a good idea to get rid of that lingering venom, dirt and smoke odor. But wash them by themselves. Don't mix with the regular family laundry so you keep that venom away from other clothes.

So now that you're comfortable just hangin' out with the bees, do it again several times – without your gloves on – don't open the hive, don't make sudden moves or jerks. If anything, simply put your ungloved hand on top of the hive and stand there for five or ten minutes. Maybe a bee will land on your hand, maybe not. Try it. Just so you can feel the bees walking on your hand. As it is, your hand is not a threat, and any bee investigating is simply wondering what it is, and is there something to eat here. Think of your cat – they do the same thing when they find something new in the environment – whether your living room, the deck or backyard. What is it? Can I eat it? Will it eat me? Life's a lot less complicated for cats, and bees.

Most beekeepers don't scale down the gloves they wear – from heavy duty, bullet proof leather gloves to lighter canvas gloves to lightest of all rubber gloves. Rather, most don't scale down at all...though some have different kinds of gloves available for different kinds of work. You'll get there soon enough. Most beekeepers try going gloveless for awhile, then awhile longer, then hardly at all. You'll know when it's time. Well, sometimes your mentor (if you are fortunate enough to have one) will tell you it's time. That's one way to meet this challenge. But if you don't have a mentor or you're doing most of this on your own – here's a good next step. But have another pair of gloves handy, all the time, just in case.

Cut the ends of the fingers off your gloves. Maybe just index and thumb to start. And just the first digit. You will not believe how much more control you have when you do just that little bit. (tip: if the gloves you have are so large that when you cut the end of the finger off the opening is large enough that a bee can crawl into it, snug the opening up with a rubber band or duct tape first. Keep the bees on the outside of the glove). Get used to that for a bit. Work the hives a few times. Learn where bees are, what they feel like when you touch them instead of the frame you want to pick up. Look before you squeeze so you see and feel bees in your way. You can gently push them out of the way, gently blow them out of the way (which is a good way to move bees off a place on a frame you want to see), or if there are a lot, puff a bit of smoke their way. Seeing, and feeling the bees goes a long way in not squeezing them any more, and avoiding the consequences of that. A wounded bee gives off alarm pheromone. And then the fun begins.

Keep practicing with fingerless gloves, or thinner gloves or dishwasher gloves or no gloves at all. Keep it so you always feel safe and so you are in control. Always have an extra set with you so if things don't go as expected you have a backup.

It'll take some time – maybe a season, maybe a couple weeks. It doesn't make any difference at all how long because if you don't feel safe, if you're not comfortable, if you avoid working the bees you'll never become a beekeeper. Keep doin' bees, gloves or no gloves. It'll happen. BC

THE BIG PICTURE

The Bees See The Big Picture. Do You?

Ann **Harman**

A beekeeper recently wrote, as a letter to the editor, that no honey bees, or other insects, have been seen on blooming trees of black locust, tulip poplar and American holly for several years.

Just after I read that account, I happened to read that a beekeeper noticed bees on bluebells this Spring but in previous years little interest had been shown. In the same journal someone else reported that profusely blooming hawthorn was seen but no nectar produced. Another beekeeper noticed "bees all over American holly" this Spring. In Germany Spring flowers bloomed before colonies had built up strength so they could benefit from the nectar.

I rode my horse past a neighbor's gigantic forsythia bush during many Springtimes and admired the glorious huge yellow fountain of flowers. Forsythia is not considered a honey bee plant – right? Why then one year, and one year only, were the blossoms covered with honey bees? My bees – I could see the flight path with hundreds of bees.

Is there a problem with all these plants? Or do we just focus on bee-related problems? Perhaps it is time for us to think about the many factors that enter into the bee's use of possible nectar sources. But more important are the possible nectar sources themselves.

First of all let's consider the records we are keeping. Oh! You are keeping records on your colonies aren't you? Your records for an inspection probably consist of: Brood? Yes. Lots. Queen? Doing fine. Food? Plenty. Disease, mites, SHB? Looks OK.

That is just a tiny snapshot of what is actually going on in the bees' world. Bees have to cope with daily weather: too cold to fly? raining? wind? snow, sun, hot, thunderstorm? Bees have to be aware of useful plants and their blooming times. Bees respond to the "reports" of scout bees. Scout bees can be considered independent operators – no bees tell the scouts where to go; they make their own decisions.

Now consider the plants, whether trees or meadow flowers. Plants are simply rooted to their spot (pun intended). Plants have to endure what each day gives them: cold, rain, wind, snow, sun, hot, thunderstorm. But plants also have to cope with the past: drought, floods, Winters too cold, Winters too warm. Since plants cannot move around they are good targets for pests. And like other living things plants can suffer from diseases and poor nutrition. Tulip poplar trees are very sensitive to ozone, an atmosphere pollutant. Unlike bees that can cluster for protection from a late Spring freeze, plants just have to cope as best they can.

We tend to take a short view of weather. Do I need a jacket today? Or a raincoat? Sunscreen or gloves? At times we take a bit longer view and grumble: "hasn't this been a particularly hot Summer?" Then a pleasant Autumn arrives and the Summer weather is forgotten.

We hear and see news stories about global warming and climate change. We hear so much conflicting information that perhaps we are not paying very close attention to the information from the scientists. They do study the cycling climate of the earth. Fossils of plant and animal life tell us much of what has happened in the past. We can, today, measure temperatures, rainfall, plant blooming times, and many other factors. The information is available and it is valuable. Changes are a slow process, not simply weather day to day.

Beekeepers need to be a participant in climate studies. It is a good way to become better beekeepers.

Keeping Good Records Is THE ONLY Way You'll 'See' What's Going On.

Information is being gathered on nectar collection and blooming dates. I encourage beekeepers to visit the following websites: **http://usanpn.org** and **honeybeenet.gsfc.nasa.gov** where you will find information about how you can participate in collecting information on nectar sources for honey bees. The Honey Bee Net was founded and is guided by a beekeeper, Dr. Wayne Esaias. I think you'll find the sites interesting and informative.

Just as bees have preferences for choosing their home, plants do, too. Types of soil, rainfall, and temperature range are all important. In the temperate area of the country the success of many plants depends on a certain number of days of cold weather during the Winter. Adequate rainfall the previous year promotes root growth. Sugar is stored in the roots of trees in the previous year to be used for nectar the following year. So sugar production doesn't just happen in the Spring. Perhaps now we are beginning to see the need to expand our observations and record keeping.

Remember I mentioned that plants could have problems with pests. In some parts of the country this is the year of emergence of the 13-year cicadas. Yes, there are cicadas that have a 17-year cycle. The nymphs (the pre-adult form) of cicadas feed on the juices in tree roots and perennials. Normally there are only a limited number of cicadas that emerge each year. But 2011 was the year for tens of thousands of cicadas to emerge in the south. So last Autumn and throughout the Winter those tens of thousands of nymphs were taking their nourishment from the roots. We might guess that the blossoms might have a limited supply of nectar. One more thing to consider. The female cicadas lay their eggs in slits made in the tender shoots of trees. These twigs generally die and fall to the ground. So a tree has effectively been pruned of young growth that may affect blooming next Spring. Just something for our records.

So you inspected a tree in your own garden. Could there be some of the same kind of tree a short distance away? It is possible that the scout bees found those trees first and recruited bees there? Microclimates exist everywhere. Just take a walk or drive around in the area your bees can cover when foraging. You may notice that some flowers are at peak bloom whereas your garden flowers, of the same kind, just have fat buds, no open blossoms yet. You are discovering these microclimates but your bees know about them already. These microclimates can change over the years. Suburbs sprout out of farmland; great shopping malls wipe out a forest. And farmers change their crops. Your bees are keeping track of these changes. Are you?

Bees are a bit particular about their nectar. That with the highest sugar concentration is preferred. Of course! Less work involved in evaporating off the water to make honey. Apple growers know that dandelion blossoms are preferable to apple blossoms. For successful apple pollination dandelions need to be mowed or eliminated from orchards.

Perhaps your bees have discovered an abandoned field that is now a carpet of dandelions. Watch the bees' flight path from your hives. Are they bypassing your tulip poplar tree and heading beyond, out of sight. It is difficult to follow bees but you might start looking in the direction of flight to see if a more attractive nectar source has been discovered.

The scientists that are measuring global warming have found some interesting results. In certain areas plants are blooming earlier than they did a few decades ago. However in areas normally warmer, plants are blooming later. This seems rather peculiar except in the temperate climates a certain number of cold days are necessary for the plants' life cycles. Therefore, those plants are staying dormant a bit longer in order to have the correct length of chill. Now you have one more things to consider – do you live in the earlier Spring area or the later one? You can find that information on the websites mentioned earlier in this article. You need to find out so that your records can be compared to others in the same region.

In observing blooming times it is perfectly all right to include non-bee plants, such as dogwood or roses and perhaps some garden flowers not necessarily favored by bees. Such observations will help you to understand what is happening.

No matter the size of your apiary – two hives, 10 hives, 100 hives – you might consider having one of them on a scale. So your bees turned down your tulip poplar tree but the hive is gaining weight. Without looking in the hive you now realize that your bees are bringing nectar in from somewhere. You will have a honey crop. Find out more about having a scale hive in the two websites mentioned. A scale hive really keeps you informed about what your bees are actually doing. A scale hive is great fun!

Now let's return to our records. It does not matter how you are keeping yours – in a notebook, on a computer, on a big calendar – your method works for you. Just don't keep records on little scraps of paper tucked under the hive cover where they get chewed by critters.

Your records are now going to include weather. No, not weather each and every day but definitely the year around. Since you will be using this information for reference in the future, think about what you are saying so it makes sense in the future. January: bitterly cold with all days and nights below freezing but no snow. April: sunny, temperatures a bit warmer than normal but no rain during the entire month. May: began as a normal month with occasional showers then on May 7 a hard freeze; tree leaves shriveled up, buds froze. Expected tree bloom won't happen.

You will be recording drought, temperature extremes, too much rain at the wrong time, perhaps pest damage. Now next Spring as you stand there blaming your tree for being lazy and not producing nectar, you can go back and see the conditions that may have produced the problem. You will be creating a picture of what the plants are doing.

The bees have the big picture. Do you? BC

Ann Harman sees the Big Picture from her home in Flint Hill, Virginia.

Oscillating Tools

They don't solve every problem you'll have, but they will make some things possible that weren't before.

Peter **Sieling**

I was balancing on a ladder with a power saw, cutting a hole in a house to remove a colony of bees. The homeowner came out with an oscillating tool that he had just purchased. I immediately saw the possibilities of this small, lightweight tool. It is capable of sawing through lath and plaster, drywall, and siding with almost no damage to the honeycomb inside the cavity, and no danger of kickback.

Oscillating tools don't have spinning or reciprocating cutters to catch in the wood and jerk you off your ladder or the tool out of your hand. Instead, the head vibrates in an arc of three to four degrees at a rate of up to 20,000 strokes per minute. You can buy blades to cut through a wide variety of materials, including wood, drywall, metal, and grout. Oscillating tools can also be used for sanding, polishing, and scraping. Because the blade is offset from the handle, they can cut flush inside corners and other tight places. They plunge cut straight into a wall, allowing a small inspection hole with minimal damage to the wall.

Oscillating tools range in price from $40 up to $400. The price varies with the quality of the machine and the accessories that come with it. Some brands include adaptors that allow you to use attachments from other brands, increasing the tool's versatility. You can find information and side-by-side comparisons of oscillating tools online at **www.protoolreviews.com/buying-guides/oscillating-multi-tool-shootout-comparison** and at **www.popularmechanics.com/home/reviews/power-tools/4325505** or search you tube for demonstrations and promos. Take the promo videos with a grain of salt.

Better Homes and Gardens *Wood* magazine (**www.woodmagazine.com**) evaluated 10 brands of oscillating tools in their March 2011 issue. They gave their Top Tool award to the Bosch Multi-X PS50-2B (www.boschtools.com) and the Fein MultiMaster FMM 250Q (fein.com), also one of the most expensive. They awarded their Top Value award (best value for the price) to the Craftsman Multi-Tool 23465 (**www.craftsman.com**). These are corded tools. I wanted something to open walls in barns and abandoned houses where no electricity is available and decided on a battery powered tool.

After doing some research, I bought the battery powered Rockwell SoniCrafter, model RK2514K2 (**www.rockwelltoolsdirect.com**). *Wood* magazine gave it good grades, plus it's one of the lightest and quietest. Unlike some cheaper brands, the price includes two batteries, so one can charge while the other is in use. Battery technology has improved since my last battery operated tool. Extra batteries used to cost more than the tool and the old batteries deteriorated in a few years. Rockwell now offers lifetime free battery replacement.

The convenience of batteries is offset by the limited power. That's not a problem if one battery is charging while you use the other, but it could be a problem where no electricity is available. New batteries will accept about 60% of a full charge, requiring several recharges before reaching full capacity. I was able to fully expose a colony, cutting a hole approximately 16 inches by three feet with one new battery. Cutting through more than one layer of sheathing may be more than a battery operated tool can handle. You can get more use from a charge by using a sharp blade and using the tool to crosscut, then splitting out sections of wood with the grain.

Other uses

There are a variety of blades available for oscillating tools, and some brands come with adaptors that allow you to use other brands of blades. I tried the scraper attachment to clean comb and propolis off frames. I first used the scraper blade as it came out of the package. Next I sharpened it. Finally I drew out a hook like a cabinet scraper. In all cases, the scraper blade tended either to dig into the wood or leave wax and propolis behind. A properly sharpened hive tool for scraping hive equipment still works more efficiently.

Outside the beeyard and honey house there are many uses for an oscillating tool, mostly in areas where you can't reach with other cutting, sanding, and scraping tools. They excel for making small openings for electrical outlet boxes, or cuts in corners where other tools won't fit.

Limitations

While oscillating tools are great for some jobs they won't replace traditional power tools on big jobs. Still, they'll do little jobs easily and reach places you'll never reach with a reciprocating or circular saw.

The most common complaint is that the blades dull quickly. They are expensive, and I used up my first blade making openings for two colonies. By comparison, a carbide circular saw blade costs about the same and can cut through several miles of kiln dried hardwood before it needs sharpening. A table saw blade can be sharpened many times. If you watch any promotional videos for oscillating tools, you might think they melt through nails like butter. They do cut nails, but plan to replace the blade every few minutes. At $10-$20 per blade, it's better to avoid nails.

As with everything, there is a learning curve with oscillating tools. It's easy to push the blade too hard. Unlike regular saws, the teeth don't clear away chips efficiently, which may cause the blade to overheat.

I've used my oscillating tool to remove several wild colonies. So far, it has been easier to use, and safer, whether I'm standing on a ladder removing siding or squeezed into a closet vibrating through sheet rock. I still carry a reciprocating and circular saw – I couldn't imagine opening a hardwood floor without those. But in most cases, except for the bee-vac, the oscillating tool is the only power tool I'll need on a job. BC

Peter Sieling makes bee hives and removes bees from buildings in upstate New York. Contact him at **www.makingbeehives.com** or **www.garresonpublishing.com**.

Corded and cordless models are available. But watch out for nails.

GLEANINGS

AUGUST, 2011 • ALL THE NEWS THAT FITS

LLL PARTY

Family and Beekeepers gather at permanent marker. David R. Oakely, cousin; Sherry L. Smith, great-great granddaughter; Dr. Rick Intres, President, Franklin County Beekeepers Assoc. (FCBA); Cynthia Allen, FCBA; Dan Conlon, President, Massachusetts Beekeepers Assoc.; Tom Graney, FCBA.

The 200th birthday of Rev. Lorenzo L. Langstroth was held at Second Congregational Church, the site of his pastorate from 1843-1848 on May 14, 2011. A formal morning presentation was held with several speakers in attendance. Dan Conlon, President, Massachusetts Beekeepers Association and Dr. Rick Intres, President, Franklin County Beekeepers Association both spoke about current and future challenges and opportunities for beekeepers. Tim Blagg, local historian and editor of the county newspaper, discussed the community at the time when Langstroth lived in Greenfield several times between 1843-late 1850s. He completed and published his seminal book, "Hive and the Honeybee," while living in Greenfield in 1853. Two relatives also presented information from the family perspective: Sherry Langstroth Smith, Great-Great Granddaughter and David R. Oakely, a cousin. The church is directly adjacent to the building that served as the High School for Young Ladies, where Langstroth served as first an educator and then a principal prior to his ministerial duties. Photographs were taken at the permanent granite marker on the church lawn. The marker had been dedicated in 1948 with E.F. Phillips and others in attendance.

LESS HABITAT = MORE INSECTICIDE

The continued growth of cropland and loss of natural habitat has increasingly simplified agricultural landscapes in the Midwest and a Great Lakes Bioenergy Research Center study says this is associated with increased crop pest abundance and insecticide use.

The relationship between landscape simplification, crop pest pressure, and insecticide use has been suggested before, but until now has not been well supported by empirical evidence.

The new study, published online in the Proceedings of the National Academy of Sciences, is the first to document a link between simplification and increased insecticide use.

"When you replace natural habitat with cropland, you tend to get more crop pest problems," says Tim Meehan, University of Wisconsin–Madison associate scientist in the Department of Entomology.

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BUMBLE DECLINE

Pollination services are at risk in Sweden after a drastic decline in the bumblebee population.

Scientists from the Swedish University of Agricultural Sciences and the University of Lund have discovered the community composition of bumble bee species and their relative abundances have changed drastically over the last 70 years in Sweden.

In the same period, the average seed yield of red clover has declined and variation in yield has doubled, suggesting the current dependence on few species for pollination of red clover has been detrimental especially to stability in seed yield.

STEP

The study was part of Project STEP – Status and Trends of European Pollinators – funded by the

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VALUE ADDED GRANTS FOR BEEKEEPERS

The U.S. Department of Agriculture today released a notice inviting farmers to apply for Value-Added Producer Grants (VAPG). Today's notice combines two year's worth of funding for the program, making $37 million available for new value-added projects. Project proposals are due by August 29.

"We have fought hard for VAPG and are delighted the notice of funding availability is out and the program is once again open for business," said Ferd Hoefner, policy director of the National Sustainable Agriculture Coalition. "Value-added grants are an important opportunity for entrepreneurially inclined small and mid-sized family farms to expand markets and increase farm income. The resulting projects also help meet consumer demand for quality food products and increase rural jobs."

VAPG is a competitive grants program that awards grants to producers to help them develop farm-related businesses that add value to basic agricultural products through branding, processing, product differentiation, labeling and certification, and marketing. VAPG includes projects that market inherently value-added production, such as organic crops, grass-fed livestock, and locally produced and marketed food products. VAPG also funds regional food supply networks that benefit the small and mid-sized farms by incorporating the producer into the larger farm-to-plate value chains.

"Congress made a good choice in targeting VAPG funds to small and medium sized family farms as well as to beginning and socially disadvantaged farmers and ranchers," noted Hoefner. "Projects involving these target groups receive extra ranking points during the grant evaluation process. In addition, ten percent of program funding is reserved for local and regional food supply networks that link farmers with other processors and distributors that market value-added products in a manner that improves small and medium-sized farm profitability. Ten percent is also reserved for projects primarily benefitting beginning and socially disadvantaged farmers and ranchers."

The VAPG program was initiated by Congress as part of the Agricultural Risk Protection Act of 2000 and extended and revised as part of the 2002 and 2008 Farm Bill. Fund-

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HONEY THIEF NOT SO SWEET

The Tulare County Sheriff Department confirms an arrest over a major theft involving several hundred thousand dollars from Cary's Honey Farms in California.

The department says based on information received and further investigation by its Agricultural Crimes Unit, Guadalupe Gonzalez, age 55 of Lindsay, was booked at the main jail on charges of grand theft and fraud.

The Fresno Bee reports the man, the 14-year trusted manager of the honey farm, which has been in business for 40 years, is accused of selling Cary's honey on the black market and pocketing the cash.

The Pipkin Detective Agency says Cary's Honey Farms lost several hundred thousand dollars in the scam. Private investigator Rocky Pipkin made a citizen's arrest of the employee after a seven-week investigation by the company.

Gonzalez pleaded not guilty to felony grand theft by embezzlement, with a special allegation of excessive financial taking. Bail was set at $100,000.

Farm owner Norm Cary tells the newspaper said his business, with 15,000 hives producing about 1.5 million pounds of honey annually, has been growing.

"I had to delegate more and trust more," Cary says. "I had no suspicion this individual was stealing. He had full access."

Pipkin alleges Gonzalez sold 55-gallon barrels to people who would take them to clandestine packing plants between Fresno and Los Angeles, put the honey into jars and honey-bear bottles, then sell them to fruit stands and markets.

"The labeling has fake bar codes, fake phone numbers and a fake website," Pipkin is quoted as saying.

The Fresno Business Journal reports the Pipkin agency was hired after honey barrels went missing.

"They were missing inventory and were concerned they had an internal theft problem," Rocky Pipkin says.

Each was valued at about $1,200 and Pipkin claims Gonzalez was selling them for between $600 and $800.

The problem had been going on for several years, but became more noticeable in recent months as the market price of honey increased, he says.

"They were selling truckloads in LA," Pipkin says. "It was a pretty big deal."

At $1,200 a barrel and with losses of $200,000, this would mean more

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Less Habitat – From Page 72

"Two things drive this pattern. As you remove natural habitats you remove habitat for beneficial predatory insects, and when you create more cropland you make a bigger target for pests – giving them what they need to survive and multiply."

Because landscape simplification has long been assumed to increase pest pressure, Meehan and Claudio Gratton, UW-Madison professor of entomology, were not surprised to find that counties with less natural habitat had higher rates of insecticide use.

One striking finding was that landscape simplification was associated with annual insecticide application to an additional 5,400 square miles in the Midwest, an area the size of Connecticut.

Although simplification of agricultural landscapes is likely to continue, the research suggests that the planting of perennial bioenergy crops such as switchgrass and mixed prairie can offset some negative effects.

"Perennial crops provide year–round habitat for beneficial insects, birds, and other wildlife, and are critical for buffering streams and rivers from soil erosion and preventing nutrient and pesticide pollution," says Doug Landis, Michigan State University professor of entomology and landscape ecology.

Gratton says perennial grasslands that can be used for bioenergy could also provide biodiversity support, specifically beneficial insect support.

"If we can create agricultural landscapes with increased crop diversity, then perhaps we can increase beneficial insects, reduce pest pressure and reduce the need for chemical inputs into the environment," he says.

"We are at a junction right now. There is increased demand for renewable energy, and one big question is: where it will come from?" Gratton says. "We hope that these kinds of studies will help us forecast the impacts that bioenergy crops may have on agricultural landscapes."

The Great Lakes Bioenergy Research Center is one of three funded by the Department of Energy to make transformational breakthroughs that will form the foundation of new cellulosic biofuels technology.

Alan Harman

Value Added – From Page 72

ing in Fiscal Year 2010 was over $20 million, but funding was reduced to just under $19 million as part of the Continuing Resolution for Fiscal Year 2011. The agricultural appropriations bill recently passed by the House of Representatives would slash the program by more than a third to $12.5 million.

"We urge the Senate to reject the House-passed cut to VAPG and to maintain funding for this innovative, market-based jobs-creating program," said Hoefner.

Grants may be used to develop business plans and feasibility studies (including marketing plans) needed to establish viable marketing opportunities for value-added products or for working capital to operate a value-added business venture or alliance.

"One of the stumbling blocks of late to farmers and groups of farmers seeking VAPG funding is the one-for-one matching grant requirement," said Hoefner. "In a major win for farmers that NSAC fought for, farmers may now provide up to half the match requirement through "sweat equity" – the farmers time in developing or implementing the project. This is an important new development that should make it easier for farmers to apply for program funding."

The agency estimates it will make about 250 awards. Awards are expected to be announced by the end of November 2011.

Applicants may submit a planning grant (up to $100,000 each) or a working capital proposal (up to $300,000 each). The agency is estimating, based on previous experience, the average size grant award will be $116,000. In the last round of awards, 41 percent of total awards were under $50,000.

Applicants may propose any time frame for the project provided it does not exceed three years.

The complete application package will be available from the USDA Rural Development site at http://www.rurdev.usda.gov/BCP_VAPG_Grants.html.

Get the application package from the Rural Development site.

You can also find out more about eligibility and the application process guidelines by contacting your local USDA Rural Development Office, or contact the national program staff Lyn Millhiser at 202-720-1227 or Tracey Kennedy at 202-690-1428, or by emailing cpgrants@wdc.usda.gov for additional information.

Additional Resources

If you are an agricultural producer or producer-controlled entity interested in applying, you can learn more at NSAC's summary of the VAPG program and read this guide to applying from the University of Wisconsin's Agricultural Innovation Center. Templates for applications are available from the University of Nebraska's Food Processing Center. More information specifically about this 2011 iteration of the program will likely be forthcoming in the near future.

This is especially valuable.To see how the FY 2009 awards were distributed and 15 examples of the projects that were funded, go to NSAC's two page summary of the 2009 VAPG projects.

Bumble Decline – From Page 72

European Union. Research leader Riccardo Bommarco says it is worrying to see evidence that previously common bumble bee species have become rare and even red-listed.

"It is possible that such changes in community composition precede extinctions," he says. "In our efforts to conserve species and manage ecosystem services is appears important to promote not only species-rich, but also more evenly composed communities of service-providing organisms."

Notable efforts were made from the 1940s to the 1960s to explore pollination and seed production of red clover (Trifolium pratense), which is an important forage crop that is dependent on pollination by bumble bees for seed set.

Those detailed records were compared to present data on relative abundances of bumble bee species collected in 2008-2010 in 44 red clover fields across Sweden.

The results show that two species (Bombus terrestris and B. lapidarius) have increased from 40% in the 1940s to entirely dominate present communities with 89%.

Other species, such as B. hortorum and B. pascuorum have decreased tenfold in relative commonness, from around 20% to 2% of the observed bumble bees in a flowering clover-field.

Notable is also the decline for B. distinguendus from 11% to 0.7%. This species is now is listed as near threatened in Sweden.

Alan Harman

Honey Thief – From Page 73

than 165 barrels were stolen.

Cary tells ABC TV station KFSN honey is a profitable commodity right now.

"There's a world shortage right now and prices are higher than they've ever been," he says. "Our wholesale price is as much as $1.85 a pound and he was selling it for quite a bit less than that."

He says he paid the employee pretty well.

"He had a nice package," he says. "Which is why he was stunned to learn a manager of nearly 15 years may have been involved in stealing from his company.

"It hurts a lot because he was my friend and I trusted him with everything. He was in charge of inventory and that was part of the problem."

Cary says family members are now in charge of plant production and inventory. – *Alan Harman*

ON TOP DOWN UNDER

Two Australian entrepreneurs are rescuing bees from the wild and turning it into a rooftop business in Melbourne, Victoria.

Vanessa Kwiatkowski and Mat Lumalasi are installing hives on the city's rooftops and balconies in the central business district.

They manage the hives and pay the site owners with a percentage of the honey they retrieve.

Kwiatkowski Melbourne Beekeepers Club members collect swarms from the wild in the Spring and Summer and help relocate the bees in different parts of the city.

The couple originally planned to only install hives above restaurants and cafes, but demand quickly expanded this concept.

Their business called Melbourne Rooftop Honey now has 20 hives in operation within six miles of the city center and a waiting list of about 110 people wanting a hive of their own.

"A lot of people are interested in getting their own local honey," Kwiatkowski says. "There's a market there for it."

Melbourne Rooftop Honey aims to cultivate honey with a distinctly Melbourne flavor. The long-term goal is to produce honey specific to each Melbourne suburb.

The couple are hobbyist beekeepers and their business started out last November as a hobby project'.

"I woke up one day and thought it would be a good idea (to install hives atop city buildings) and was quite relieved to realize that most of the world was doing it already," she says.

French research shows city bees produce more honey and have significantly longer life spans than their rural counterparts.

Kwiatkowski says this may be because city bees don't have to travel as far to forage and the lack of agricultural pesticides in the central city.

What she did find was a surprising amount of bee-friendly plants in the concrete jungle.

"In the city itself we have about 18,000 to 20,000 London Plane trees (a hybrid of the American and Oriental Plane tree), which bees love," she says. "We've got quite a lot of diverse plants in the city too, even in people's little terraces and cottage gardens."

This means distinctively flavored honey and the amber crop from the first two sites tasted completely different to each other.

"We're really interested to see what the variation in the city is," Kwiatkowski says.

The restaurants hosting a hive plan to feature their home-made honey on the menu.

The off-beat nature of their business attracted the attention of the Melbourne chapter of the Awesome Foundation. It's a loose-knit international group first formed in Boston in 2009 that gives $1,000 grants for ideas so crazy they just might work.

Kwiatkowski and Lumalasi won their grant ahead of 30 other applicant and used the money to buy a honey extractor and other beekeeping equipment.

"We extract the honey raw and unprocessed, which we will do at one of the restaurants that has donated its kitchen to help out," Kwiatkowski says. "Individuals can purchase their own local honey, with the balance being sold back to the city community for pick up at nominated collection points."

She says they see urban beekeeping as an ideal way of increasing the bee population.

"We saw the need to get involved in the worldwide effort to help save the honey bees," Kwiatkowski says.

"With the Asian honey bee threat and *Varroa* mite on our doorstep, a serious risk is taking place on our natural food supply. Since the honey bee is crucial in our environment and their existence helps with sustainability in food along with the responsibility of pollinating a large proportion of the food we eat, if the honey bees are in trouble, we are in trouble as well."

They have overwhelmed with the support they are receiving.

"Some businesses just come to us and say, We just want to be involved, we don't really want the honey," she says. "During Spring and Summer the couple checked on the hives about every 10 to 14 days, but now the southern winter has arrived they plan to winter them down and leave them alone. – *Alan Harman*

NW SHB TRAP

Australian researchers release a small disposable trap that sits at the bottom of the hive, taking advantage of the small hive beetle's natural behavior of retreating into the trap to evade bees

The beetles are then killed by insecticide inside the A$4.95 single-use trap that lasts up to three months.

The Apithor Hive Beetle Harborage device has a tamper-resistant rigid plastic design that fits on the hive bottom board to ensure beetles enter the harborage. The precise size opening allows beetles to enter while excluding bees.

The insecticide impregnated cardboard in harborage is set back from the openings to ensure bees cannot make any contact. Trials confirmed there is no residue in honey when the trap is used.

Apithor was developed, tested and patented by the Rural Industries Research and Development Corp. (RIRDC) and NSW Department of Primary Industries (DPI) after extensive work by NSW entomologist Garry Levot.

The SHB first appeared in Australia in NSW in 2002 and since then has spread rapidly and now is a major pest of honey bee hives.

It's estimated to cost beekeepers around A$4.5 million annually in damaged hives, weakened bee colonies and affected honey.

"The benefit of the trap is that it is inexpensive, easy to install, is lethal to the SHB and is safe for beekeepers and bees. Extensive testing also shows that the honey is unaffected."

To coincide with the launch of Apithor, RIRDC released a new report aimed at improving understanding and management of the SHB.

It looks at the biology and behavior of the SHB and the environmental factors such as temperature, humidity which favor its spread.

The study, conducted by Nick Annand of NSW DPI, reports temperatures of 15°C or less and 45°C and above have been found to prevent SHB laying eggs, and eggs exposed to these temperatures do not hatch.

It says the greatest number of SHB enter hives in the two hours prior to nightfall and the populations of SHB in the hives peaked in late autumn then declined right through Winter with the lowest numbers in late Spring

Almost half the SHB observed were outside the hive during the hottest month of the year however when seasonal conditions cooled the SHB retreated back into the hive.

Alan Harman

HORSES LOVE HEALING HONEY . . .

It works with humans, so why not horses?

That's the question Australian researchers asked before finding a simple application of manuka honey to horses' leg wounds results in smaller wound sizes and a faster healing time.

University of Sydney researchers say while honey has been used to treat wounds in humans since ancient Egypt, their research, using manuka honey from New Zealand, is the first time in the world a clinical trial has been conducted on horses.

"Wounds in horses, particularly leg wounds, have long healing periods," lead researcher Andrea Bischofberger says. "We found applying a manuka honey gel throughout healing led to 27% faster healing times.

Bischofberger is a Swiss veterinarian working with the Research and Clinical Training Unit (REaCT) at the University Veterinary Teaching Hospital in Camden, a part of the University of Sydney.

She says wounds in horses which received no treatment took an average of 64 days to heal, while those treated with manuka honey gel took 47 days to heal.

"In our pilot study we used pure honey, but in our second study we used a water-based manuka honey gel of 66% honey. When applied for 12 days we found these wounds healed just as well as those treated with pure honey."

Bischofberger says using a manuka honey gel means expensive bandages can be avoided.

"With its faster wound healing times and its bandage-free application, the manuka honey gel solution is an extremely versatile and affordable topical wound product," she says.

In a third study Bischofberger investigated how manuka honey actually works to speed up wound healing. She says while it seems to have an anti-bacterial effect and immune-modifying effect on the key initial healing phase, the inflammatory stage, the honey's exact healing mechanism is still unclear.

"What we do know is treating wounds with manuka honey leads to healthier tissue regrowth," Bischofberger says.

"Wounds treated with manuka also showed improved new blood vessel and skin surface growth compared to control wounds."

REaCT director Andrew Dart, a surgical specialist and expert on the complications associated with lower leg wound healing in horses, says healing in horses' limbs, particularly lower limbs, is usually a long and complicated process compared to wounds on the body.

"The results of these studies have led to significant national and international interest both from the animal and human fields," Fart says. "There is potential for the manuka honey gel to be used across species with similar beneficial effects."

Alan Harman

GUARD BEES

Beehive fences are being successfully used to keep elephants and farm crops apart in Kenya.

Researchers from the University of Oxford and Kenya's Save the Elephants organization, who earlier discovered African elephants quickly leave areas where they hear the sound of buzzing bees, designed a fence with beehives spaced every 33 feet.

The researchers report in the African Journal of Ecology that increasing elephant populations in Kenya since 1989, while a conservation success story, are resulting in rising numbers of incidents of human-elephant conflict.

The project saw 5,577 feey (1,700 meters) of beehive fences semi-surround the outer boundaries of 17 farms in a Turkana community of 62 communally run farms.

The elephant invasion events were then compared with those of 17 neighboring farms whose boundaries were protected only by thorn bush barriers.

There were 45 farm invasions, or attempted invasions, recorded over two years ands the beehive fences were easily the most effective/

The 13 groups of elephants that approached the beehive fences were turned away.

There were 31 successful invasions of farms guarded by thorn bushes and only one bull elephant broke through the beehive fences.

"These results demonstrate that beehive fences are more effective than thorn bush barriers at deterring elephants and may have a role to play in alleviating farmer–elephant conflict," the researchers report.

"Additionally, the harvesting of 106 kg (233 pounds) of honey during the trial period suggests beehive fences may also improve crop production and enhance rural livelihoods through honey sales."

Alan Harman

. . . MORE ON THE WAY

New Zealand beekeepers win a NZ$1.7-million (US$1,346,387) grant for research to improve the reliability of supply and yield of medical grade Manuka honey, in the process creating a billion-dollar industry.

Half the money comes from the government's Primary Growth Partnership (PGP) and the rest from the industry.

They money goes to a Manuka honey industry consortium whose business plan outlines a program of innovation over seven years.

The group covering the Manuka honey supply chain aims to expand the value of the sector by developing a science-base for the industry to understand how local ecosystems affect yields and activity levels in Manuka honey.

It is lead by Manuka Research Partnership (NZ) Ltd. and Comvita Ltd.

The objective is to increase the reliability of supply and proportion of medical grade Manuka honey. If fully realized, it is estimated the program could see a 16-fold increase that will grow the sector to a billion dollar (US$702,000) industry.

Ministry of Agriculture and Forestry Director General Wayne McNee says the funding is an illustration of the potential that exists within New Zealand's primary sector.

"PGP is all about investing in forwarding-thinking, visionary business plans that have the potential to transform our primary sectors and bring about substantial and sustainable economic growth," he says.

Agriculture Minister David Carter says the successful bid by the Manuka honey industry consortium is a sign the industry has the potential to grow significantly.

"The government's investment in this latest proposal is what the PGP is all about – a commitment to significantly boost economic growth through research and innovation right across the primary sector," he says.

"I congratulate this consortium on meeting the robust approval process and I wish it every success in its bid to expand into a billion-dollar industry." – *Alan Harman*

HONEY WITH BEE VENOM ADDED A NO-GO IN UK

Britain's Food Standards Agency orders Nelson Honey and Marketing (New Zealand) Ltd. to stop selling its bee venom honey in Britain.

The New Zealand company asked the agency for a "novel food" licence to sell the product, but it ruled there is in not enough evidence to prove that eating bee venom is safe.

The Bee Venom honey is labeled Manuka Ease and is touted for use on "toast, porridge, a warm drink or even off the spoon and help soothe any aches and pains with one of Mother Nature's best kept secrets.

It's listed as being sold in 500-gram (16.6-oz) jars for £16.99 ($27.35).

Honey containing venom has been on the New Zealand market since 1996, however it is considered novel in the European Union.

Venom is obtained from bees via a milking apparatus procedure, dried and added to honey. The applicant states the novel ingredient may help to alleviate symptoms of arthritis.

Before any new food product can be introduced on the European market, it must be rigorously assessed for safety. In the UK, the assessment of novel foods is carried out by an independent committee of scientists appointed by the Food Standards Agency, the Advisory Committee on Novel Foods and Processes.

Following an initial public consultation on the application and the discussion of this application, the committee earlier formulated a negative initial opinion on the venom ingredient.

It recommended bee venom not be approved on the basis the committee cannot be certain the ingredient is safe for all consumers and it could not identify any additional data that could be generated to remove this uncertainty.

The Food Standards Agency was also concerned people who are unknowingly allergic to bee venom could be put in danger.

In its June 2009 application to the agency, the New Zealand company said there had been more than 13,437,000 individual 20-gram (.7 of an oz) doses of Manuka honey with bee venom sold in 13 years and reported incidences of adverse reactions had been extremely low.

"In fact, only three adverse reaction reports where Manuka honey with added bee venom has been causally associated have been made to the Center for Adverse Reactions Monitoring in New Zealand" supporting evidence stated. "Two reports were in 1998 and the last was in 2005 and involved a 91 year old with a number of other conditions."

Nectar Ease UK Ltd. is the UK distributor and owner Clinton Lammas tells *The Telegraph* newspaper the ruling is ridiculous. He says he has already sold "about 100,000" jars of the honey by mail and in independent food stores.

The newspaper says the honey is produced in 4,000 hives in New Zealand that are tended by Lammas's father-in-law Philip Cropp.

Bee interested. For beekeeping information read the AMER. BEE JOUR. New editorial emphasis on practical down-to-earth material, including question & answer section. For information or free copy, write to: AMERICAN BEE JOUR., Hamilton, IL 62341.

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After the meeting we had the Beekeepers' Ball, a sit-down dinner at a swanky joint in Glenwood. Each course featured honey. Are you interested?

For an appetizer, we sampled reggiano cheese, pears, finocchiano with mesquite honey and balsamic. Oh, my!

Then, honey and chipotle-glazed shrimp tostada with avocado and queso fresco. Served with 2009 Ventana Gewurztraminer. Of course!

Next time try some honeycomb on your salad! Our local greens and radishes were garnished with honeycomb and feta, as we tasted the incomparable 2010 Jack Rabbit Hill "Upper West Side" Chardonnay from right down the road.

Are you still hungry? Now, Moulard duck breast with dried figs and honey, and curried rice fritters. The wine: A 2008 Michele Chiarlo "le Orme" Barbera D'Asti. The perfect choice, no?

Followed by, yes! Mead-braised short ribs and blue cheese grits! To drink, the king of wines, the wine of kings: mead, from Hunter's Moon Meadery. How much better can this get?

Did you save some room for fried blueberry pie with honeyed lemon crema? I didn't, but I ate mine anyway!

Medhat regaled us with stories the whole meal through. I put Marilyn next to him, because they both like to talk.

When he told us about Alberta prairie canola as far as the eye can see, all pollinated by tens of thousands of beehives, I broke the spell.

"If all there is is canola, canola pollen must be all the protein the bees get. Do they do OK on nothing but canola pollen?" I asked.

"They do fine on canola pollen," Medhat said.

"But aren't those canola seeds all treated with (the neonicontinoid) chlothianidin?" I queried.

"Yes," he said patiently.

I pressed on. "And you don't think that harms the bees?"

Medhat rolled his eyes. Didn't I get it?

"Look," he said. "Don't worry about it. It's not a problem, if you bring *healthy bees!*"

Display Advertisers

Father Bob grew up on the farm. The other day at Mass, he said, "Hey, Ed, I watched a program on bees, and it explained whey they're all disappearing!"

"Tell me, Father," I said.

"It's because of all the pesticides," he said. "We need to stop using them."

"Put that in your homily," I said.

It's not just pesticides that threaten the little darlings. It's those darned Western Tanagers!

First Marilyn spotted them out and about, but especially over by the bees. The males have red heads, yellow bodies, black wings and tail. They're stunning. Marilyn is fonder of them than I am, however.

My carriage house tenant Kari is a bird nut, and when I spotted her in the driveway training her binoculars on the beeyard, I joined her. Six tanagers sat on the hives or on the yard fence. From time to time, one would drop down to a hive bottom board for a snack. "Look," Kari said. "They rub the bees against the fence or the top of the hives to knock off the stingers." She sounded thrilled.

"Do they always pick them off the hive entrances?" I asked.

"Heck, no," she said. "Sometimes they snatch them right out of the air! Watch and you'll see! She handed me the binoculars."

Kari seemed to think this was about the neatest thing she'd ever seen, but I'd seen enough.

Later, I came back for a closer inspection. The hive tops were littered with empty bee thoraxes. The birds had squeezed the insides out of the little darlings. They ate the pizza and left the crust.

There were 50 hives in that yard. They had an average of 40 dead bees on top of them. That's just on the hive tops. There were bee carcasses everywhere. How many bees do you suppose got eaten by those beautiful tanagers?

I felt sick. I love the birds and the bees, but the latter somewhat more than the former.

I didn't do anything illegal or even cruel. I moved the little darlings. I was going to, anyway.

A few weeks later at the Colorado state bee meeting at Paul's place in Silt, Lyle Johnston gave his standard aw-shucks healthy-bee talk. I've heard it before. I'd go again tomorrow. Listen, if you've ever got the blues about your bees, or your prospects, just find out where Lyle is giving his next talk. Then buy a ticket and go there. You'll be born again.

Lyle's a big, big man, soft-spoken like big men can be, casual with his farm-boy grammar. He always gives credit to "the smart guys." Ol' Lyle, he's just a beekeeper.

Don't fall for that one. Lyle's brilliantly successful in a business that's supposed to be on the skids. Further, he's happy to share his "secrets." Nothing secret about it! Keep healthy bees! Keep your *Varroa* and nosema under control, feed tons of pollen substitute, especially in the Fall. The only problem you'll have is swarm control! Simple as pie.

Heir to a family business that goes back a hundred years, Lyle insists his colonies have never been stronger.

"I don't worry about viruses or CCD," he says. "I don't even think about them! I just keep healthy bees!"

Besides managing his own huge bee operation, Lyle brokers bees for almond pollination. He commands top dollar from his growers by demanding strong hives from his beekeepers. He tells them how to deliver bees bustin' out of the boxes: control nosema and mites, feed 'em.

Our out-of-state speaker this year was Dr. Medhat Nasr, the Alberta provincial apiculturist. A jolly and sometimes argumentative Egyptian who left the old country and never looked back, Medhat agrees with Lyle. Keep healthy bees, and don't sweat the petty stuff.

Continued on Page 78

Ed **Colby**

Healthy Bees