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Bee Culture

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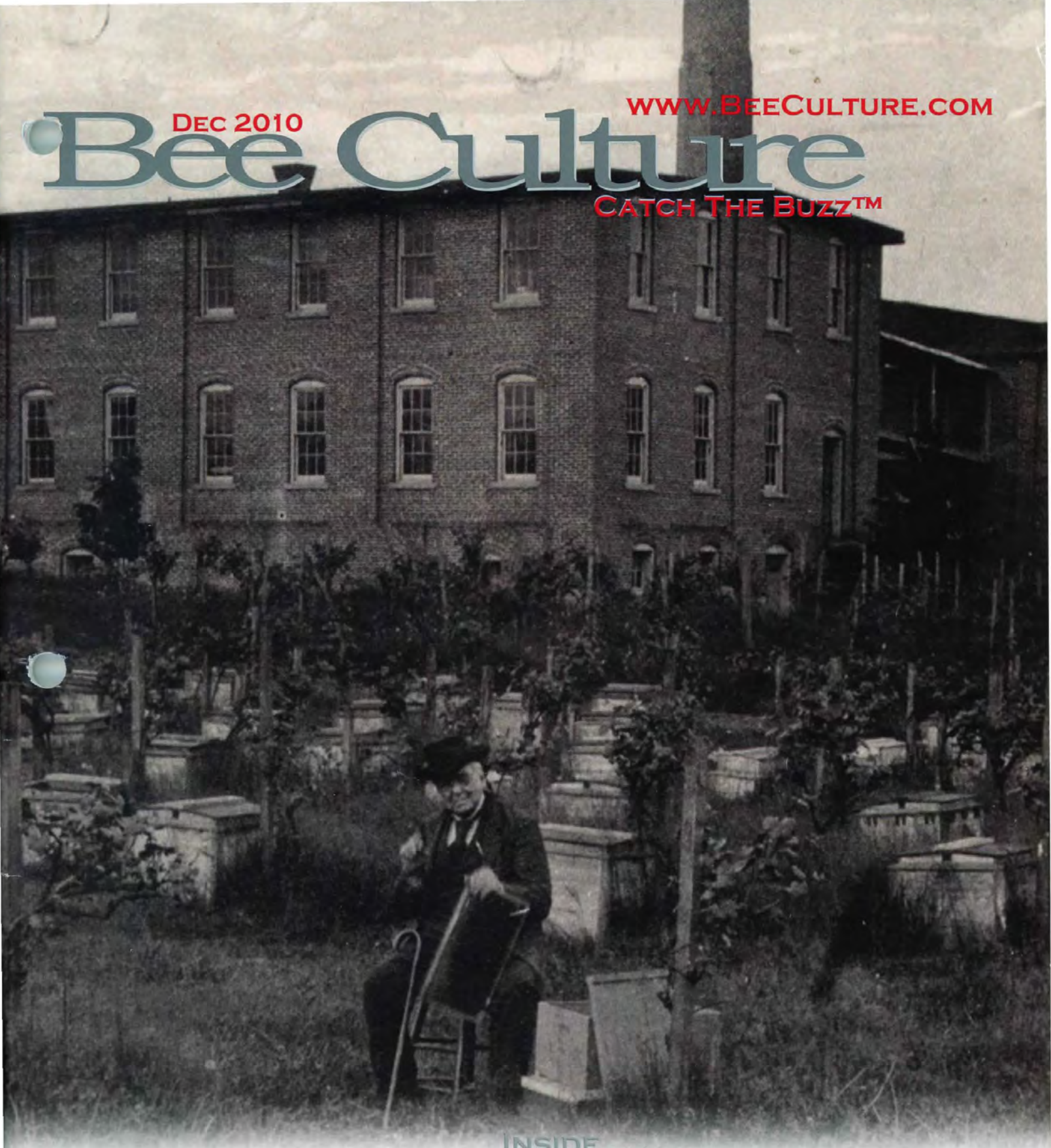

INSIDE . . .

ROOT PUBLICATIONS
$4.99

Science Of Bee Culture

Vol. 2 No. 2 - Center Section

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We end our year-long celebration of the 200th Anniversary of the birth of L.L. Langstroth in the A.I. Root Company's beeyard, just outside the factory that Langstroth's discoveries essentially built. Amos Root, the day after he discovered bees, rushed to Cleveland to find all he could find about these fascinating creatures. He found The Hive And The Honey Bee in a book store there, brought it home and consumed it in a matter of days. And the rest, as they say is history. A beekeeping dynasty was born based on the fundamental use of that tiny 3/8ths of an inch.

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Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

DECEMBER 2010 VOLUME 138 NUMBER 12

FEATURES

DEPARTMENTS & COLUMNS

Science Of Bee Culture

Vol. 2 No. 2 - Center Section

GLEANINGS-59, CALENDAR-60, CLASSIFIED ADS-61

Staying Cool!

The best way to stay cool in a beesuit is to wet the shirt, or t-shirt with cold water, if you can stand it, then put it on. It keeps me cool for about 1½ hours. Then I put on another out of my chest cooler. I have found bees do not land on wet clothes or sting through clothes as much.

For a change our bees look good going into Winter. Heavy. Nucs heavy. I feed pollen patties when corn tasseled so they would not pick up corn pollen for Winter storing.

About five years ago "Cool Beekeepers" was a picture of me and my workers in our beesuits in a pool before going to the beeyards.

Dick Crawford
New York

A New Beekeeper

When my father passed away, we had to decide what to do with his remaining hive. A neighbor offered to kill them for us, but that would never do. I heroically volunteered to take over the hive, in honor of my father.

My father's beekeeping equipment consisted of a veil that hung from the brim of a hardhat and tied with strings behind his back, a big old screwdriver for prying things apart and a smoker that he seldom used. I put on the veil, making sure to tie it behind my back, grabbed the trusty screwdriver and bravely marched out to the hive in order to open it up and take a look around. Don't need no stinking smoker. I pried open the top and looked into the box. It was packed with comb and a few bees rose up to greet me. No big deal. This beekeeping is a piece of cake.

I pried off the top box and looked into the second box. This time, however, I tore open some of the comb and honey began to leak out. A whole flock of bees rose up and told me that they were not happy to see me. I began to get a little nervous, but, I can still handle this. I took off the second box, tore open more comb and a giant herd of bees rose up to tell me to leave. I realized that I had no clue as to what I was looking for and agreed to get out of there. I hurriedly stacked the boxes up. Squashing some of the little critters in the process. This seemed to make them angrier. Then it happened!

The stand that the hive was sitting on collapsed and boxes and bees and frames spread out on the ground in front of me. A tornado of mean, awful, nasty bees engulfed me. Now what?

There was nothing else to do but pick everything up. I bent over to pick up a box. The hardhat fell through the top of the veil. The bees came in. I panicked. With one hand I tried to hold the veil shut and with the other hand I started slapping myself in the face, trying to kill the bees that were stinging me. I knocked my glasses off and now I can't see. So, I started running through the field and bushes for the house. All the while, I'm holding the veil shut with one hand and with the other, I'm alternating between slapping myself in the face and trying to untie those dang strings that held the veil on and were behind my back. Finally, I got the strings untied, threw the veil, bees and glasses on the ground and got out of there. Now what?

Eventually I was able to put the hive back together. I went out and bought the full beekeeper's suit, a couple of books on beekeeping and a subscription to *Bee Culture* magazine.

David Birskovich
Niles, OH

Communication

The Sept issue of *Bee Culture* carried a very interesting article by Clarence Collison and Audrey Sheridan about the communication between scout bees and the swarm cluster.

For several years I have used a bait hive in the swarming season. I usually catch at least one swarm and I think the most has been three. I set the bait hive up in my home garden where there are no hives. My bees are away from home in an out-apiary. I usually see some activity around the entrance with bees going in and out and also doing orientating (zig-zag) flights around the bait hive. When I see this I know that a swarm could arrive within the next few days.

From my casual observations I suspect that a colony due to swarm may send out scout bees two or three days before the swarm leaves the hive. I wonder if any of your readers have noticed a similar pre-leaving behavior?

An Old Beekeeper
from the UK

Smoker Fuel

I got my first colony of bees during 1959 from an old farmer friend. He said his son had them for 4H and they had been unattended for sometime and he would like to get rid of them. There were two colonies. I hauled them home on the back of my old 37 Chevy. That was the beginning of many pleasant years with bees which is another story.

Through the years I have tried numerous things in the smoker and most work quite well. While chain saw chips work quite well it had never occurred to me that contamination from oil could occur. A better source may be chips from a stump removal machine or from a wood chipper. These machines do not lubricate the chipping blades with oil. Thickness planer shavings work but will burn more quickly and may tend to be a little too hot. Many times grass and leaves that are not too dry have done the job quite well for me. One fuel I did not like was suggested by an article in *Gleanings In Bee Culture* sometime during the 1970s. I did not care for the odor and thought it aggravated the bees. This fuel was lint from a clothes dryer.

Whatever fuel used it is important to learn smoker technique that produces great quantities of nice cool smoke. As a beginner I fear that I scorched a few wings!

Jerald Osier
Story City, IA

For The Beekeepers On Your List -

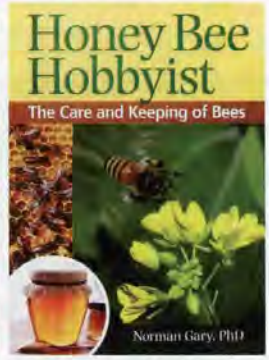
Bee Conservation. The Evidence for the effects of interventions. A synopses of Conservatin Evidence Series. By Lynn Dicks, David Showler & William Sutherland. Pelagic Publishing, LTD. Paperback. 146 pgs. 6" x 9". B & W. ISBN 9781907807008. $29.99.

This book brings together scientific evidence and experience relevant to the practical conservation of wild bees. The authors worked with an international group of bee experts and conservationists to develop a global list of interventions that could benefit wild bees. They range from protecting natural habitat to controlling disease n commercial bumblebee colonies. The book summarizes studies captured by the Conservation Evidence project where that intervention has been tested and its effects on bees quantified. The efforts look at residential and commercial development, land use changed due to agriculture, pollution, transportation and service corridors (this book was published in the UK, where these are common), invasive non-native species, native species, artificial nests and captive breeding and release.

A host of international experts are on the advisory board, most from the UK, others from the U.S. and other countries. This book is intended for those studying bees of all types, the threats to their continued existence, what has been done to reduce those threats, and the effect of these actions.

The Bee-friendly Beekeeper. A sustainable approach. David Heaf. Published by Northern Bee Books. **www.GroovyCart.co.uk/beebooks**. ISBN 9781904846604. 150 pages, all color, paperback, 6.5"x 9.5". About $35.00 plus post from the UK.

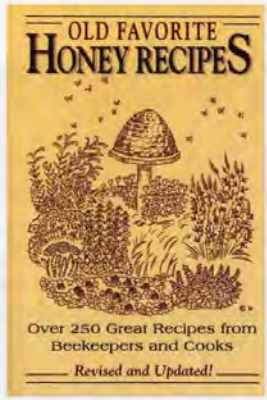
David Heaf's name should be familiar as he is the leading proponent of the Warre Hive, a top bar hive using stackable supers, rather than a long hive. The book explores current problems with bees, and the author's concern, and probable causes, then offers his management techniques as one solution. It is beautifully done, and indeed, does explore natural methods of raising bees using these type hives. Illustrations and instructions on building these are well done, though I'm not sure that just anyone could produce one of these, but they are less complicated than other English hives I have seen. Since there are no frames, and the rest is made from standard materials, the cost in much less than other hives. If keeping bees in standard Langstroth hives seems a less desirable choice, then this book is what you have been looking for.



Honey Bee Hobbyist. The Care and Keeping of Bees. By Dr. Norman Gary. Bowtie Press 8.5" x 11". Paperback, all color. 144 pages ISBN 9781933958941. $16.95.

Norm Gary has put out a pretty good beginner's book. I always look for five things in a beginner's book, and if most aren't there, or they aren't right, the book doesn't make these pages. Most are here, plus a few other things that make this an interesting book. It is well written, informative and a good place to start, but you will need more information to continue. Like many beginner's books, this one is conservative on handling problems...mostly because what helps in one part of the country doesn't in another. And, that first year is often not very troublesome. The book covers basic biology, problems, management, harvesting and honey plants, all in a fairly general way with lots of photos. It's entertaining and easy to read, and there's a chapter at the end on fun things to do with bees which has some new thoughts...leashing drones for one.

A good glossary and resources list at the end are a big help and there are lots of hints throughout the book separated by boxes and highlights that are helpful. That thing they missed....? Not the author's fault, but on the back, they asked me several months ago to write a blurb about the book...and they spelled my name wrong. Let's hope they get it fixed next printing.



Old Favorite Honey Recipes. Published by Bright Mountain Books. 144 pages. 6" x 9". ISBN 99780914875567. B & W. Softcover. $10.00.

This is a combination of 2 previously published honey recipe cookbooks, resulting in over 250 recipes...some nearly ancient, though good, others modern and updated. Since some of the originals date to over 70 years ago, all references to honey and small children have been removed, and standards for measurements have been combined. All manner of recipes are covered in straightforward directions. Recipes include breads and pastries, cakes, candies, icing, cookies and desserts, meats and vegetables sandwiches, salads and dressings...and more. Bulk orders by clubs are possible, check out **www.brightmountainbooks.com**.

CREAMED HONEY CONTAINER from B & B Honey. One pound size with appealing and attractive graphics. A nutrition chart on each container and room for a UP code and a personal label. Visit **www.bbhoneyfarms.com**.

Honey, I'm Homemade. Sweet treats from the beehive across the centuries and around the world. Edited by May Berenbaum. 184 pages, 6.5" x 8". B & W. Soft cover. ISBN 9780252077449. $21.95 Published by Univ Of IL Press.

May Berenbaum is a prestigious researcher and scientist at Univ IL. She is the Swanlund Professor of Entomology there, and has written other books about insects and people. She is involved with CCD research and other projects. I've had the good fortune to meet and talk with her on a few occasions. This is a collection of recipes gathered from the historic files of U of IL Vern Milum, the IL State Beekeepers historic records, very special family friends and other places, that have been updated, modernized, or left as is, and include cookies, breads, muffins, desserts, pies and puddings, cakes and more. Profits from the sales are to be donated to help maintain the Univ of IL Pollinatarium, a science center devoted to flowering plants and their pollinators.

At the beginning are 20 some pages on honey bee lore, honey information, and pollination science and wisdom by the Editor, and at the end there is information on honey festivals, and a great reference section. In between, there's all these recipes, a couple hundred by my reckoning. Some ethnic, some familiar, some to me unknown, some good, some better. It's a fun stroll through May's good choices. If you are looking for a good honey cookbook, this is one to look at. And the money you spend helps more than just the beekeepers who collect the honey you use.

INNER COVER

We don't publish as many books as we used to here. A subtle change in direction has diverted our energies toward different areas, so book publishing has diminished. But we have one coming out this month. It's a very functional book . . . all about removing bees from buildings. It's by a couple of people who do this for a living (or did . . . since one has just retired now). Cindy Bee and Bill Owens have removed hundreds and hundreds of colonies from all manner of buildings, structures, enclosures and places you can't imagine successfully over the years. Neither of them believe in killing bees to remove them, so the extractions are done live . . . buzzing bees, sticky honey, tall ladders, power tools, tight spaces, sawdust, bee poo, and nervous customers . . . all in a day's work.

Both are very good at what they do, and both are excellent beekeepers. Bill is the only Master Beekeeper in Georgia's excellent Master Beekeeper program (see the article this month . . . he's the guy not named), and Cindy has been with the Bees most of her life. She has a soft spot when it comes to bees, so care and tenderness are at the top of the list when removing these uninvited house guests for both of them.

This is a good time of year to consider this activity if you think it might be in your future because you have some time to prepare before the summer rush. I suspect demand for this skill will only go up, for a variety of reasons . . . but a couple dominate the scene.

First, with the much increased awareness of the plight of the honey bee, and all pollinators for that matter, there are more people willing to at least consider removing bees from places they don't want them in their homes alive, rather than dead. Almost always it costs more to get them out alive, but not much more, and the recent attention has convinced some home owners that live bees are a better deal all around.

But this brings me to the second reason this activity will increase, and it isn't quite as simple.

Probably the question I am most often asked by reporters doing a story on urban agriculture, which always includes urban beekeeping is why has there been an increase in beekeeping . . . boxes of live, stinging, venomous insects on the roof, patio, fire escape or back porch doesn't seem, at least to many reporters, a safe and sane way to reconnect with the land, which is what many of these reporters want to hear about.

But if you talked to more than a very few people who actually live in the concrete jungle you get a story with more depth, more feeling, that's more in tune with what is really going on I think. It has to do, simply, with regaining some control in our lives. And one way people are using to do that is to find out where their food comes from. Food is a basic, a fundamental requirement, and if you don't know where it comes from, how it was produced, and what happens between picking and packing and purchasing an important part of your life is missing. Food should be an intimate part of every day living, and when it comes shrink wrapped and bar coded and laced with more preservatives and enhancers and flavorings and colorings and ingredients other than the actual food we wanted to purchase...it's time to take back the way we shop, the way we eat, and the way we live. Michael Pollen has been very successfully selling that message for several years now.

The recent phenomenal increase in farm markets, community supported agriculture operations, backyard gardens, patio gardens, community gardens, chicken raisers, rabbit raisers...and beekeepers speaks of people reaching out to satisfy this fundamental need to know...where does my food come from? The crimes of industrial agriculture continue to shine . . . contaminated eggs, meat, honey, lettuce, spinach and the rest are almost daily events . . . so common that they no longer generate the headlines of the past, when we were rightly indignant, even ashamed of what we had let our lives become. So now, finally, many have said ENOUGH! and are doing something, anything they can about it.

But basic skills in sustainable gardening, small animal care, fruit and vegetable harvesting and storage are not part of the skill set we have when we graduate from high school anymore. If our parents didn't, we don't.

Go to the Amazon web page and do a search for books on beginning gardening, chickens, goats, or composting and then step back . . . there are a million of them, and most have been published in the past three or four years. There are a lot of people who now want to know how and there's ample information on the subjects available.

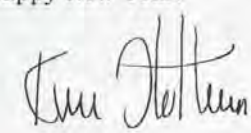
And once people figure out that bees and gardens go hand in hand, that without bees . . . well, you know this story, don't you . . . we tell it to people hundreds of times a year. No bees, not much food. Simple.

So for many people having bees is a logical step in producing some of their food directly . . . honey, or indirectly through increased pollination . . . and you don't need acres of land, in fact you don't need any land at all to have bees. When I talk to apartment dwellers now I find bees have come to be a part of where food comes from, something they have some control over . . . not the bees mind you, but the buzz they make, they make for us.

So why is this a reason you'll do well if you choose now to look at removing bees, alive, from places people don't want them? With all those new beekeepers out there, many more urban than rural, and many still figuring out all there is to know . . . next Spring there will be swarms, more swarms than last year, and far more than the year before. And some of those swarms won't be caught. As much as I like to see feral swarms survive, some will choose homes not appreciated by their human neighbors. That's where you come in.

Yes, this is a commercial. But I wanted you to know a bit about why we think it's an important topic to address right now, and, of course, a little bit about the authors. Removing bees from buildings puts food on their table. Believe them.

On that good note, all of us here at the Root Company, and *Bee Culture* Magazine wish you and yours a safe, sane and wonderful Holiday Season. Have A Very Merry Christmas, and a Happy New Year.



Where Does My Food Come From?

DECEMBER – REGIONAL HONEY PRICE REPORT

What difference does a year make? Take a look at December 2009 prices compared to today. Check out your region. Are you keeping up, or leading the way. Honey prices are outstepping most food items, and you should be taking advantage of this.

REPORTING REGIONS - 2009

	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	1.50	1.65	1.57	1.55	1.55	1.54	1.61	1.70	1.43	1.55	1.50	1.53	1.43-1.70	1.56	1.56	1.48
55 Gal. Drum, Ambr	1.40	1.53	1.40	1.36	1.45	1.41	1.49	1.43	1.20	1.40	1.42	1.40	1.20-1.53	1.41	1.48	1.35
60# Light (retail)	125.00	124.50	130.00	123.25	120.00	133.33	130.71	129.75	120.00	137.54	148.00	145.00	120.00-148.00	130.59	137.35	121.76
60# Amber (retail)	125.00	115.00	130.00	121.60	120.00	121.00	127.17	130.00	110.50	127.09	128.00	150.00	110.50-150.00	125.45	138.02	113.31
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	52.08	61.98	55.00	47.50	66.03	55.45	48.56	85.15	66.03	59.55	55.00	86.90	47.50-86.90	61.60	58.64	51.93
1# 24/case	65.52	84.28	72.00	66.20	101.33	78.83	71.70	74.56	69.50	97.44	76.48	95.50	65.52-101.33	79.44	78.60	76.60
2# 12/case	69.72	64.08	66.60	58.33	106.50	65.45	65.57	75.00	65.00	75.00	55.67	83.80	55.67-106.50	70.89	68.83	67.37
12.oz. Plas. 24/cs	69.66	74.98	52.95	68.47	60.00	65.50	54.43	60.64	54.00	57.60	67.07	70.50	52.95-74.98	62.98	64.73	59.45
5# 6/case	80.82	75.98	78.00	72.25	77.80	90.00	73.67	85.60	72.00	80.40	73.00	92.00	72.00-92.00	79.29	79.19	80.90
Quarts 12/case	113.96	133.44	113.96	101.92	90.00	92.57	94.99	95.50	120.00	107.94	93.00	125.00	90.00-133.44	106.86	97.54	98.19
Pints 12/case	70.23	67.48	70.23	67.40	61.75	60.00	68.92	57.81	84.00	69.30	65.00	69.75	57.81-84.00	67.66	65.19	65.05
RETAIL SHELF PRICES																
1/2#	3.13	3.27	3.05	3.08	3.98	3.16	2.88	2.75	2.99	3.00	3.19	4.50	2.75-4.50	3.25	3.27	2.94
12 oz. Plastic	4.13	3.90	4.50	3.57	4.19	4.06	3.34	4.27	3.65	3.50	4.15	4.58	3.34-4.58	3.99	3.90	3.88
1# Glass/Plastic	4.31	4.55	5.54	4.60	5.76	4.98	4.13	4.48	3.95	4.40	5.42	5.50	3.95-5.76	4.80	4.75	4.65
2# Glass/Plastic	9.00	7.30	8.93	7.06	9.50	7.50	7.17	7.75	6.93	7.25	8.02	9.15	6.93-9.50	7.96	8.13	7.61
Pint	7.90	8.25	7.90	7.13	6.48	7.95	6.69	6.93	7.85	7.87	7.75	10.31	6.48-10.31	7.75	7.43	6.92
Quart	13.10	14.48	13.10	10.41	11.50	10.25	10.93	11.04	11.00	12.41	10.64	15.00	10.2-15.00	11.99	11.66	10.45
5# Glass/Plastic	16.85	15.24	21.10	17.00	23.50	16.00	16.59	17.50	18.00	18.75	19.81	23.25	15.24-23.50	18.63	18.35	17.44
1# Cream	5.50	5.86	6.50	5.33	8.43	5.00	5.31	5.56	5.75	8.34	6.66	6.87	5.00-8.43	6.26	5.68	5.57
1# Cut Comb	5.50	5.34	7.25	5.56	7.06	6.38	6.94	5.99	7.06	7.33	8.00	9.13	5.34-9.13	6.79	6.76	7.14
Ross Round	6.96	4.99	6.50	5.00	6.96	6.50	6.57	4.89	6.96	6.96	7.50	8.41	4.89-8.41	6.52	6.48	6.37
Wholesale Wax (Lt)	3.83	4.00	4.25	2.77	3.15	4.63	3.38	4.00	4.50	5.00	3.75	3.67	2.77-5.00	3.91	3.51	3.24
Wholesale Wax (Dk)	3.25	3.32	3.50	3.55	3.00	3.40	3.15	3.75	4.00	4.15	2.88	2.50	2.50-4.15	3.37	3.18	2.66
Pollination Fee/Col.	80.00	91.67	70.00	44.20	127.50	58.75	50.33	89.62	89.62	89.62	70.00	122.50	44.20-127.50	81.98	81.06	75.40

REPORTING REGIONS - 2010

	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	1.66	1.85	1.66	1.50	1.60	1.64	1.75	1.60	1.80	1.65	1.54	1.55	1.50-1.85	1.65	1.72	1.56
55 Gal. Drum, Ambr	1.63	1.75	1.63	1.48	1.55	1.48	1.85	1.60	1.40	1.63	1.51	1.55	1.40-1.85	1.59	1.54	1.41
60# Light (retail)	130.00	129.00	130.00	135.00	120.00	140.00	140.60	145.00	143.17	143.17	141.25	155.00	120.00-155.00	137.68	144.78	130.59
60# Amber (retail)	130.00	125.00	130.00	132.60	120.00	140.00	136.00	142.50	108.00	166.00	154.83	159.82	108.00-166.00	137.06	133.48	125.45
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	55.20	51.95	54.40	53.90	69.53	53.75	51.16	69.53	69.53	58.00	52.90	83.65	51.16-83.65	60.29	63.43	61.60
1# 24/case	85.56	75.57	76.20	81.20	101.67	90.38	73.80	89.60	72.00	99.84	74.40	101.93	72.00-101.93	85.18	90.92	79.44
2# 12/case	73.80	68.28	68.70	72.33	96.50	74.85	67.75	81.00	58.50	81.00	67.20	84.08	58.50-96.50	74.50	75.63	70.89
12.oz. Plas. 24/cs	68.16	70.37	66.40	68.33	60.00	73.33	58.45	79.60	66.00	61.20	70.45	74.40	58.45-79.60	68.06	70.77	62.98
5# 6/case	99.81	78.98	78.90	74.88	84.00	99.00	74.75	87.00	82.00	85.20	75.66	96.33	74.75-99.81	84.71	88.01	79.29
Quarts 12/case	104.73	110.88	112.20	105.12	96.00	91.69	95.00	103.50	126.00	120.06	97.28	119.33	91.69-126.00	106.82	109.63	106.86
Pints 12/case	69.44	56.95	66.00	69.00	61.50	55.38	65.50	64.35	96.00	92.40	57.50	72.00	55.38-96.00	68.83	72.27	67.66
RETAIL SHELF PRICES																
1/2#	3.00	2.98	3.23	3.29	3.68	3.33	3.50	2.76	3.19	3.15	3.30	5.00	2.76-5.00	3.37	3.68	3.25
12 oz. Plastic	3.50	3.82	3.41	3.77	5.00	4.07	3.43	4.21	3.65	3.71	4.06	4.59	3.41-5.00	3.93	3.78	3.99
1# Glass/Plastic	4.38	4.36	5.02	4.82	5.76	5.36	4.00	5.22	5.99	5.25	5.32	7.04	4.00-7.04	5.21	5.05	4.80
2# Glass/Plastic	7.50	7.44	8.62	7.71	9.50	7.52	7.72	8.85	8.42	9.07	8.63	10.75	7.44-10.75	8.48	8.38	7.96
Pint	8.94	8.50	6.50	6.81	6.15	6.39	6.66	7.05	9.75	7.63	7.30	9.12	6.15-9.75	7.57	7.90	7.75
Quart	12.25	9.60	11.00	11.42	12.00	10.84	13.66	11.43	18.50	12.75	10.78	15.75	9.60-18.50	12.50	11.82	11.99
5# Glass/Plastic	17.00	15.98	20.52	16.49	25.00	18.60	21.27	19.66	18.00	18.45	19.54	23.00	15.98-25.00	19.46	18.87	18.63
1# Cream	5.84	6.22	7.50	6.08	5.84	5.38	5.04	5.41	5.29	5.18	5.99	6.50	5.04-7.50	5.85	5.93	6.26
1# Cut Comb	6.50	6.78	6.50	6.95	8.06	6.13	5.85	7.25	8.06	8.00	7.20	11.50	5.85-11.50	7.40	7.95	6.79
Ross Round	6.36	5.22	6.50	5.33	6.36	6.25	6.00	7.25	6.36	6.36	7.45	8.62	5.22-8.62	6.50	6.97	6.52
Wholesale Wax (Lt)	3.00	4.00	2.75	3.36	2.15	4.08	3.42	5.67	5.50	5.00	3.00	5.25	2.15-5.67	3.93	4.22	3.91
Wholesale Wax (Dk)	3.00	3.15	2.75	3.14	2.08	3.58	4.50	4.75	5.00	3.58	2.58	4.00	2.08-5.00	3.51	3.43	3.37
Pollination Fee/Col.	90.00	102.50	70.00	43.60	127.50	60.00	55.00	75.00	89.23	89.23	66.67	116.00	43.60-127.50	82.06	82.89	81.98

A Closer LOOk

POLLEN FORAGING

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

All sorts of reasons exist for foraging behavior differences.

Pollen is a vital nutritional resource for honey bees providing protein, amino acids, lipids, vitamins, minerals and sterols in their diet. Pollen represents the colony's only supply of protein, essential for brood rearing and the glandular development of young worker bees (Winston 1987). Nurse bees consume forager-collected pollen to biosynthesize a proteinacious hypopharyngeal gland secretion called brood food that is progressively provisioned to larvae. It is through nurse bees that larvae are the principal consumers of protein in a colony. Honey bees are adept at regulating pollen stores in the colonies based on the needs of the colony. Mechanisms for regulation of pollen foraging are complex and remain controversial (Sagili and Pankiw 2007).

Two hypothetical mechanisms dominate studies of pollen foraging regulation: brood food hypothesis and the direct independent effects of stored pollen and brood. The brood food hypothesis predicts that brood and stored pollen indirectly affect the behavior of pollen foragers through a single inhibitory signal (Camazine 1993, Camazine et al. 1998). Bees are activated to collect pollen, thus regulation occurs through inhibition. With excess pollen stored in a colony there is also an excess of inhibitor that is presumably distributed to foragers by trophallaxis with nurse bees. If pollen is in surplus, it is hypothesized that nurse bees transfer more protein to foragers and inhibit pollen foraging. Brood food is the most likely inhibitor, thus the brood food hypothesis for the regulation of pollen foraging.

A competing hypothesis is that stored pollen and brood have direct, independent effects on pollen foraging. Many studies have demonstrated the effects of quantities of brood and stored pollen. Increasing the amount of larvae in colonies, or the chemical cues derived from larvae called brood pheromone, increases the number of pollen foragers and pollen load weights returned. Pollen foraging activity level decreases in response to the addition of stored pollen (Free 1967, Barker 1971, Moeller 1972, Danka et al. 1987, Fewell and Winston 1992, Camazine 1993, Fewell and Bertram 1999) and increases in response to the removal of stored pollen (Free 1967, Fewell and Winston 1992, Camazine 1993). Increasing the amount of stored pollen in colonies concurrently increases brood rearing and decreases pollen foraging activity to a homeostatic set point (Fewell and Winston 1992). Empty comb space near the brood also stimulates pollen foraging behavior, while stored pollen clearly inhibits. Dreller et al. (1999) demonstrated that pollen foraging decreases only when foragers have direct access to stored pollen, and direct access to brood is necessary for an increase in pollen foraging response to an increase in amount of brood.

Using conventional colony-level manipulations is problematic because both the direct and indirect hypotheses predict the same pollen foraging outcomes. But for the different mechanistic reasons, both hypotheses predict pollen foraging deceases with additional quantities of stored pollen and pollen foraging increases with additional amounts of brood. Given a fixed amount of available comb area, there is an interaction between amount of stored pollen,

"Pollen foraging behavior is modulated by at least two stimuli in the brood nest: the presence of brood pheromone and young larvae and the quantity of stored pollen."

number of larvae, and empty space. Changing one necessarily changes the others. However, manipulating the amount of brood pheromone allows for a change in the perceived number of larvae without changing the allocation of comb area for larvae, pollen, and empty storage space (Pankiw et al. 1998, Pankiw 2004abc, Le Conte et al. 2001, Pankiw and Rubink 2002). With brood pheromone added to colonies, the brood food hypothesis predicts no change in pollen foraging due to no change in demand for brood food. The direct independent effect of amount of brood and pollen hypothesis predicts an increase in the amount of pollen foraging as a consequence of the increased pollen foraging stimulus of brood pheromone. Colonies treated with supplemental amounts of brood pheromone foraged more for pollen than did control colonies containing the same amount of brood and stored pollen (Pankiw et al. 1998, 2004, Pankiw and Rubink 2002, Schulz and Robinson 2002, Pankiw 2004abc). Results of these studies support the direct, independent effects hypothesis, such that colonies approximated amount of larvae from their chemicals accordingly.

In an effort to obtain direct experimental evidence of brood food protein as a feedback mechanism inhibiting pollen foraging, Sagili and Pankiw (2007) manipulated nurse bee biosynthesis of brood food using a protease inhibitor that interferes with midgut protein digestion, significantly decreasing the amount of protein extractable from hypopharyngeal glands (Sagili et al. 2005). Experimental colonies were given equal amounts of protease inhibitor-treated and untreated pollen. Colonies receiving protease inhibitor treatment had significantly lower hypopharyngeal gland protein content than controls. There was no significant difference in the ratio of pollen to nonpollen foragers between the treatments. Pollen load weights were also not significantly different between treatments. These results supported the pollen foraging effort predictions generated from the direct independent effects of pollen on the regulation of pollen foraging and did not support the prediction that nurse bees regulate pollen foraging through amount of hypopharyngeal gland protein biosynthesis.

"Pollens from different plant species may differ in amino acid composition, concentration, or both and pollens with high proportions of essential amino acids are assumed to be of greater nutritional value than pollens with lower proportions of essential amino acids."

Pollen foraging behavior is modulated by at least two stimuli in the brood nest: the presence of brood pheromone and young larvae and the quantity of stored pollen. Genetic variation in pollen foraging behavior has been demonstrated repeatedly. Tsuruda and Page (2009) used selected high and low pollen-hoarding strains of bees that differ dramatically in the quantity of pollen collected to determine if the observed differences in foraging could be explained by differential responses to brood stimuli. Workers from the high and low pollen-hoarding strains and wild-type bees were co-fostered in colonies with either brood or no brood. As expected based on previous studies, returning high pollen-hoarding foragers' collected heavier pollen loads and lighter nectar loads than low pollen-hoarding bees. Effects of brood treatment were also observed; bees exposed to brood collected heavier pollen loads and initiated foraging earlier than those from broodless colonies. More specifically, brood treatment resulted in increased pollen foraging in high pollen-hoarding bees but did not affect pollen foraging in low pollen-hoarding bees, suggesting that high pollen-hoarding bees are more sensitive to the presence of brood. However, response to brood stimuli does not sufficiently explain the differences in foraging behavior between the strains since these differences persisted even in the absence of brood.

Analyses of the species composition of field-collected pollen gathered by foraging honey bees suggest that they have pollen preferences, because foragers concentrate their efforts on a smaller number of plants than the total available within their foraging range (Free 1963). Laboratory experiments also indicate that when pollen is removed from flowers, honey bees retain preferences for the pollen of some plant species over others (Boch 1982, Schmidt 1982), implying that preferences could be based on pollen-derived cues in addition to any differences in the ease of flower handling. The nutritional value of pollen is usually based on its protein content. While high-protein pollens generally contribute more to colony growth and honey bee development than do low-protein pollens (McCaughey et al. 1980, Schmidt et al. 1987), the nutritional quality of pollen high in protein is reduced if there are inadequate amounts of the essential amino acids required for growth (McCaughey et al. 1980, Loper and Cohen 1987). These studies suggest that the nutritional value of pollen may be defined more accurately by the amino acid composition than by protein content.

Pollens from different plant species may differ in amino acid composition, concentration, or both and pollens with high proportions of essential amino acids are assumed to be of greater nutritional value than pollens with lower proportions of essential amino acids (Day et al. 1990). The early studies of De Groot (1953) showed that methionine, arginine, tryptophan, lysine, isoleucine, phenylalanine, histidine, valine, leucine, and threonine were essential amino acids for honey bees, while tyrosine, cysteine, serine, hydroxyproline, alanine, glycine and proline were non-essential. Of the essential amino acids, leucine, isoleucine, and valine were required in the greatest amounts (most essential amino acids), tryptophan, methionine, and histidine in the lowest amounts (least essential amino acids), while threonine, phenylalanine, arginine, and lysine were intermediate.

The pollen foraging behavior of honey bees was investigated in laboratory and field-based studies using pollen from oilseed rape *Brassica napus* L. and field bean *Vicia faba* L. to determine if foraging preferences are affected by

amino acid composition (Cook et al. 2003). In choice-test experiments, bees showed no innate pollen-foraging preferences but preferred oilseed rape pollen over field bean pollen after previous foraging experience of oilseed rape. Pollen from oilseed rape contained a greater proportion of the most essential amino acids required by honey bees (valine, leucine, and isoleucine) than field bean, suggesting that oilseed rape pollen is of greater nutritional quality for honey bees than is field bean pollen.

Even though the bees showed a preference for the pollen that was richer in the most essential amino acids (Cook et al. 2003), oilseed rape and field bean pollens may differ in other properties that may also affect the foraging preference. Pollen color and odor differ between the two pollens. Also, other essential nutrients in pollen may influence foraging behavior, as may phago-stimulants in pollen (Schmidt 1985). BC

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Dear Larry —

Larry **Connor**

Local Queens/Local Nucs

Two somewhat related communications arrived in my email and I am using them as the basis for this month's article. Thanks to David and Pam for sharing their questions with *Bee Culture* readers.

Breeding from my best queen

Hi Larry, how are you? I was at your CT queen-rearing course this past summer and enjoyed it very much. I have spent all summer planning on raising queens next year and observing my colonies for positive traits. I had a quick question for you if you do not mind. I typically run around 10 hives and was wondering your thoughts on breeding solely from my best queen. If I requeened all hives with daughters from a single queen will this result in too many diploid drones eventually? Since I have so few hives, doing my own queen rearing from several hives may be counter productive when trying to develop local traits. I guess a better way to put it is, I want to breed from my best hive, but am wondering if the only way to reduce the chances of diploid drones would be to graft from several colonies, thus reducing the overall effort of strengthening the stock when I only need nine cells. I hope this makes sense and would greatly appreciate your advice. Thanks for your help, – Dave

David C. Mosher
East Windsor, CT. 06088

Dave,

Thanks for the comments. Let me break down your question into several parts. That way we can look at this from a complex way as well as simply as possible.

Simple answer: Go ahead, graft from your best colony and re-queen the other nine colonies with one queen's daughters. Since you are in a part of the country where there are plenty of beekeepers, we will make the assumption that you have a pretty diverse drone population in the East Windsor area, and the final colonies will be influenced by the many drones each daughter queen sexually encounters. With the average queen mating with 13-20 drones, and a few with 40 to 60 mates, your resulting colonies will represent a sample of the many drones found within a three to six mile radius of your apiary.

Keep in mind what I covered in the class: that individual virgin queens are very unlikely to mate with drones from their colony or a colony from the same apiary. This seems to be part of the honey bee species mechanism to minimize inbreeding, which is part of your question. While there are always exceptions, most of the queens will find drones from a several-mile radius of the apiary. It seems unlikely to me that any 10-colony beekeeper is going to see a problem with inbreeding, especially in Connecticut.

From a more analytical perspective, I would ask you a few questions:

1. Are the 10 queens from the same or a different source? If they are all sister queens from packages or nucleus hives, then they are probably closely related unless you have intentionally purchased from unrelated sources. You will continue to have closely related queens, and they may all be pretty good or pretty bad, depending on the season and the one colony you select. You are reducing diversity by grafting from one queen, and they could be good, bad or you may not see any change.

2. Do you plan to expand your colony numbers? Larger beekeepers who graft from just one breeder queen often regret the decision – beekeepers with hundreds or thousands of colonies. Why? There is no single answer, but the genetic diversity issue is probably the most important part of the issue. Even if you picked the top two queens out of 10, you would reduce the risk of getting a poor stock in your operation due to some genetic fluke. I have heard of queen producers generating upwards of 50,000 daughter queens from one grafting mother. While worthy of some sort of award, it may not be for best use of intelligence. This represents a huge risk genetically. True, if the queen is fantastic, there could be a large number of really great colonies. But what if there is something genetically defective with the queen mother of 50,000 daughters? Then the result may not be very good!

Breeders are going more and more to closed population bee breeding programs designed to stabilize a number of queens, say 30 to 50, and instrumentally mating them with a syringe filled with sperm collected from hundreds of drones from the same queens, and mechanically mixed to maintain diversity. The risk of inbreeding is reduced dramatically, and the closed population may be maintained for a human generation without much decline in vigor or increase in the level of inbreeding.

All colonies express some spotty brood as a function

Would you graft all your daughter queens from one colony, maybe this one? Photo provided by David Mosher

of the haploid/diploid sexual mechanism. This is usually five percent or less of the brood in a worker frame. The missing cells are where the sex alleles for the worker are the same, causing a diploid drone. Bees remove these drones during their early larval stage, explaining why you have some missing cells on every frame.

3. You are a young beekeeper, so do you imagine you will graft from just one colony every year for the next 50 years? If you also become famous for your queens, will you sell or give away a thousand queens, queen cells, or virgins, every year because you find peace and contentment by doing this wonderful thing?

Now the mathematics changes quite a bit, since you are probably saturating the area with the same genetic information as you are grafting from. Inbreeding suppression develops when you have a very close pedigree within the same bloodline. Very quickly you should expect to see an increasing number of empty brood cells in sealed brood, a reflection of you bee breeding from a single or closely related stock, plus the implied saturation of the area with drones that are functionally gametes of the queen. Pretty powerful genetic trouble.

Avoid this problem by bringing in new stock every year. Put it in the drone side of the mating by evaluating colonies and promoting drone production if you like what you see. Inhibit drone production if you are not impressed, or need to look for an entire season. These new queens could be from another Connecticut or New England beekeeper who has been working toward a regional, adapted, mite resistant bee, from a wild bee tree, or a selective purchase of a queen from a bee breeder.

Or all these options. Even with 10 colonies you are able to make observations, and determine the best colonies. Welcome to bee breeding!

Local Guild produces nuclei hives for members

Hello Dr. Connor,

Pam Fisher of the Beekeepers Guild of Southeast Virginia here. I wrote to you last year about your article supporting local queen and nuc production. You probably get so many email messages that you don't remember mine, but I wrote to you because your article was very timely for me – a group of local beekeepers, including me, had just left a traditional beekeepers association and established our new guild because we felt that we were not getting anywhere trying to advocate sustainable beekeeping practices . . .

Now it is a year later and I am happy to report that our guild has not only survived, we've doubled in size. And we have remained true to our sustainable tenets by producing local state-inspected nucs for every one of our members who requested them. It was no small feat after we graduated a class of 85 beginning beekeepers from our first bee school, more students than we had members!

With the recent news of the discovery of Africanized bees in Georgia, the leading producer of bee packages for our area of the U.S., I feel vindicated in urging our members to eschew the immediate gratification bee packages for the better survival rate of nuclei. Yes, they had a little wait while we produced the nucs, but now the reward is two-fold: stronger colonies and no Africanized bees.

Just as with local food, there is a powerful incentive for a local nuc producer to provide only the best to his customer; he will see the customer again at meetings and have to answer for his product. We paired our new beekeepers with experienced beekeepers through a structured mentor program and as a result, most new beekeepers were quite successful with their nucs. I feel that it also kept the nuc producers from selling anything sub-standard to a new beekeeper since they knew that an experienced beekeeper would be helping to install and maintain the new colony.

As a result, our new beekeepers have a wonderful attitude of wanting to repay the kindness shown them by their mentors and nuc producers; they want to produce nucs for next year's new beekeepers to keep the cycle going. So I just wanted to let you know that a local sustainable nuc program worked for us in its first year and that the goodwill that it generated will expand the program in years to come.

Thank you very much for your articles supporting local queen rearing and nucleus colony production. They were the inspiration that we needed this first year to keep going when we wondered if we could ever pull it off!

Sincerely,
Pam Fisher
Beekeepers Guild of Southeast Virginia
The VA Commonwealth's first beekeeping guild
http://beekeepersguild.org/

Dear Pam,

You have identified two key points here – the importance of mentoring and local reliance for nucleus hives. I know that this represents a huge change in thinking for many beekeepers. The idea of ONLY getting local nucleus hives is revolutionary for a vast majority of beekeepers, especially those who have relied on Sunbelt package bees in the past.

My experience with Sunbelt packages in 2010 will be remembered as the year of my $216 packages – so many colonies had queens that were poorly mated and produce drones within a monthly, developed European foulbrood, or had failed supersedures that I ended up with a lot of

Mentor Bob Montcalm of the beekeepers Guild of Southeast Virginia (in helmet), instructs students Debbi Torres and Jim Doubler.

Virginia nucleus hives are made from Virginia colonies and Virginia based queen producer.

colonies being stacked up to take the Winter losses in the Fall. It is a three to one reduction over the season and I paid $72 per package (ironically, to increase the number of bees I had for support hives for bee breeding). Maybe in a better year (in the Sunbelt states) I would have done far better than I did. But with African genes in Georgia, Texas, California and other states I agree with you and your group that NOW is the time to develop local queen rearing and nucleus production.

There is a huge financial incentive for suppliers to support the resale of package colonies to local beekeepers. There is no secret about this. Tens of thousands of package colonies are sold at a profit to new and existing beekeepers. These suppliers need to ask if they want to be known as the beekeeper who brings in African genes.

Mentors are key to this program. There will be a discussion about this at the Federation meeting of the Joint meeting in Galveston, TX in January. As part of the Sixth Serious Sideliner Symposium, I have several folks talking about developing a Country-Wide Master Beekeeper program. My position is that for such a program to work effectively we need to have a fantastic method of teaching the teachers (mentors, trainers, coaches, master beekeepers, etc) in all parts of the country.

With the flood of new beekeepers, there is an enormous demand for training and education, as you report with 85 new beekeepers in your group. Having more students than the club has members is becoming a routine challenge for a lot of groups. And while history says that this swell in interest will fade, many of the people getting into bees and beekeeping are better educated, better informed, and more diverse that I have ever seen. There are all sorts of partnerships: married couples, same-sex couples, intergenerational relationships between grandparents and grandchildren and a lot more. I think this will generate a longer level of interest over the future.

Going to the use of nuclei (nucs) does delay delivery to the beekeeper, but as you stated, this results in a stronger colony and reduces the chance of African genes in the colonies. Recently I worked with colonies from Texas packages that were pretty peppery, to be polite. They demonstrated the veil banging and long term following associated with African bees. These were 2010 packages. These reports increase more and more as I travel the country.

The Challenge

You will face the ultimate challenge of maintaining this program, keeping interest levels high and insuring that every new beekeeper gets the best possible nucleus and queen you can provide. I hope you have a good team to help you, since this sort of effort will suck you dry as a member of a voluntary organization. BC

After talking about Bee Sex in the City to New York City beekeepers in early December, I will be getting ready for the International Joint meeting in Galveston, TX. Join us at the Sixth Serious Sideliner Symposium in early January. Is that S to the fourth power? Hope to see you there!

CARING FOR

Dead outs are normally discovered on those occasional mid to late Winter days when the sun shines and the temperature rises high enough to allow the bees to wake up and make some cleansing flights. Your blood flows with the sound of the bees flying and you hope for strong hives coming out of Winter. Yes, a few hives are active, but there is one hive that seems strangely quiet. No regular traffic at the entrance. Maybe a bee or two investigating an upper entrance or browsing about on the bottom board where the mouse guard prevented intruders from taking up residence last Fall. There are a few dead bees at the entrance. That means it's time for a hive check.

Opening the hive we see what we dread. A mass of bees clustered between the frames but there is no movement. No life. Prying a frame loose and gently removing it shows a layer of dead bees on the frame, their lifeless sisters head first in the cells below. I believe it's the saddest sight in beekeeping. The fact that one of your hives is gone strikes deep and hard at a time when you are feeling the urges of Spring return after a long, cold Winter. Our desire to nurture the bees or even be greeted by the occasional sting will no longer be satisfied by this hive. Try as we may, it can be hard to determine exactly what may have caused the demise of our hive. Hopefully, we did all we could under the adverse conditions bees and beekeepers face today. Death is a part of life in our current environment, but we must always try to make the best of a bad situation.

Our inclination may be to close up the hive and take care of it later. This is definitely a situation where we should be proactive. A little effort now will save us time preparing equipment in the busy Spring and help conserve the energy of the bees destined for this equipment later. If you have ever seen a dead hive neglected until spring you understand by then, the frames of dead bees have become a sticky, smelly mess. Strange molds and fungi may grow on the combs and carcasses and who knows what affect these may have on bees. The cleaning of these combs and cells would be a monumental effort for the bees when their energy would be better spent establishing their new colony, building combs, and foraging. I do not like to leave the cleaning to the bees. Although they may eventually accomplish the task, they really do have better things to do.

The best thing you can do to help your bees after a

A DEAD OUT

Jim **Agsten**

dead out is to clean it as best you can the day it is discovered. This may seem like an obvious and simple statement but you really should do more than just brush the bees off the surface of the frame and leave the rest to the bees. The longer the dead bees are in the cells, the harder they are to remove, for you or the bees. After brushing the frames off, hold the frame by the end bars and strike the top bar sharply a few times against an outer cover or hive body to expel as many bees as possible from the cells. I like to use something at least as long as the top bar so the force is distributed across the entire frame rather than one end or the other. Flip the frame over and repeat. An errant strike will damage comb so exercise care. Yes, this can test your frame strength, but top bars are thick and you did put those last two nails through the end bars when you built the frames, right? Getting each and every dead bee out of the cells is not practical. Get as many as you can and move to the next frame.

Examine each frame of bees for disease signs and check other frames for honey or pollen that may be used to bolster hives light on stores (if disease free). Once the dead out is cleaned, either store the equipment or reassemble the hive and seal all entrances against mice still seeking a cozy comb to nest in for the remainder of the winter. Now check your remaining hives for adequate stores. If the temperatures are up and the bees are active, it is an ideal time to get some sort of feed on them before they join the hive you just attended to. Frames of honey and pollen are the first choice. Pollen patties, fondant, syrup, or even dry sugar may help prevent a late Winter starvation if the hive is light. Place these in close proximity to the cluster. Other feeding methods appropriate for colder weather will work as well. Remember once cold returns, the bees may not be able to move to the feed, so get it as close as possible.

The effort expended in a little extra clean up of dead hives will make a big difference to the next bees that occupy those combs, whether it be a new package, a split, or that first big swarm catch of Spring. Save the bees time and energy and they may reward you with a stronger hive and a nice crop of honey (but don't take too much!). BC

LORENZO L.

A Ded

Matt **Redman**

It is fitting that we offer, in our final issue of this momentous celebratory y
Birthplace Marker, in Philad

Honored speakers, distinguished guests, and friends in attendance: today, with the generous help of so many, we stand together to dedicate this marker at the birthplace of Lorenzo L. Langstroth. We celebrate and welcome the spirit of the man back to Philadelphia where he belongs. The reunion of Langstroth with his native city is long overdue. He had wanted to return for a visit much sooner but circumstances prevented it. At the end of January, in 1872, having been away for 20 years, Langstroth was heading to Philadelphia for a meeting, on February 1st, with two of his old Yale acquaintances, Rev. Dr. Ephraim Dod Saunders and Rev. Dr. Noah Porter, Jr., from the remarkably gifted class of 1831.

The friendship of this intellectual triumvirate was forged because all had spent a session or more living in the home of Denison Olmstead, the professor of mathematics and natural philosophy at Yale. The doctor was by all accounts a wonderful, inspiring man, filled with inventiveness and curiosity. Langstroth biographer Florence Naile suggests that, for the young, perceptive Lorenzo, Olmstead may have set "a memorable example of ingenious observation and practical objective."

The collective achievements of these three great intellects, Saunders, Porter and Langstroth, were dazzling. All three made it clear in their ministries and teaching that they opposed slavery. Porter, at that time the President of Yale, was a prolific writer, lucid thinker, and rugged soul who would eventually publish over one 120 books on a variety of topics. "What you believe in depends strongly on what you are" was one of his beliefs. Porter Mountain, in the Adirondacks, bears his name as he was one of the first on record to climb its peak.

After a run of about 20 years, E.D. Saunders had recently closed his highly successful military school for boys. Formerly known as the Saunders Institute, he donated this valuable property in West Philadelphia for the purpose of founding the Presbyterian Hospital, the beginnings of the current Penn Presbyterian Medical Center, "to provide for the needs of the sick and disabled regardless of race, color, or creed." To this day, the Ephraim D. Saunders Award, created in 1968, is presented "in response to exceptional acts of community service as demonstrated by its recipients." Saunders was the very man who excitedly sat up with Langstroth on the evening of October 30th 1851 after the latter, earlier that momentous day, had had the "Eureka moment" that would lead to his patented invention, the hive that still bears his name. "Full of enthusiasm," Langstroth reminisced later, "we discussed, until a late hour, the results which both of us thought must come from using moveable frames instead of bars."

To proceed with our story, Lorenzo Langstroth was on his way to Philadelphia to meet these two dear old college friends, Porter and Saunders, in late January of 1872. But during a stopover in Washington, DC, he suffered a grievous injury when he fell between two street cars and one of the wheels ran over his foot. One Phila-

LANGSTROTH

ication

ar, the speech given by Matt Redman at the dedication of the Langstroth lphia in September this year.

delphia paper speculated that the accident might "cost Mr. Langstroth the amputation of a part of his foot, or even a more serious loss." The flange of the wheel broke several bones in his instep and all five of his toes, nearly severing the small ones.

On his way east from his Oxford, Ohio home, Langstroth had stopped at the Nation's Capital to briefly look in on another longtime associate and kindred spirit, Samuel Wagner. Born in York, Pennsylvania, Wagner was a great and gifted figure in the history of American beekeeping. A bank cashier and newspaperman by trade in his early days, Wagner had never kept honeybees but, nonetheless, as a result of his utter fascination, gained an encyclopedic acumen regarding them. By producing a translation from German into English, Wagner introduced Langstroth to the works of Jan Dzierzon, a Silesian priest who had gained renown among the Prussian nobility and rulers of Europe as a preeminent keeper of bees.

If Langstroth had been keen to find out what Wagner was learning in theory from Europe, Wagner was likewise eager to find out what Langstroth was putting into practice at Philadelphia. When Wagner came to the city in August of 1852 and peered into Langstroth's hives, with their soon-to-be patented movable frames, he made a momentous decision. He was determined from that time on to make beekeeping a prosperous business in the United States and championed Langstroth's superior hive and management system. At Wagner's urging America's classic apiary handbook was written, *Langstroth on the Hive and the Honey-Bee: A Bee Keeper's Manual.*

In Washington, responding to the accident immediately, the superintendent of the railroad brought Langstroth to Wagner's house. Inexplicably, the old bee man's foot caused him relatively little pain and the wound healed so well that no operation was needed. But, as fate would have it, during Langstroth's stay to regain his health, his comrade and host Samuel Wagner died.

Langstroth never made it back to visit Philadelphia. Speaking for the family, Wagner's son wrote gratefully to *Gleanings in Bee Culture* magazine that "we cannot but esteem it providential that he was here when my father died, and able to prepare the obituary . . ." Of Samuel Wagner, his long-time friend and fellow Pennsylvanian, Langstroth made the following appraisal in his tribute: "Better acquainted with the history and literature of bee-culture than any man in America, perhaps than any living man – seldom if ever forgetting a single fact once lodged in his extraordinary memory; he was so modest and reserved, that only those who knew him well, understood the wide range of his reading and investigation." Wagner's son, with the assistance of Langstroth, tried valiantly to continue the *American Bee Journal* magazine, of which the elder Wagner had been the founder and editor. Apparently, Langstroth may have done most of the editorial work until January, 1873, when the periodical was sold and, more significantly, Langstroth's wife died.

This was one of the darkest periods for Langstroth. His friend, Dr. Joseph Frederic Berg, the versatile pastor of the German Reformed Church on Race Street, had died in July of 1871 at Philadelphia. Curious to know more about Lorenzo Langstroth after reading about his glass-walled hives in a newspaper account, it was Berg who in

the spring of 1851 went to visit him and who was completely astounded by what Langstroth had accomplished on his own with little knowledge of the latest European methods. Berg was the prudent intermediary who first made Langstroth and Samuel Wagner aware of each other's complimentary enthusiasm for the honey bee. Now both Berg and Wagner were gone. Later that year, in September of 1872, Langstroth's philanthropic Yale friend E.D. Saunders died at Philadelphia. Then, in January of 1873, as previously mentioned, Langstroth's wife Anne passed away. Their son James Tucker Langstroth had died of tuberculosis in 1870.

Langstroth was able to comfort others because he had personally endured so much suffering in his lifetime. According to an essay by John Bidwell, during the first great national economic crisis, the Panic of 1819, Langstroth's father, a papermaker in Philadelphia, wrote a report showing "that production had declined by 82 percent since 1816 because so many hands had been laid off, and so many mills shut down." With his father's financial help young Lorenzo had managed to attend a first-rate preparatory school under the aegis of the University of Pennsylvania. But upon his acceptance to Yale, Langstroth struggled to pay his own way by taking on tutoring jobs in mathematics. To complicate matters, he suffered, during extended periods through out his life, from a disturbing mental disability that he referred to as his "head trouble." Langstroth once confided to a friend, historian Henry Howe, that "his life had been marred by a strange mental malady, an alternation of seasons of excessive uncontrollable joyousness and exuberation of spirits, followed by dreadful turns of despondency and mental agony." "It was a curious form of melancholia," observed biographer Ophia Smith, "bordering on insanity." When he struggled with this mysterious psychological ailment the toll took him out of the public eye for months at a time.

Horace, one of the classic Latin writers that Langstroth was fond of, is the source for the aphorism, "Adversity reveals genius, prosperity conceals it." This adage does much to explain the enduring brilliance of the old Bee Man, who aspired to greatness in the realm of apiculture. His incredible knowledge in that field garnered for him, if not riches, richly-deserved national acclaim. His patented hive has far and away revolutionized how honeybees are kept, both in the United States and around the globe. To this day, with some refreshing exceptions, when we offer a cluster of honeybees a new home we present them with a Langstroth hive.

So it is that here today, though long delayed, we do our small part to welcome Langstroth home for a reunion. With the great admiration implied by the dedication of this marker, we at long last reunite Lorenzo L. Langstroth's spirit to the city that he helped to establish as the Cradle of American Beekeeping and, in his honor, launch the Philadelphia Honey Festival. Congratulations to all of the Cowan relatives on this occasion, which not only establishes a marker at the birthplace of their ancestor but observes the bicentennial year of his birth as well.

"For the many favors I have received from bee-keepers at home and abroad, and from personal friends and relations," remarked Lorenzo Langstroth toward the end of his life, "I hereby tender my heartfelt thanks." Likewise, *my* heartfelt thanks goes out to all that made this project a reality, including Sec. Redding, the Pennsylvania Historical and Museum Commission members, Marc Hoffman, Carl Flatow, Suzanne & Norman Matlock, Joel Eckel, Dave Harrod, Matt Feldman, Nicole Juday, Kim Massare, Lee Miller, Yvonne Crimbring, Teresa Bryson, James Castellan, Anaiis Salles, Pam Rogow, State Representative Rosita Youngblood, Barbara Ceiga, Roy Goodman, Charles Greifenstein, Marcella Durand, Kim Flottum, Karen Galle, and Jeffery Reinhold. I would also like to express gratitude to all of the numerous donors, sponsors, and contributors. Please forgive me if you have helped and I have failed to give notice here. BC

Many people have contributed to our series of articles on the life and times of Lorenzo L. Langstroth during this year celebrating his 200th birthday.

Certainly Roger Hoopingarner, who instilled in us all the need to mark the passage of time with his admiration of Langstroth, and shared many insights too often overlooked in his articles this year.

Marc Hoffman provided background, historical references and a unique insight to this most famous but troubled beekeeper. His one man play on LLL's life is one of a kind.

Matt Redman, too, offered his perspectives on Langstroth's roots and influence, and made connections missed by many that have filled our gaps and added to our understanding of events and the people who shared, aided and influenced Langstroth's life and times.

Florence Naile's work . . . *America's Master of Bee Culture, The Life of L. L. Langstroth* is the beginning point for anyone interested in the man who harnessed modern beekeeping, and remains required reading for all beekeepers.

Others added insightful looks at the influences ongoing in L.L.'s times. Tammy Horn added dimension, depth and a definite feminine side to our story, and Jim Tew provided basic wood working skills in his effort to explain the basics of the First Hive.

Certainly on this list belong all of the beekeepers, their friends, spouses, and supporters who organized and arranged and provided for the actual Marker Dedication this month's issue celebrates. Chief among them is Suzanne Matlock, and all of those in the Philadelphia Beekeepers Guild.

And of course Carl Flatow's inspiration and energy to honor this beekeeper, and to have his image forever remembered on a postage stamp must be noted, and support must continue for this venture.

We hope you have enjoyed, and benefitted from this short series of articles on the man who made beekeeping possible. Happy Birthday Lorenzo! And a Toast to the space you saw, and the wisdom to use it well.

The Authors, Editors, Publishers, & Beekeepers of the world.

Everything Changes

James E. **Tew**

Sooner or later everything changes – even in beekeeping

About Last Month's *Bee Culture* Piece

During the past couple of years, I have written some particularly squirrelly articles. The one I wrote last month about the OSU bee storage facility blowing away was probably a high water mark for J. Tew squirrelly articles. Maybe I should apologize – or at least – explain. I'm feeling better now, so I can calmly say that the facility is gone. A cement slab is all that remains. The mess is cleaned up, the shock has passed *(as much as it is going to pass)*, and the loss has been accepted *(as much as it can be accepted)*.

What Was This Place?

If I fully explained what the place was and why it was important to you and me, it would take several pages of tedious writing for you to read. Briefly, I suppose I could describe it as a user collection of bee equipment and supplies that had taken about eighty years to accumulate. While the barn was nearly filled to capacity at the time of its destruction, the inventory was continuing to slowly grow. Odd plastic frames, odd sized equipment, manufactured pieces, unique beekeeper-made pieces, vintage hives, modern hives, queen-mating nucs of all styles, full and empty honey drums, international hive equipment, hive feeders of all types, extracting equipment (modern and vintage), manufacturing equipment from the A.I. Root Company, hive lifters, Kelley wax presses and Better Way wax melters, a complete vintage "Bee-Off" gasoline-powered blower system, skeps, hundreds of queen excluders of all different styles, observation hives of all styles, foundation mills, a near complete collection of bee journals (much of which was saved), beekeeping books and vintage extension publications, original research data, two small tractors – one with a rear tiller, a complete woodworking shop with three table saws, all kinds of tools, branding irons, bee exhibit components . . . I estimate that the holdings are 95% gone and most of what we still have is damaged.

Everything Changes

During the recent weeks that have passed, we have grown (and are growing) to accept the loss. It's time to start again. Get over it. Everything changes. The storm is seemingly the biggest catastrophe to befall the research center where I work. Certainly, it was the biggest clean-up job I have even been assigned, but now the moment has passed and the new bee program will be cleaner, leaner, and newer. In all this mess, that's a good thing. Too often, our old usable equipment was just a bit embarrassing. My university equipment was well maintained and worked properly, but most new beekeepers had far better equipment than I. Truthfully, the barn was vintage and inefficient. Heating and maintenance costs were high. Don't you just know that somewhere university accountants are barely able to suppress grins?

A Clean Slate

On many fronts, this is a time of change, evolution and adaptation in beekeeping. My facility loss was a forced redirection of my program. The irony is that a good deal of the facility holdings meant very little to

What do these two beekeepers have in common?

most new beekeepers. Only rarely was there a good opportunity to dig all that old stuff[1] out just to show *"how it used to be."*

Beekeepers – Then And Now

While the same in many ways, modern beekeepers represent a change in several significant areas. In years past, bee hive management had a strong agricultural flavor but, for the most part, it does not have such a strong connection today. Beekeeping was frequently a part-time job for many and for others it was the sole income provider for the beekeeper's family. Then and now – most beekeepers are in it for pleasure and enjoyment. Many of our challenges then (1970s – 2000) are easily recognizable now. Concern over pesticides, wholesome honey production techniques, honey prices, disease control, Winter losses, swarm control, queen genetics . . . All the same as today. But, many other primary aspects of beekeepers and beekeeping are morphing into a newly-styled beekeeping community.

Commercial Beekeeping

Thirty to 40 years ago, there was a logical sequence to beekeeper growth. An energetic new beekeeper would begin as an enthusiast (a hobby keeper); grow to several hundred hives or enough to provide supplemental income (side-line beekeeper) and from that group a very select few would progress to full-time beekeeping. Today, few of you are aspiring to become anything other than an enthusiast. To a degree, I conjecture that part of this change has been caused by the evolution and adaptation of the pathway to true commercial beekeeping.

Years ago, a family business would commonly run something like 1200 – 1400 colonies – maybe more. A home operation with commercial honey production at the center and protected local marketing accounts rounded the operation out. Pollination rental fees were barely worth the colony move. If one did it at all, commercial pollination was something to do with the colonies at times when there was no nectar flow ongoing. Individuals' livelihood depended on beekeeping. Often, these people were in close contact with elected officials and dogged university researchers for pertinent information. They won some battles and they lost some battles, but what is important is that they fought for beekeeping. But it was not just commercial beekeepers who fought. Some of the most tenacious, confrontational beekeepers I have ever known never had more than a few scruffy colonies. People of this ilk are seemingly all gone. I miss the disruption and din that they caused.

Presently, commercial beekeeping seems to be near the ceiling of our ability to manage large numbers of bees. Computers and GPS certainly help, but when all aspects are considered, it comes down to frames, hive bodies, drawn combs, disease control, queen productivity, and the like. Fundamentally, at the most elementary level, commercial beekeeping is today as it was about four decades ago. I have lamented that our industry was not keeping pace with our agricultural cousins such as row crops, animal production, dairying – indeed even common farm equipment has evolved to unimagined levels. The tractor, with which we farmed 50 years ago, is barely considered to be a garden tractor today.

But while commercial beekeeping may not have changed enough, it has certainly changed in some very significant ways. Aggressive commercial beekeepers must now be long distance haulers – even to the extent of completely trucking across the country. Interstate regulations, individual state quarantines, dealing with fueling stations and escaping bees, semi-rig driving certifications, acquiring experience in operating such a large load of live bees, scheduling and booking pollinations sites, loading/unloading . . . this is not commercial beekeeping of years past. This is migratory beekeeping today and it's expensive to do. It requires technical skills on many fronts and as we have all realized in the past few years, it is risky. Bees seemingly die more easily now than they did in years past. Finally – I get to one of my points ... who amongst you new beekeepers who are reading this are planning to become commercial operators? Not many?

So what does that mean? When a commercial beekeeper decides to sell or to take on new (younger) partners, the selection pool is scant. In one of the southern states, a long-time established beekeeper recently sold his bee farm and land for millions of dollars. The actual value of the bees and bee equipment was minimal compared to the value of the land. His geographical area is increasingly crowded meaning that a commercial beekeeping enterprise of his size will never be practiced there again. In many states, commercial beekeeping is highly specialized for the highly specialized few.

Beekeeping Enthusiasts (Hobby Beekeepers)

During the dark years of Africanized honey bees and mite invasions, beekeeper numbers dwindled to all-time lows. Those of us who survived those times were hardheaded and committed to bees for our duration.

A new group of beekeeping trainees with new needs and expectatons.

[1]For your information, our beekeeping museum, that holds our best and most unique equipment pieces, was untouched by the storm. The OSU beekeeping equipment museum is open by appointment only and on special occasions.

How could we entice new people into becoming apiarists? We anguished. We subdivided our industry into *"haves"* (AHB or mites) and *"have nots"* (no AHB or mites – yet). We fought amongst ourselves.

The Perfect Bee Storm

In 2006-2007, the U.S. bee industry was hit by the most perfect storm of our bee lives. Colony Collapse Disorder (CCD) galvanized the public's imagination. Were we hanging on the edge of a world having no bees? Everyone was concerned. On the second front, urban/suburban agriculture or the "greening" of large metropolitan areas became vogue. Locally, highly nutritious vegetables produced in urban gardens in the middle of inner city food deserts was the right thing to do. Even the First Family has bees. Beekeeping has become the fashionable thing to do. It would appear that everyone either wants to either keep bees or to research them. Approximately half the faculty members in my immediate department presently have some interest in bees. This is true at other universities, too. At meetings everywhere, new beekeepers have signed on in significant numbers. Happy days are here again.

True – Happy Days Are Here Again

Absolutely, the present time is the grandest time – ever – to be a beekeeper. Equipment manufacturers and suppliers are in financial heaven. For the past few seasons, packages and queens have sold out. New clubs have sprung up and established clubs have added new members. Everything is injected with a high speed information delivery system that was far, far beyond the scope of science fiction just a few years ago. We blog and tweet. We surf the web. We set up social media networks[2]. In milliseconds, we can procure information that would have taken months to acquire several decades ago.

The New And Improved Beekeeping Industry

If any of the old beekeeper survivors thought that just bringing in new beekeepers and new technology would somehow bring about the rebirth of the old-styled, troubled bee industry, they were wrong. Beekeeping as we knew it decades ago is presently morphing itself into *the new and improved beekeeping industry* – modern and technologically suited for the beekeeper of today and the beekeeper of today is not the beekeeper of yesterday. That is a very healthy thing for the overall survival of our passion.

But . . . There Are Changes

True, many groups presently have full rooms of new beekeepers, but they are not necessarily there for all the old, traditional reasons. Very few – if any – of these people have an interest in pursuing beekeeping as anything other than an ecologically rewarding diversion. Beekeeping is something they *do*, but it is not who they *are*. That was true before of earlier beekeepers, but not so stringently. As before, it's still difficult to get members to serve as club officers. That's just human nature. As before, it's nearly impossible to get most groups to develop state and national political strategies for supporting state and federal agency bee programs. In many instances, those programs, when left undefended by a commodity group will be reduced or even eliminated.

The recent tornado scattered bee stuff everywhere. A worker brought me a wet, crumpled newsletter from *"The Minessota Beekeeper"* (June, 1969). No offense intended to Minnesotan beekeepers, but it was not something that had initial high value to me. I don't even know why we had it in storage. It got tossed in my truck, where it dried. Later, on a whim, I took a look at what was happening in 1969 and I was shocked and impressed. The first half of the mimeographed newsletter was dedicated to intensive political involvement at both the state and national level. These people in 1969 were activist players. They had multiple initiatives ongoing and infrastructures in place. Today, not all states enjoy such support but some do; so, if you are a beekeeper in a politically active state, kudos to your group.

Our Modern-Day Triadic Beekeeping Industry

States in different regions of the country have always had different flavors to their individual beekeeping industries. Today, some states are home to large commercial industries while other states support large numbers of hobby beekeepers but have few commercial operators. Over time, I sense that increasingly our industry has subdivided itself into three groups: Academic beekeeping, hobby beekeeping, and commercial beekeeping. Each of these groups has their own agendas and goals and is semi-autonomous. A commercial beekeeper recently told me he rarely attends bee meetings, *"because he didn't get much from sitting around a bunch of hobby beekeepers."* To survive and thrive, academic programs must go where the funding is but that is not necessarily where the commercial and hobby needs are. Hobby beekeepers are passionate and hungry to learn, but beekeeping is more of a social event rather than an industry structure. Even if these subdivisions truly exist and are as defined as I describe them, are they a bad thing? No, but they do exemplify the changes that our unique industry is undergoing. Beekeeping is changing itself – adapting – modifying – surviving. As a group, we keep holding on. That's a good thing. BC

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[2]You are invited to join the Ohio State University's beekeeping Facebook group at http://facebook.com/beelab. You can visit the page without joining.

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Science Of Bee Culture

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INSIDE

Genetic Stock Identification Of Production Colonies Of Russian Honey Bees

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Keywords: Russian honey bee, production, queen, genetic stock identification

In 2008, the USDA-ARS Honey Bee Breeding, Genetics, and Physiology Laboratory (USDA-ARS HBB Lab) fully released the Russian honey bee stock to the Russian Honey Bee Breeders Association (RBBA). Each year, members of the RBBA are required to have their breeding stock genetically certified, to conduct tests of honey production, and assess pest and pathogen (Varroa mites, tracheal mites and *Nosema ceranae*) status.

When the stock was released the stock diversity was characterized and a suite of genetic markers was identified that would be used for later stock certification (Bourgeois and Rinderer 2009, Bourgeois *et al.* 2010). A summary of the procedures used to certify breeding stock is given below. The members of the RBBA often use different times and mating apiaries to produce the production queens that they use in honey production apiaries and market to other beekeepers. We were curious about the genetic nature of their production queens. Hence, in Autumn 2009 and Spring 2010, we asked beekeepers of the RBBA to submit samples of worker bees from their production queens to determine the level of Russian alleles in the production colonies.

A total of 5 of the 8 certified members of the RBBA submitted samples for this study. All bees were submitted as live bees and were frozen upon receipt. DNA was then extracted according to published protocols (Bourgeois *et al.* 2010). Russian and non-Russian alleles were identified as previously described in Bourgeois *et al.* (2010). Briefly, 8 individual bees per colony were genotyped with 12 microsatellite and 5 single nucleotide polymorphism (SNP) markers. These markers created a genetic fingerprint of each bee. After genotyping was completed, the data were visually inspected to identify bees that had "drifted" into the colony. This was done

using the identification of the queen's alleles. All bees that do not have one of the queen's two alleles for each locus were considered to have "drifted" and were eliminated from the analysis pool. This procedure is a component of the standard procedure used for testing certification samples for Russian honey bees.

After drifting bees were identified and removed from the data set, ONCOR software (http://www.montana.edu/kalinowski) was used to determine genetic stock identification. The software algorithm compared the genetic fingerprint of the test bees to the genotypes of bees that comprise a baseline sample of Russian and non-Russian honey bees from commercial operations throughout the U.S. The software provided the probability of assignment of each bee to either the Russian or Non-Russian group. The minimum acceptable threshold for assignment to the Russian group is held at 70% for each bee for stock certification. Because the production colonies are openly mated and are not held to the strict standards required for the propagation of breeder stock (i.e., isolated mating yards and strict control of drone source colonies), we would expect to see lower levels of Russian alleles in production queens. Dilution of the stocks' alleles is not uncommon in production yards where open mating and drift are likely to occur.

Overall, colonies had a mean probability of assignment to the Russian group of 0.66 ± 0.04. This compares favorably with a recent report of stock assessment in commercial operations (Spivak *et al.* 2009) using Minnesota hygienic bees. An assessment of commercial apiaries using the Minnesota Hygienic stock of honey bees 10 years post-release showed that 24-29% of sampled colonies exhibited the hygienic trait at a high enough rate to be considered as good potential breeder colonies (Spivak *et al.* 2009). In the Russian production colonies, 48% had an average assignment value of > 0.7 meaning that 48% of these colonies could serve as potential breeder colonies.

The variability in probability of assignment was high among colonies and among beekeepers (Figure 1). Stock assignments of individual colonies ranged from 0.95 to the Non-Russian group to 1.0 to the Russian group. SAS 9.2 was used for all data analyses. Group assignment values were consistent among beekeepers ($P > 0.05$) with all operations having a large degree of variation among colonies (Fig. 1). A comparison of the production colonies with certified breeder colonies for each beekeeper showed that breeder colonies have higher percentages of Russian alleles (0.94 ± 0.01; $P < 0.001$). This was expected, because the RBBA members must follow strict guidelines while setting up their mating yards. The production yards are not held to the same restrictions. However, RBBA members work only with Russian bees in their apiaries. The primary source of non-Russian alleles would be from nearby apiaries or feral colonies. In other words, some level of introgression of non-Russian alleles is expected in openly mated production colonies.

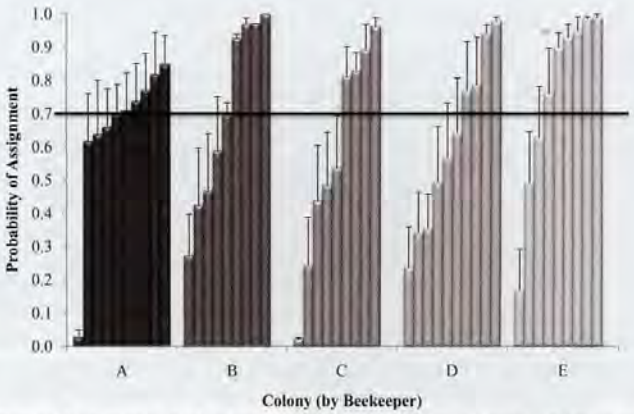

Figure 1. Genetic stock identification of production colonies of Russian honey bees. Bars represent mean ± S.E. for colonies from five Russian honey bee breeders. The horizontal line signifies the minimum assignment threshold for the certification of breeder stock that is used by the Russian Honey Bee Breeders Association.

The high level of Russian alleles in the production colonies is an indication that the bees should exhibit the characteristics of the USDA-ARS stock of Russian honey bees. Even in the presence of non-Russian alleles, the continuous selection that the Russian stock undergoes through activities of the RBBA should maintain the positive stock characteristics.

***Acknowledgements**: We thank the members of the RBBA for submitting their samples for testing. We also thank L. Beaman, A. Ellender and J. Escobar for processing samples. Mention of a trade name, proprietary product, or specific equipment does not constitute a guarantee or warranty by the USA Department of Agriculture and does not imply approval to the exclusion of other products that may be suitable.*

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A Spring Evaluation Of Thymol Formulated In A Sucrose Dust For The Control Of *Varroa destructor*, a Parasite Of The Honey Bee (*Apis mellifera*) In Alberta, Canada

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SUMMARY

We evaluated thymol formulated in a sucrose dust, as a control for the *Varroa* mite (*Varroa destructor*) under the cool spring conditions of northern Alberta, Canada. Our study compared two different application schedules of this formulation (four applications of 30 g at 7 d intervals or two applications of 60 g at a 14 d interval,

per colony) to a commercial thymol product, Apilife VAR®, or an untreated control group receiving sucrose without thymol. The number of *Varroa* mites falling on adhesive bottom boards was counted for 30 d during the treatment period. Treatments were then removed, highly effective synthetic acaricide strips (amitraz) were applied and the number of residual mites was counted for an additional 12 d. Overall, the thymol treated groups had higher mite counts during the treatment period compared to the untreated group, while the reverse was observed during the post-treatment interval. During the treatment period counts differed significantly on only two dates. On these dates we observed that all the thymol treatments had significantly higher counts compared to the untreated group, but only the application of 60 g of dust at the 14 d interval had similar high counts compared to Apilife VAR®. Nonetheless, the percentage of *Varroa* counted during the treatment period, compared to the total counted during both the treatment and post-treatment period, was similarly high for all the thymol treatments (>94%). Our results suggest that spring treatments with thymol dust provide a good alternative to Apilife VAR® and that reducing the application frequency of dust from four to two applications does not reduce treatment efficacy.

Keywords: Thymol, Apilife VAR®, honey bee, *Varroa* mite, acaricide

Introduction

The *Varroa* mite, *Varroa destructor* Anderson and Trueman, is considered the most damaging parasite of honey bees (*Apis mellifera* L.) (van Engelsdorp and Meixner 2009). To date, infestations have largely been managed using four synthetic acaricides (fluvalinate, flumethrin, coumaphous and amitraz), however, mite resistance to all four has evolved across the major beekeeping regions of the world (reviewed in Rosenkranz et al. 2009). Furthermore, acaricide residues have accumulated in honey and beeswax, generating concerns for not only human health but also for the health of the colony (reviewed in Rosenkranz et al. 2009).

Naturally-derived acaricides have been developed as alternatives to synthetic products, not only because their novel modes of action would be useful in managing *Varroa* mite populations that are resistant to synthetic ingredients, but also because they frequently are less persistent in the hive (reviewed in Imdorf et al. 1999). Thymol, a naturally-derived monoterpenoid, has pronounced selective toxicity against *Varroa* mites as compared to its honey bee host (Lindberg et al. 2000, Gashout and Guzmán-Novoa 2009). Consequently, two thymol-based commercial fumigants have been registered in the U.S., Apilife VAR® and Apiguard™. No thymol treatments are currently registered in Canada.

The current formulations of thymol, including products like Apilife VAR®, do not provide consistent control of *Varroa* mites (reviewed in Imdorf et al. 1999). In an effort to improve thymol efficacy, Emsen *et al.* (2007) compared a number of novel formulations, most notably a sucrose-based dust, to a previously developed formulation in which the thymol was impregnated in vermiculite blocks, similar to that of Apilife VAR®. The authors observed that while the efficacy of the thymol formulated in dust against *Varroa* mites was not different from that of the vermiculite formulation, only the dust formulation demonstrated a significantly higher efficacy compared to the other formulations in the study.

We investigated the efficacy of the dust formulation of thymol developed by Emsen *et al.* The objective of this work was not only to confirm their findings under different environmental and apicultural conditions, specifically the cool spring conditions in the Aspen Parkland zone of Alberta, Canada, but also to compare the effect of reducing the frequency of treatment application.

Materials and Methods

Acaricides. Thymol experimental dust treatments were prepared by Medivet Pharmaceutical Ltd. (High River, AB, Canada) and were previously described by Emsen *et al.* (2007). The thymol was finely powdered and mixed into confectionary sugar at a rate of 0.2 g of thymol per gram of total powder. The commercial thymol standard was Apilife VAR® (Chemicals Laif, Vigonza, Italy) which consisted of 11 g tablets containing 74.08% (wt:wt) thymol, 16.00% eucalyptus oil and 3.7% L-menthol. Apilife VAR® was applied according to the manufacturer's treatment recommendation of three applications of one tablet at 7d intervals.

Colony set-up. The experimental colonies were obtained from a pool of overwintered commercial colonies located near Grimshaw, Alberta, Canada (56° 11' N – 117° 36' W). In mid-April 2009, 40 single-chamber, Langstroth-hives were identified with similar high levels of *Varroa* mite infestation on the 29 April (9.1% ± 1.1 (SE), alcohol wash of phoretic *Varroa* from ~ 150 brood nest bees, Currie and Gatien 2006) and with comparable worker bee populations (adult workers covering at least six frames, with at least two frames of brood) and were moved to an apiary, where they were randomly assigned to ten replicates of four treatment groups: 1) thymol dust (4 × 30 g), 2) thymol dust (2 × 60 g) 3) commercial thymol standard (Apilife VAR) and 4) untreated control. A total of 120 g of the dust formulation was applied to each colony on a 25 x 10 cm piece of newspaper placed in the frame top bars right above the brood. The thymol dust was applied to colonies at two different frequencies: 1) four applications of 30 g at 7 d intervals (4 × 30 g) (Emsen *et al.* 2007) or 2) a previously untested schedule of two applications of 60 g at 14 d intervals (2 × 60 g). The untreated control colonies were provided with sucrose dust that was formulated without thymol.

The first application of treatments was on 8 May 2009 and coincided with the blossoming of willow (*Salix spp.*), the first major source of natural forage in the region. Immediately before the treatments were applied, 30 x 40 cm paper sheets coated with hydrogenated vegetable oil (Crisco®) were placed on the bottom boards of each colony to collect dislodged *Varroa* mites. Bees were restricted from contacting the adhesive surface with a 2 mm-mesh hardware cloth. The adhesive sheets were replaced at three to five-day intervals and the adult mites adhering to the surface were counted and recorded. The four week- treatment period was followed by a 12 d post-treatment period (9 – 21 June) in which all residual thymol or sucrose was removed from the colonies and replaced with controlled-release plastic strips containing 3.33% (wt:wt) amitraz (Apivar®, Véto-pharma S.A., France), an acaricide that kills >80% of the *Varroa* in a colony (Floris *et al.* 2001). The number of *Varroa* mites counted on the adhesive sheets during the post-treatment period was an estimate of the size of the population of mites not killed by the experimental treatments.

We estimated the overall treatment effectiveness for each colony by calculating the number of mites counted during the treatment period as a percentage of the total counted (treatment period + post-treatment period, Figure 1).

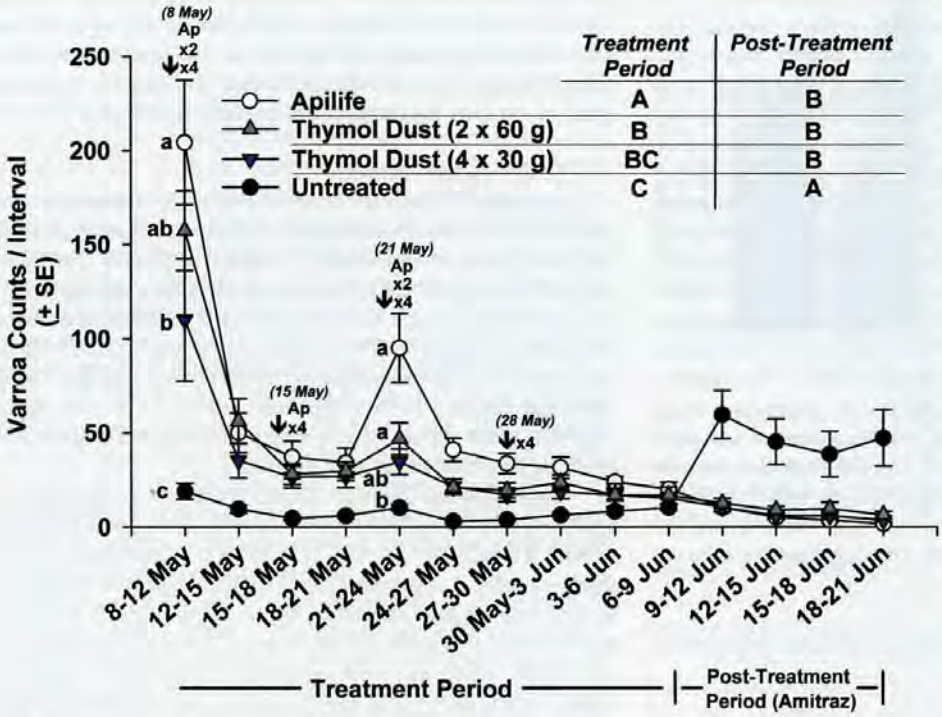

Figure. 1. *Average interval varroa mite counts on grease-coated boards for colonies not treated, treated with Apilife VAR® (Ap), a commercial thymol treatment, or treated with 120 g of thymol dust applied across four dates 7 d apart (×4) or two dates 14 d apart (×2). Means followed by the same lower case letter indicate no significant difference in counts for specific dates during the treatment period (Tukey-Kramer, α = 0.05). Although there were significant time × treatment interactions during the treatment period (see text), overall means across this period followed by the same uppercase letter indicate no significant difference (Tukey-Kramer, α = 0.05). Means across the four dates of the post-treatment period were combined for the comparison as the treatment × time interaction was not a significant source of variation (see text) and the same upper case letter indicate no significant differences (Tukey-Kramer, α = 0.05).*

Temperature - We measured the ambient temperature in the apiary every two hours during the treatment period by placing a **StowAway® TidbiT™** temperature logger (Onset Computer Corporation Bourne, MA, USA) in a shaded spot within the apiary location.

Statistical Analysis. We tested the hypotheses that *Varroa* mite counts among the treatment groups did not differ either in the treatment period or post treatment period, within each three- to five-day interval, or by the interaction of treatment and interval using a repeated measures mixed model analysis of variance (PROC MIXED, SAS version 9.2, Littell *et al.* 1996). We used the PDMIX800 macro (Saxton 1998) to get Tukey-Kramer adjusted mean letter groupings for each period, and when significant treatment by date interactions were detected, within each period. We tested the hypothesis that percent efficacy did not differ among the treatments using a one way analysis of variance, separating treatment means using Tukey-Kramer (PROC GLM, SAS version 9.2, Scholotzhauer and Littell 1987).

Results

Varroa mite counts underwent significant change through both the treatment period (Figure 1, May 9 – June 9) ($F = 56.88$; df = 9,324; $P < 0.001$) and the post-treatment period ($F = 9.98$; df = 3,108; $P < 0.001$), in spite of there being no evidence of difference in pre-treatment phoretic *Varroa* population ($F = 2.19$; df = 3,36; $P = 0.1057$). There was a large increase in counts during the first week of treatment, then again following the warming of ambient temperatures beginning on 21 May, but only among the thymol treated colonies (time × treatment, $F = 7.02$; df = 27,324; $P < 0.001$; treatment, $F = 12.92$; df = 3,36; $P < 0.001$). We observed ten-times the *Varroa* mite counts among Apilife VAR® colonies compared to untreated colonies on 12 May and twenty-times the counts on 24 May. Only the thymol dust treatment applied twice at a rate of 60 g had counts that did not statistically differ from those of Apilife VAR®. We also, however, observed higher counts among colonies receiving four 30 g applications of thymol dust compared to untreated colonies.

Varroa mite counts increased again at the beginning of the post-treatment period (June 9) when amitraz strips were applied, but, this was due to mite counts in the untreated colonies only (time × treatment, $F = 1.84$; df = 9,108; $P = 0.068$; treatment, $F = 10.18$; df = 3,36; $P < 0.001$).

The percentage of mites counted during the treatment period for the three thymol treatments were not different from one another, but were different from the untreated colonies (Figure 2, $F = 37.48$; df = 3,36; $P < 0.001$).

The average temperature through the treatment period was 8.6 ± 9.0 (SD)°C. There was considerable variation throughout this period, with the highest temperature recorded at 32.2°C on 3 June and the lowest at -9.4°C on 18 May (Figure 3).

Discussion

The application of thymol treatments resulted in a significant increase in *Varroa* counts compared to untreated colonies. This trend was reversed after the 30 d treatment period, when acaricide strips were placed among all the colonies, and untreated colonies alone exhibited a significant increase in *Varroa* counts. Furthermore, the proportion of the total number of *Varroa* counted among the thymol treatments during the treatment period exceeded 94%, compared to the 60% among the untreated colonies. Combined these results suggest that thymol treatments significantly increased *Varroa* mortality.

In general we cannot reject the hypothesis that the three thymol treatments were similar to one another and this suggests that thymol dust is a suitable alternative to Apilife VAR®. It should be noted, however, that there were two treatment period count intervals when we could not specifically reject this hypothesis (9-12 May and 21-24 May). For both intervals we found that only the thymol dust applied across two rather than four dates did not differ from the Apilife VAR® treatment. This suggests that reducing the number

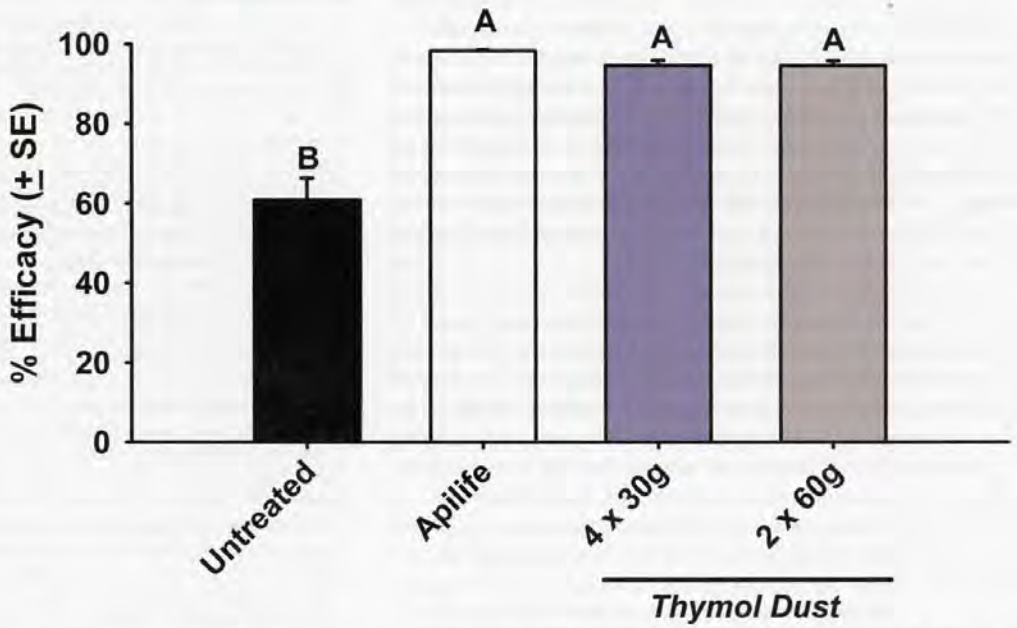

Figure. 2. *The average percentage of the overall number of* Varroa *mites that were counted during the treatment period for colonies not treated, treated with Apilife VAR®, a commercial thymol treatment, or treated with 120 g of thymol dust applied across four dates 7 d apart or two dates 14 d apart. Means followed by the same letter indicate no significant difference in percentages (Tukey-Kramer, α = 0.05).*

of thymol dust applications in half, which reduces treatment labour costs, does not reduce efficacy. Moreover each dust treatment application took less labour to apply to colonies than the Apilife VAR® treatment.

The labour cost associated with thymol dust treatment application could be further decreased by eliminating the use of the newspaper platform. Consequently the necessity of this step with respect to treatment efficacy and safety to bees should be investigated. Since powdered sucrose is also a matrix for applying antibiotics to colonies, labour costs could be further rationalized by combining thymol and antibiotics in a single application treatment. The possibility of cross-compatibility with commonly used antibiotics should thus be investigated, although tempered with strategies to eliminate unnecessary prophylactic antibiotic applications.

These results should be considered noteworthy given the unseasonably cool spring conditions under which the treatments were evaluated. The temperature observed in our study was below that recommended for thymol treatments generally (reviewed in Imdorf et al. 1999) and, specifically, below the 12°C threshold indicated on the U.S. label for Apilife VAR® below which, the label suggests, the control of *Varroa* mites may be reduced. Furthermore the temperatures which Emsen *et al.* (2007), for example, found dust treatments to be effective in their study in Ontario in September (14.5°C) was almost twice the average temperature registered in this study. Specifically the temperatures in our study were markedly cool four to nine days into the treatment (12-21 May), when we observed an average temperature of 4.02°C, which is well below the 30 year average of 9.75°C. The return of seasonal temperatures over the next interval, 21-24 May, coincided with a period when *Varroa*

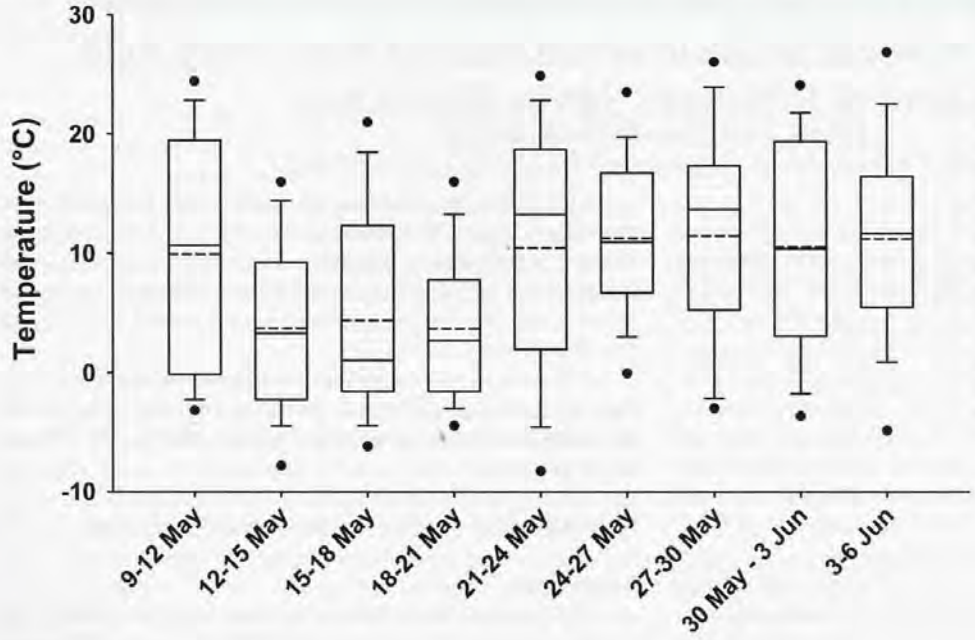

Figure 3. *Box plots of ambient temperature for each varroa mite counting interval in the experimental apiary during the treatment period (9 May – 9 June 2009). The mean for each interval is represented by the hashed line and the median by the solid line inside each box. The 25th and 50th percentile is represented by the bottom and top of the box, 10th and 90th percentile by the whiskers outside the box and the 5th and 95th percentile represented by dots outside each box.*

mite counts dramatically increased, suggesting low temperatures constrained efficacy. Consequently, it is reasonable to hypothesize that under more seasonal spring conditions treatment efficacy could have been higher. The possibility of control at low temperatures is of significance to beekeepers in the region as many prefer treating for *Varroa* in the spring due to time and labor constraints following honey harvest. It remains to be seen, however, whether reducing the frequency of thymol dust from four applications 7 d apart to two applications 14 d apart will continue to provide similar treatment efficacy at higher ambient temperatures.

We counted a high percentage of *Varroa* mites, exceeding 94%, falling onto adhesive boards during the treatment period for all the thymol treatments. This percentage, in a sense, is comparable to estimates of percentage efficacy calculated in other *Varroa* mite acarcide trials. Making comparisons to these studies is problematic as our approach likely overestimates efficacy because it is based on a post-treatment interval of only twelve days, whereas the complete treatment interval for the Apivar acaricide strips is 56d. This is strongly suggested when comparing the efficacy estimates for the untreated colonies in this study (61%) to those of Emsen *et al.* (2007) (~20%). Nonetheless, we are confident that while this may lead to an overestimate of efficacy, the post-treatment counts nonetheless reflect the numbers of mites remaining in the colony, as short-term acaricide counts are correlated to the counts across the entire span of the treatment (Calderone 1999). Furthermore, we suggest that since the rate of post-treatment *Varroa* drop remained relatively unchanged among the untreated colonies compared to the thymol treated groups, which declined, that we are likely overestimating the efficacy of the untreated group to a greater extent than we are for the thymol treatments.

Conclusion and Recommendations

Thymol dusting appears to be a promising alternative to vermiculite-based formulations. We recommend the continued testing of thymol dust formulations across different regions of North America in order to better predict the consistency of *Varroa* mite control beekeepers could expect. Nonetheless, our results suggest that better efficacy may be attained when average temperatures are above 10°C. Although reducing the treatment application frequency from four applications at 7 d intervals to two applications at 14 d intervals shows promise for reducing the labour costs of dust formulations, we recommend continued research to confirm this finding in other apicultural settings.

Acknowledgments

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Combining An Artificial Break In Brood Rearing With Oxalic Acid Treatment To Reduce Varroa Mite Levels

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Summary

Sixty-two colonies were set up to test the hypothesis that *Varroa* control with oxalic acid (OA) can be enhanced by combining treatment with late summer requeening. Each colony consisted of two full depth boxes with nine frames per box. All colonies were queen right at the beginning of experiment and had brood present. Approximately 300 adult bees were collected pre- and post-treatment to calculate mites-per-bee. This experiment consisted of four treatment groups, requeen plus OA, requeen only, OA only, and controls (untreated). Queens were caged in the requeen treatment groups five days prior to placing a sealed queen cell in the colonies. This provided a period of 18-21 days without egg lying, which allowed most of the brood present to emerge.

A 1.7 oz (50 ml) application of a 3.0% OA sugar water solution (sugar:water) (1:1) (w:w:w) was applied to the requeen plus OA, and OA only treatment groups. The OA solution was trickled from above the frames into the bee-ways with a 3.4 oz (100 ml) syringe. Post-treatment alcohol samples were taken four days after treatment. The results indicate that combining late summer requeening with OA treatment significantly reduced mites compared to untreated colonies, colonies that are requeened but not treated, and colonies only treated with OA.

Although we had a significant decrease in the treatment group that was requeened and treated with OA, we found evidence that the presence of brood is not the only factor affecting the efficacy of OA treatments.

Keywords: *Apis mellifera*, *Varroa destructor*, honey bees

Introduction

The *Varroa* mite (*Varroa destructor*) was first detected in North America in 1987 (Anonymous 1987). It is currently the most

destructive bee pest in North America (Sanford 2001). *Varroa* is an obligate ectoparasitic mite of the honey bee (*Apis mellifera* L.) that feeds on both adult bees and brood. It injures them both by feeding and by facilitating infection with viruses and microorganisms (Martin 2001). We investigated the hypothesis that combining an artificial break in the brood cycle in late summer with an oxalic acid (OA) treatment would provide a greater reduction in *Varroa* mite infestation than treatment alone or a break in the brood cycle without treatment. Synthetic miticides have been used frequently by beekeepers to control *Varroa* mites with differing degrees of success. However, *Varroa* mites have shown the ability to develop resistance to synthetic miticides. All of the synthetic miticides used in beehives are lipophilic in nature, and can accumulate in beeswax (Wallner 1999). Oxalic acid (OA) has been used in Europe and Canada extensively for the control of *V. destructor* with a high degree of success. OA is applied to colonies by spraying the adult bees on each frame, by trickling a solution of OA in 1:1 sugar water between the frames (Charrière and Imdorf 2002, Special Supplement 2005) or by sublimating oxalic acid crystals with heat (Special Supplement 2005). OA has been used to reduce *Varroa* mite infestations for approximately 20 years (Popov *et al.* 1989), but it is largely ineffective when brood is present (Charrière and Imorf 2002).

Queen replacement (requeening) is a best management practice that creates an artificial break in a colony's brood cycle (Laidlaw and Page 1997). A break in the brood cycle can then be used to control swarming by allowing thorough nest cleaning (Miller 1917) or to reduce diseases in the colony like sac brood (Scott Dupree 1996). In addition, a break in the brood cycle and introduction of a new queen can be used at the start of a main honey flow to release adult bees from brood rearing and therefore increase honey production (Killion 1981, Taylor 1977).

Materials and Methods

The 62 experimental colonies were located at the University of Nebraska-Lincoln's Agricultural Research and Development Center (ARDC) near Mead, Nebraska. The experiment was conducted from August 12th to September 4th, 2007. The colonies were a mixture of *A. mellifera carnica* and *A. mellifera ligustica* (obtained from C.F. Koehnen and Sons, Glenn, California). Each colony consisted of two full depth Langstroth hive bodies with nine frames each. All colonies were queen right at the beginning of experiment and had brood present. Mite infestation levels were equalized by moving frames of sealed brood among the colonies approximately three weeks prior to the beginning of the experiment. We randomly assigned the 62 experimental colonies to four treatment groups, requeen plus OA, requeen only, OA only, and controls (untreated). The treatments were applied to colonies distributed in four different apiary locations at the Agricultural Research and Development Center.

Oxalic acid treatments

A 1.7 oz (50 ml) application of a 3.0% OA solution in sugar water (1:1) (w:w) was applied to the requeen plus OA, and OA only treatment groups. The two-story colonies were separated and each half received approximately 0.85 oz (25 ml) of the OA solution. The OA solution was trickled from above the frames into the bee-ways with a 3.4 oz (100 ml) syringe and an effort was made to maximize adult bee contact with the solution. OA treatment occurred later in the afternoon when most of the colony's adult bee population was present.

Requeening

The queens in the requeen treatment groups were caged 5 days prior to inserting queen cells, and were killed when the queen cells were inserted. Queen cells normally take 10-14 days from queen emergence to the start of egg laying (Spivak and Rueter 1997), so this technique provided 18-21 days without egg lying in the treatment groups that were requeened. This protocol allowed most of the brood present in the colonies to emerge prior to OA treatment resulting in exposure of all or most of the *Varroa* mites to the OA treatment.

Estimating mite numbers

We collected approximately 300 adult bees from each colony to estimate mite populations. We used the alcohol wash technique to estimate the number of mites per adult bee (Shimanuki and Knox 2001). Adult bee samples were collected three times: 1) initial samples were taken before there was a break in the brood cycle, 2) pre-treatment samples were taken after the break in brood to estimate the *Varroa* population before OA treatments were applied, 3) post-treatment samples were taken four days after OA application.

Experimental design and statistical analysis

Our experimental design was a randomized complete block design (RCBD). Apiary was the blocking factor, and mites-per-bee ratio was the response variable. We analyzed the data using PROC GLIMMIX (SAS Institute 2006) and separated means using a *t*-test ($\alpha = 0.05$).

Results

There was no significant difference in the number of mites-per-bee among the treatment groups prior to beginning the experiment. This is shown in the first column of Table 1. The treatment groups ranged from a high of 0.04 ± 0.05 mites-per-bee to a low of 0.02 ± 0.02 mites-per-bee. There was also no significant effect for apiary location. Since up to 80% of the mites are in sealed brood when available (Martin 2001), it is understandable that there would be an increase in the number of mites on adult bees with a break in the brood cycle. This was evident when we observed an increase in mite numbers in all four treatment groups prior to OA treatment (Table 1). Post-treatment samples showed that *Varroa* mite numbers on adult bees decreased significantly in both the requeen only and the requeen plus OA treatment groups. The requeen only treatment was significant at $\alpha = 0.05$ ($t = 2.04$, $df = 168$, $P = 0.0429$). The requeen plus OA treatment provided the greatest reduction in mite infestation with a drop in infestation from 0.2 ± 0.05 to 0.04 ± 0.05 mites-per-bee ($t = 2.65$, $df = 168$, $P = 0.008$)(Figure 1).

Table 1- Estimated mites-per-bee before a break in brood cycle and after break.

Treatment	Mites-per-bee before break	Mites-per-bee after break	Reps (n)
Requeen + OA	0.04 ± 0.05 a[1]	0.20 ± 0.05 a	16
Requeen only	0.02 ± 0.02 a	0.10 ± 0.02 b	16
OA only	0.03 ± 0.02 a	0.08 ± 0.02 bc	16
Untreated	0.03 ± 0.01 a	0.05 ± 0.01 c	14

Table 1- *[1]Means in a column followed by different letters represent significant differences (t-test, á = 0.05, df = 114).*

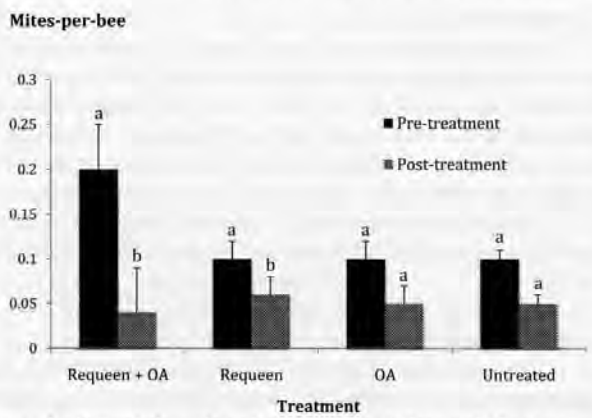

Figure 1. *Estimated number of mites-per-bee before and after treatment for the 4 treatment groups. Sample times bearing different letters for each treatment group were significantly different (t-test, $\alpha = 0.05$).*

Discussion

Combining late summer requeening with an oxalic acid treatment significantly reduces *Varroa* mite levels in honey bee colonies. Colonies that were only requeened had a significant drop in mite infestation, but the difference was not as large as occurred when OA treatment and requeening were combined. Colonies that were treated with only OA and untreated controls did not exhibit a significant drop in mite infestation. Although mite levels were significantly reduced, we did not achieve the degree of efficacy that Aliano (2008) achieved with late fall OA treatments. The difference we observed may be due to the presence of some brood, to OA not being distributed efficiently (bees do not form a tight cluster in August) or to evaporation due to warm ambient temperatures.

Our research shows that an artificial break in brood rearing accomplished by requeening can be exploited to enhance OA efficacy in late summer treatments. This experiment along with previous work, suggest that the presence of brood is not the only factor that limits OA treatment efficacy at warmer temperatures.

It would be helpful to investigate why late summer treatment of broodless colonies is less effective than early winter treatment of clustered bees. We speculate that temperature, humidity or reduced distribution are possible factors affecting OA's efficacy. Repeating this experiment using sublimation as an application method would result in more uniform distribution and would help clarify the distribution question. Placing colonies in climate controlled chambers for treatment would help clarify the role of temperature, humidity and evaporation.

Conclusions and Recommendations

The protocol used in this experiment has multiple benefits as a beekeeping management strategy. The results demonstrate that an artificial break in the brood cycle can be used to increase the effectiveness of different miticides in late summer treatments. In the Midwest, late summer is the optimal time for rearing and mating queens. This strategy provides colonies with young mated queen for the following spring. The colonies will fill the brood nest with food stores (nectar and pollen), when available, thus increasing the odds of the colony being able to overwinter. The benefits described above also provide beekeepers with optimal colonies for early spring pollination of crops such as almonds. Finally, if OA becomes a legal treatment in the United States it will allow the beekeeper to reduce *Varroa* mites with a low cost miticide.

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The Effect Of Oxalic Acid On Honey Bee Queens

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Summary

An experiment was conducted to determine if oxalic acid (OA) has a lethal or sub-lethal effect on honey bee (*Apis mellifera* L.) queens. Single-story Langstroth hives were fitted with dividers to house three three-frame colonies providing a total of 45 three-frame colonies. Each of the colonies had a separate entrance. Each colony was stocked with one frame of sealed brood, one empty comb, and 1 frame of honey and pollen. Sufficient adult bees were added to cover the frames. The colonies were randomly assigned to one of the three treatment groups: 1) control (1 µL of acetone), 2) 18 µg OA per µL (low dose), or 3) 180 µg OA per µL (high dose). Treatments were applied by first anesthetizing the queens with CO_2 and then applying the OA solution to the abdomen with a Hamilton micro syringe. The high dose was equal to the 48-hour LD_{10} for worker bees (Aliano *et al.* 2006). Four response variables were measured for all colonies: queen survival, eggs laid in 24-hours, percent brood viability, cm^2 of sealed brood. The high dose (180 µg OA) queens exhibited a percent brood viability of 46.7 ± 7.35%, which

was significantly lower than in both the controls (untreated) and the low dose treatment (18 µg OA) groups. However, we found no significant difference in the amount of sealed brood following OA treatment. The reduction in brood viability appears to be temporary as colonies continued to develop normally. The dosage required to cause a measurable affect was higher than a queen would receive in a hive treated with 50 ml of a 3.0 % OA solution.

Keywords: *Apis mellifera*, *Varroa destructor*, oxalic acid, honey bee queen

Introduction

The *Varroa* mite (*Varroa destructor*) was first detected in North America in 1987 (Anonymous 1987). It is currently the most destructive bee pest in North America (Sanford 2001). *Varroa* is an obligate ectoparasitic mite of the honey bee (*Apis mellifera* L.) that feeds on both adult bees and brood. It causes injury by feeding and facilitating infection with viruses and microorganisms (Martin 2001). Synthetic miticides have been used frequently by beekeepers to control *Varroa* mites with differing degrees of success. However, *Varroa* mites have shown the ability to develop resistance to synthetic miticides. All of the synthetic miticides approved for beekeeping are lipophilic in nature, and they accumulate in beeswax (Wallner 1999). Oxalic acid (OA) has been used in Europe and Canada extensively to control *V. destructor* with a high degree of success. OA is applied to colonies by spraying the adult bees on each frame, by trickling a solution of OA in a 1:1 sugar water syrup between the frames (Charrière and Imdorf 2002, Special Supplement 2005) or by sublimating oxalic acid crystals with heat (Special Supplement 2005). Oxalic acid (OA) has been used to reduce *Varroa* mite populations for approximately 20 years (Popov *et al.* 1989), but it is largely ineffective when brood is present (Charrière and Imorf 2002). Even though extensively used in Europe and Canada oxalic acid's effect on the reproductive members of a colony is relatively unknown. This study was conducted to see if there are any sub-lethal effects on honey bee queens when used to control *Varroa* mites.

Materials and methods

Construction of divided hives

We designed and built 15 single-story Langstroth hives that were fitted with dividers to house three three-frame colonies providing a total of 45 three-frame colonies. The dividers were made of 1/8" plywood and provided a bee-tight seal between the sides of the hive body, the inner covers, and the bottom board. Each divide had a separate inner cover, which allowed examination of one colony without disturbing the others. Each of the colonies had a separate entrance. The two colonies to the outside of the hive body had entrances on one side and the middle colony had an entrance on the opposite side of the hive body. This was done to reduce drifting between the individual colonies.

Stocking the divides

We stocked the 15 divided hives by splitting colonies from an apiary located at the University of Nebraska-Lincoln East Campus. The parent colonies were composed of a mixture of *A. mellifera carnica* and *A. mellifera ligustica* honey bees (obtained from C.F. Koehnen and Sons, Glenn, California). Each colony was stocked with 1 frame of sealed brood, one empty comb, and one frame of honey and pollen with sufficient adult bees to cover the frames. This resulted in three frames for each colony and nine frames total for the entire Langstroth hive. The entrances to each colony were sealed and the hives were moved to a cool (21-24°C) dark storage building for 12 hours. The following morning the hives were moved to the University of Nebraska-Lincoln Agricultural Research and Development Center, approximately 35 miles north of Lincoln, Nebraska. A ripe queen cell (ready to emerge) was then placed in each colony. The hives were left untouched for 2 weeks, which gave the virgin queen time to emerge, mate and begin laying eggs.

Treatment and data collection

The queens in the 45 three-frame colonies were randomly assigned to one of the three treatment groups: 1) control (1 µL of acetone), 2) 18 µg OA per µL (low dose), or 3) 180 µg OA per µL (high dose). The high dose was equal to the 48-hour LD_{10} for worker bees reported by Aliano *et al.* (2006). The low dose was calculated to be 10 fold lower than the LD_{10}. Serial dilutions of OA dihydrate (>99% purity) (The Science Company) (CAS no. 6153-56-6) in acetone were prepared. The 45-mated queens were located and placed in individual cages. The queens were anesthetized with CO_2 one at a time. The corresponding treatments were applied to the abdomen using a Hamilton micro syringe and repeating dispenser (Hamilton Company, Reno, NV). The queens were then returned to their colonies and monitored for seven weeks.

Queen survival was measure by locating the queen in each colony seven, 14, and 21 days after OA treatment. The queens were each marked on the thorax with a unique color of enamel paint (Dadant & Sons Inc.) when they received the OA treatment. The markings made it possible to determine if the original queen was still present.

To measure queen productivity all of the frames in the colony were removed individually and a piece of clear plexiglass with a 1" X 1" grid was placed over the frame. The cm^2 of sealed brood were then estimated. The measurements were taken approximately three weeks after treatment.

To examine the egg laying rate, the queens were caged to one side of an empty frame for 24-hours. The cages measured 17.8 cm X 17.8 cm and covered approximately 1165 worker cells. The cages were built with eight-mesh wire and had plastic queen excluder covering the center of the cages so that worker bees would be able to tend to the queen. After 24-hours, the queens were released and the eggs on the frame were counted. To measure percent brood viability, the frames that the queens were caged on were removed from the colonies after 10 days and the sealed brood cells were counted. The number of sealed brood cells was then divided by the number of eggs originally laid in the 24-hour period.

Experimental design and statistical analysis

The experimental design was a completely randomized design (CRD). Four response variables were measured for all colonies: 1) queen survival, 2) eggs laid in 24-hours, 3) brood viability, 4) square centimeters of sealed brood. We analyzed the data using PROC MIX (SAS Institute 1999) and separated means using a *t*-test ($\alpha = 0.05$).

Results

Queen survival

Before OA treatment occurred 14 of the 45 queens were lost. This was due to some of the queens not emerging or not returning from mating flights. Even though the LD_{10} for workers reported by Aliano *et al.* (2006) was used as the high dose, there was no loss of due to the treatment of OA.

Treatment	Estimates ± std. error	N
High Dose	639.3 ± 335.6 a[1]	11
Low Dose	768.8 ± 443.1 a	12
Control	846.8 ± 489.7 a	8

Table 1. *Mean queen productivity estimates (cm^2 of brood by treatment) for queens that received one of two concentrations of oxalic acid.*
[1]Means followed by different letters represent significant differences (t-test, $\alpha = 0.05$).

Queen productivity

The three treatment means for queen productivity are shown in Table 1. There was no significant difference in the cm^2 among the three treatments ($F = 0.60$, $df = 28$, $P = 0.5561$). The amount of sealed brood present for the 3 treatments ranged from 226 to 1852 cm^2.

Egg production

The three treatment means for egg production are shown in Table 2. There was no significant difference in the number of eggs laid in 24 hours among the three treatments ($F = 0.49$, $df = 28$, $P = 0.6194$). The highest number of eggs laid in 24 hours was in the high dose at 679. Both the control and low dose treatments had queens that laid no eggs.

Treatment	Estimates ± std. error	N
High Dose	400.27 ± 225.01 a[1]	11
Low Dose	387.58 ± 186.56 a	12
Control	315.75 ± 156.86 a	8

Table 2. *Mean egg laying estimates during the 24-hours following treatment with one of two concentrations of oxalic acid.*
[1]Means followed by different letters represent significant differences (t-test, $\alpha = 0.05$).

Brood viability

The treatment effect was significant for brood viability ($F = 7.93$, $df = 26$, $P = 0.002$). There was a significant difference in brood viability between the control and the high dose treatments ($t = 3.12$, $df = 26$, $P = 0.0043$)(Figure 1). Similarly, there was a significant difference in brood viability between the high dose and low dose ($t = -3.60$, $df = 26$, $P = 0.0013$). There was no significant difference between the controls and the low dose.

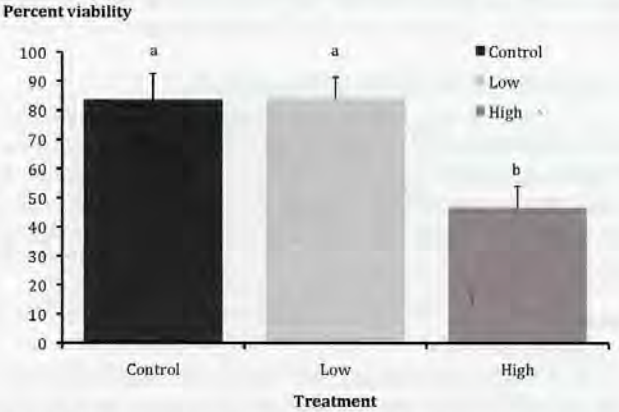

Figure 1. *Mean percent viability for brood laid by queens treated with one of two concentrations of oxalic acid. Treatments bearing different letters were significantly different (t-test, $\alpha = 0.05$).*

Discussion

The queens in the high dose (180 µg OA) treatment demonstrated a mean brood viability of 46.7 ± 7.35% which is significantly lower than both the control (untreated) and the low dose treatment (18 µg OA) queens' mean brood viability. However, since we observed no significant difference in brood production following OA treatment, the reduction in brood viability seems to have little effect on the colonies' development and may be temporary. The low dose treatment (18 µg OA) more closely resembles what a queen would be exposed to when a colony is treated with OA (trickling method), and it did not result in any reduction in egg laying or brood production. There was also no significant reduction in brood viability between the low dose and controls. Interestingly, there was no difference in queen survival for any of the three treatments, and no queens died during the experiment.

The results also indicate some interesting trends. Queens in both of the OA treatment groups (high and low dose) laid a higher number of eggs in a 24-hour period than untreated queens. Although the difference was not significant, this trend is possibly a response by the queen to the stress of exposure to OA. However, the cm^2 of sealed brood present 3 weeks later was numerically lower in the OA treatment groups than in the control group. Although our results indicated a trend, the differences between treatments were not significant.

Some remaining questions to answer include: 1) is there a difference in how workers, drones and queens respond to OA exposure? 2) at exactly what developmental stage is brood viability affected? 3) does OA affect sperm stored in the spermatheca?

Conclusions and Recommendations

The results of this study support the recommendation that beekeepers should be careful not to exceed the recommended dose of OA. The results also suggest that there may be a difference in the ability of workers and queens to tolerate OA exposure with queens possibly being less vulnerable to injury. A larger test would be required to verify this possible difference.

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Analysis of Bacterial Pathogens in Virginia Honeys

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Abstract

The presence of microorganisms in honey samples from beekeepers throughout the State of Virginia (USA) was investigated to determine the prevalence of *Clostridium botulinum* (van Ermengem) and *Paenibacillus larvae* (White). Several studies have shown honey to contain microorganisms such as spore forming bacteria and yeasts. *C. botulinum* has been linked to cases of infant botulism, and *P. larvae* is the etiological agent of American Foulbrood (AFB) in honeybees, *Apis mellifer*a L. Out of 92 honey samples submitted by beekeepers from around the state, only three (3.2%) were found to contain *P. larvae*, and no *C. botulinum* was found.

Keywords: *Paenibacillus larvae, Clostridium botulinum*, American Foulbrood Disease

Introduction

The low pH, high sugar content, and low water content contribute to the antimicrobial activity of honey (Iurlina and Fritz, 2005). According to White (1963) the pH of honey ranges from 3.4 to 6.1 with an average of 3.9 and an optimum moisture content of 17.2%. Glucose oxidase also contributes to the bacterostatic and bactericidal properties of honey by producing hydrogen peroxide and gluconic acid when honey is diluted. These compounds influence the volatile conditions that prevent growth and germination of microorganisms in honey (White, 1963). However, several studies have shown honey to contain microorganisms such as spore forming bacteria and yeasts (Finola et al., 2005; Iurlina and Fritz, 2005). Microorganisms are not typically able to grow in honey, but may be able to survive in a static or spore stage. Spore forming bacteria are potentially dangerous because spores are not destroyed during the extraction and processing of honey and can persist in honey indefinitely. Two spore forming bacteria of particular concern are *Clostridium botulinum* and *Paenibacillus larvae* because of the potentially harmful diseases they produce (Arnon et al., 1978; Shimanuki, 1997).

C. botulinum, a Gram positive anaerobe, is the causative agent of botulism, a neurotoxic disorder. *C. botulinum* spores have been found in honey and have been linked to several infant botulism occurrences (Arnon et al. 1978). Children less than one year of age have an immature intestinal flora that cannot prevent spore germination or production of the botulinal neurotoxins after the spores have been ingested (Nevas et al. 2002). Previous studies have indicated that the incidence of *C. botulinum* in honey samples is usually low (Monetto et al. 1999), but can range from 2% to 24%, with an average prevalence of about 10% (Nevas et al., 2006). However, Iurlina and Fritz (2005) did not find *C. botulinum* in any of the honey samples they tested from Agentina.

P. larvae is a gram positive aerobe and the etiological agent of American Foulbrood Disease (AFB) in honeybees, *Apis mellifera* (Shimanuki 1997). AFB is a highly contagious disease that affects only the larvae of honeybees, but can be detrimental to a colony and may result in hive death, if it is not caught early in the disease outbreak cycle (Lauro et al. 2003). The spore is the only infectious stage, yet can cause disease after the ingestion of as few as 10 spores by a larva (Brodsgaard et al. 1998). AFB is easily spread to healthy hives though the transfer of spores by robbing or drifting bees. Furthermore, Antúnez et al. (2004) indicated that there is a correlation between the first occurrence of AFB in a hive and the spread of the disease to other colonies in close proximity. Since *P. larvae* is easily transmissible and highly destructive to colonies, it is of considerable socioeconomic importance to beekeepers (Lauro et al. 2003).

Studies on the prevalence of *C. botulinum* and *P. larvae* have not been conducted on Virginia honey, although several studies have reported on the occurrence of both pathogens in honey in the United States. The most recent study (Solomon and Lilly 2001) reported a 13% prevalence of *C. botulinum* in U.S. honey, while Alippi (1995) reported an 8% incidence of *P. larvae* in U.S. honey. Steinkraus and Morse (1992) reported an 8.5% incidence level for *P. larvae* in some U.S. and Canadian honeys. The focus of this study was to identify the incidence of *C. botulinum* and *P. larvae* in Virginia honeys and identify any associations with respect to pathogen distribution within the state.

Materials and Methods

Sample sources. A total of 92 honey samples were examined for the presence of *C. botulinum* and *P. larvae* spores. The honey samples were submitted by local beekeepers in different areas of Virginia (Figure 1), following requests for honey samples at local and state association meetings, and in the state association newsletter.

Moisture content and pH. An Atago honey refractometer (Atago USA, Bellevue, WA) was used to determine the moisture

***Figure 1**. The locations within Virginia USA from which honey samples were submitted for the analysis of the pathogenic bacteria,* Paenibacillus larvae *and* Clostridium botulinum. *Squares indicate the location of positive* P. larvae *samples.*

content of each honey sample. The pH of 58 of the honey samples was taken following the procedures outlined in the AOAC Official Method (Method 962.19) for honey acidity (AOAC 2002). An Accumet pH meter (model 805MP; Allied Fisher Scientific, Pittsburg, PA) was used for the pH determinations after calibration using Orion buffers (pH 7.00 and 4.01) (Thermo Electron Corporation Waltham, MA). All measurements were performed at 25°C. Since low pH and low moisture content both contribute to the antibacterial properties of honey, they were examined to determine if there was any correlation between high pH or moisture content and bacterial growth.

Bacterial Detection. Honey samples were warmed to 35°C in a water bath prior to mixing and analysis. A 1 ml sub-sample was removed from each beekeeper sample and diluted 1:2 (w/v) in sterile distilled water. The samples were then centrifuged at 12,000 x g for 30 min. The supernatant was discarded and the pellet was streaked onto one Brain Heart Infusion plate supplemented with 1% thiamine (BHI+T) and one Columbia Blood agar plate. *P. larvae* requires thymine in the media in order to survive; it is not capable of growth on minimal media, but can sometimes grow on Colombia Blood agar plates (Heyndrickx et al. 1996). Plates were incubated at 37°C for up to 72 hours to allow sufficient time for growth of any spore forming bacteria present in the honey. Plates that had observable growth were further analyzed to determine the species of bacteria. Classification of bacterial growth was based on characteristic colony morphology on BHI+T and Colombia Blood agar plates (Heyndrickx et al., 1996). Cell morphology was also used as a diagnostic tool in identification through use of a standard Gram stain method and a spore stain using malachite green with basic fuchsin as a counter stain. Samples suspected to be P. larvae were subjected to further investigation.

Catalase and Plagemann tests. All cultures suspected to be P. larvae based on colony and cell morphology were analyzed by catalase and Plagemann tests (Kilwinski et al. 2004). For the catalase test, a small portion of the colony from the BHI+T plate was transferred onto a clean petri plate and mixed with a drop of 3% H_2O_2. Production of air bubbles indicated a positive reaction; no production of air bubbles or weak/delayed production indicated a negative reaction. *P. larvae* is negative or weakly positive for catalase (Kilwinski et al., 2004). For the Plagemann test, blood agar slants were inoculated and sealed with Parafilm. After 10 days of incubation at 37°C on a blood slant, growth was examined for the presence of giant whips (Hansen and Brodsgaard, 1999) using phase contrast microscopy.

***C. botulinum* detection**. Ten samples suspected to contain *C. botulinum* were selected based on the observation of spores when the raw honey sample was examined either by Gram stain or a spore stain and no aerobic growth. These samples were diluted 2:1 (w:v) in sterile DI water and centrifuged at 12,000 x g for 3 min. The supernatant was discarded. The pellet was transferred to 19 ml of thioglycolate medium and initially incubated under anaerobic conditions at 35°C for 48 hours. Samples that appeared turbid were then streaked onto BHI agar roll tubes and incubated under anaerobic conditions at 35°C for 48 hours. Samples which were not turbid were incubated further at 35°C for a total of 5 days and new colonies were isolated. From the BHI+T agar roll tubes, each sample was inoculated into TPYG medium (Appendix A) (Nevas et al. 2002). Positive samples were then subjected to a cellular fatty acid analysis by gas chromatography and fatty acid profiles compared to a library of known organisms (Moore et al. 1994). Prior to GC cellular fatty acid analysis the samples were concentrated by centrifugation, washed, and then frozen.

Cellular Fatty Acid Identification (CFA). The frozen pellets from the PYGT cultures were thawed and the cells were lysed and saponified with 1.0 ml of basic methanol (45 g of NaOH, 150 ml of methanol, 150 ml of deionized water). The samples were then heated in a boiling water bath for five min, mixed, heated in the boiling water bath for an additional 25 min and then cooled. The anaerobe cell constituents were methylated and the methylated components were then extracted following the procedures of Moore et al. (1994). Each extract was washed once with a three ml solution containing 5.4 g of NaOH in 450 ml of deionized distilled water saturated with NaCl.

A 2ul portion of the washed extract was analyzed on an HP-5890A gas chromatograph (Hewlett-Packard Co., Palo Alto, CA.) equipped with a fused-silica capillary column, a flame ionization detector, a model HP 6763 autosampler, and a model HP-3392A integrator (Hewlett-Packard). Gas flow rates were 400 ml/min for air, 30 ml/min for hydrogen, and 30 ml/min for nitrogen. Temperatures were 250°C for the injection port and 300°C for the detector. After injection, the oven temperature was increased from 170 to 270°C at a rate of 5°C/min and then from 270 to 310°C at a rate of 30oC/min, held at 310°C for 2 min, and then returned to 170°C before the next sample was injected. A standard mixture containing known fatty acids (FAs) (C9 through C20 straight-chain FAs and 2-OH, C10, 3-OH C14, 3-OH C14, and 2-OH C16 FAs) was chromatographed at the beginning of each day on which samples were analyzed and after each set of 10 samples.

The Sherlock Microbial Identification System version 4.0B software package (MIS), (MIDI, Inc., Newark, DE) (13) was used to identify the peaks (by retention time) and to determine the area, the ratio of area to height, the equivalent chain length (ECL), the total area, and the total area for named or listed compounds. The (MIS) software package was used to calculate the percentage of area for each named or listed compound compared with the total area of the compounds detected. Compounds were identified using the Moore Broth library, version 3.90 (released in 1995) for anaerobes.

Results and Discussion

The pH of honey samples fell between 3.70-5.26, with an average pH of 4.19 (± 0.31 SD). All pH values fell within the mid-range of values reported by White (1992) for US honeys. The moisture content of the honey samples fell between 13.6 –19.4% with an average of 17.0%; only four samples (4.3%) had a moisture content greater than 18.6%, the U.S. standard for Grade A honey. Moisture levels above 19.0% increase the likelihood of fermentation (White 1992, Finola et al. 2007). No significant correlations were found between pH, moisture content, and bacterial growth on either media.

Out of 92 honey samples tested, 46 (50.0%) samples had growth on either BHI+T plates, Colombia Blood plates, or both. From these, 11 (23.9%) plates had colony characteristics that matched *P. larvae*. Five (10.8%) of these colonies had either a negative or weakly positive result to the catalase test and were examined microscopically for the presence of giant whips after the Plagemann test was conducted (Figure 2). Giant whips were present in three (3.2%) of the honey samples, confirming the presence of *P. larvae*.

Ten samples were suspected to contain *C. botulinum* spores based on the microscopic analysis. Several colonies with different morphology were observed after growth on a BHI agar roll tube.

***Figure 2**. Gram stain giant whips. Sediment from the Plagemann test was Gram stained and found to be Gram-positive. Giant whips, indicative of* P. larvae, *were observed in three samples.*

Each colony with a different morphology was subjected to fatty acid analysis by GC, but none of the fatty acid profiles were indicative of *C. botulinum*. The identity of the organisms was not confirmed, but could indicate the presence of other obligate anaerobes in the honey samples. These results are consistent with those of Iurlina and Fritz (2005) who did not find *C. botulinum* in any of the samples they tested. The results are also in agreement with Piana et al. (1991) who found unidentified anaerobic spores in their samples. Additional studies are needed to identify the unknown anaerobic bacteria in honey.

Brevibacillus laterosporous was identified in two cultures through microscopic analysis and cell morphology. *B. laterosporous* has a characteristic appearance identified as a Gram-positive canoe-shaped body that stains darkly with a large spore that is not penetrated by stain during a Gram stain (Figure 3). During the spore stain, the spores appear green, while the cells appear pink. *B. laterosporous* was not of primary concern because it is a microbe that is found throughout soil, but does not have any pathogenic implications.

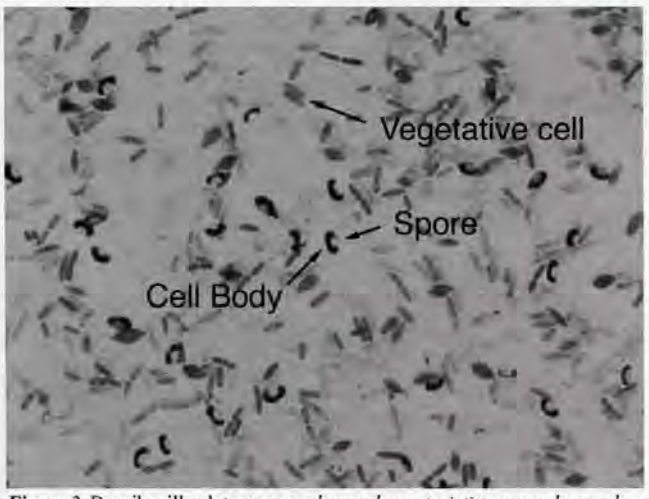

***Figure 3**.* Brevibacillus laterosporus *has a characteristic canoe-shape when observed under a Gram stain.* B. laterosporus *are Gram-positive rods that appear dark, but the spores can not hold a stain and are clear, resulting in the characteristic shape.*

The low level of *P. larvae* (3.2% of all samples) found in Virginia honey reflects the low incidence of AFB in hives (3%) in the state (Tignor 2009). Both Steinkraus and Morse (1992) and Pernal and Melathopolos (2006) reported significantly higher incidence levels of *P. larvae* in U.S. and Canadian honeys. The initial higher number of samples (11 samples, 12.0% of all samples) that had bacterial colony characteristics similar to those described for *P. larvae* indicates the need for confirmatory tests, such as the Plagemann test, before drawing conclusions as to the identity of the organism. The development of PCR assays for the detection of *P. larvae* in honey samples provides an alternative approach for the detection and confirmation of contaminated honey (Govan et al. 1999, De Graaf et al. 2001, Bakonyi et al. 2003).

The absence of *C. botulinum* in any honey samples is consistent with reports from several other studies on honey (White 1992, Iurlina and Fritz 2005). However, this result could also be due to several factors such as a low incidence of *C. botulinum* in the soil in Virginia or to a lack of detection from an uneven distribution or low numbers of spores in honey (Midura et al., 1979). Efforts were made to obtain a homogenous mixture of each honey sample; however, multiple sub-samples might better achieve this goal and yield different results. A knowledge of the levels of *C. botulinum* in Virginia soils may also give a better indication of the accuracy of these results, since Nevas et al. (2006) found a correlation between *C. botulinum* spores found in honey and the surrounding environment.

Conclusions and Recommendations

Honey can serve as a vector medium for both honey bee and human disease organisms (Sturtevant 1932, Arnon 1980). However, the low levels of pathogenic bacteria in the honey samples analyzed in this survey indicate that the honey produced and extracted by beekeepers in Virginia has a very low probability of causing health problems to humans or bees. The low incidence of *P. larvae* in honey also suggests that the movement of honey frames between hives by beekeepers (within their own yards) is relatively safe as long as the hives do not exhibit signs of AFB.

Acknowledgements

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Appendix A: TPYG formula

Peptone	0.5 g
Tyrpticase	0.5 g
Yeast extract	1.0 g
Resazurin	0.4 ml
Cysteine	0.05 g
Glucose	0.5 g
Salt solution	4.0 ml
Hemin solution	1.0 ml
Vitamin K1	0.2 ml
Distilled water	100 ml

Ross **Conrad**

Should You Have A Relationship With Your Bees?

I Think You Should

Here in the Northeast the final month of the year is a quiet time for most beekeepers. The bees are all tucked in for Winter and our focus during this season tends to be on selling the harvest, preparing equipment that will be needed next year, catching up on our reading, and attending the occasional beekeeper's meeting. As important as all these tasks are, they inevitably all take a back seat to the holiday season. This time of gift giving, feasting, and celebration tends to bring us together with those who are closest to us and it's a time when we focus on our relationships.

As beekeepers how much time do we spend thinking about, or working on our relationship with the bees? If we don't give it a lot of thought, our relationship with the bees is likely limited to looking out for their welfare, doing our best to keep them healthy and well fed, enjoying the benefits of pollination and gathering up products from the hive for our own benefit in return. While there is nothing wrong with this relationship, it could be so much more.

What is preventing our relationship with the bees from being much more? For each of us, the answer to this question will be different. In general insects are not high on the list of life forms that our culture typically respects and expresses concern for. For example, if an individual ignores the health and needs of their dogs, cats, or horses, society intercedes on behalf of the animals. Depending on the situation we may refer the individual to the humane society for education on proper animal care, we may seize the animals and place them in better conditions if the person is unable to provide for them, or in the most extreme cases of willful negligence, court proceedings may be in order. Yet a person can purchase a hive of bees and ignore their needs, allow them to get sick or starve and as a society we seem to simply look the other way in acceptance.

Perhaps our beginner beekeeping classes should put more emphasis on the importance of not getting started in beekeeping unless the individual is ready and willing to fully commit to taking the time to properly educate themselves on a hive's proper care, and ensure that they devote adequate resources of time and money to seeing that proper husbandry actually occurs.

A good place to begin is with an apicultural ethic that does not place the needs of the bees below our own needs. I mentioned this ethic last month and I don't want folks to be confused. I did not say to put the bees needs *above* our needs, but to place them in *equal* importance. Such an ethic would not allow the bees to benefit at our expense, nor would it allow us to benefit at the bees expense. The idea is to strive for a give **and** take, a win-win situation where both parties benefit roughly to an equal extent. Following this approach for example, one would not secure a hive of bees in the Spring, rent them out for pollination, harvest all their honey and allow them to die in Winter with the plan on purchasing new bees in the Spring simply because it was economically advantageous to do so.

When one nurtures a personal relationship with their bees, such an apicultural ethic comes naturally. Why would one want to develop a personal relationship with a bunch of insects? Well first of all it feels good. You will feel closer to your bees and not separate or cut off from them. The personal relationship you develop with your hives has the potential to move you as much as a human relationship will. Over time the connection you develop with certain hives can feel similar to your connection to old friends.

However, like all close personal relationships, it takes time and work to develop. Indigenous cultures had a natural connection to the land and animals. We unfortunately have to put more effort into making such connections strong since our society does not offer much support in this area. Building a close personal relationship with your bees can help eliminate fear of the bees, allowing us to feel safer around the hives. After all, when you think about it, humans are the most dangerous animals on the planet . . . if anything it should be the bees that are fearful of us!

So let's say that you think that developing a close relationship with your bees, above and beyond the relationship you have now may be a good idea, just how might you go about it? To start with, when opening up the hive be full of wonder and try to view the hive as if you were looking at it for the first time. To see the hive with the eyes of an innocent child means being enthusiastic about what you see. This is a way to see what is always there but may often be overlooked, perhaps because we don't slow down enough to take the time to see. While it is natural to focus on the activities the bees are engaged in, force yourself to notice other things like the approximate age of the bees, or the comb and its condition and use (e.g. size of cells, amount and kind of pollen stored in cells, age of brood, etc.)

This process of careful observation can be further enhanced by closely observing a single comb covered with bees for 15-30 minutes or more. What jobs are the bees engaged in? What condition is the brood in? Are the bees reacting to your presence? While an observation hive really comes in handy for this exercise it can be done out in the field when the weather is favorable and robbing pressure is minimal.

While we tend to be a visual society, when you spend time with the bees make an effort to pay attention to your other senses during your visit. What body sensations do you feel? What odors do you sense? What sounds fill your ears? Do you get goosebumps when you are with the bees? What emotions come up for you when you are opening the hive or manipulating the frames of comb?

You may be surprised by the range of non-visual information that you receive during your time with the bees. While children are often very tuned into these non-verbal cues, as adults, we may have to make more of a conscious effort to observe them. Pay attention also to how these sensations and emotions may change over time as your relationship with the bees matures.

An essential part of what I refer to as feeling a connection to the bees is being able to feel what is going on inside of ourselves. This is something we are not given much encouragement for in our everyday lives. Being aware of the bodily sensations, or emotions that are evoked by what is going on around us can provide valuable information as to how well the situation, person, or hive resonates with our being.

The ability to form a strong connection with the bees relies on regular interactions. Visit your hives regularly, at least once a week. Those that are interested in forming a strong personal relationship with the bees may even choose to make a date with them. Pick a certain day and time and show up every week rain or shine. You don't have to open the hive every time you visit...just spend time with the hive. Regular visits are especially important when you are just starting to develop your relationship with the bees as it will take a few seasons to develop the relationship strongly.

When dating it is common to bring gifts. While the bees may appreciate a gift of flowers, they may not appreciate a gift of chocolate as much as you or I. Honey bees are always giving to us through their work as pollinators, and their production of honey, wax, propolis, pollen, and even bee venom therapy. It is good to give back both through our concern and care for their welfare and through gifts of the heart, mind, or prayer. When I approach a hive with a jar and ask the colony, a super organism, to give up a part of its body by letting me take several bees for bee venom therapy, I will offer part of my body in return by pulling out a few hairs from the back of my neck and leaving the hairs by the hive. Such symbolic gifts act as a physical reminder of the respect and appreciation we have for the bees.

You might even consider making offerings to the bees without taking anything in return. Have you ever experienced how worn down you can become when others are constantly taking from you without offering anything in return. We receive so many blessings from the bees, to give to them without expecting to receive anything ourselves is one way to form a healing relationship with the bees.

Another way to help forge a personal connection with bees is to talk to them or even sing to them. Talking to bees, along with prayer, gift giving, song, and dance, all have a long history in beekeeping and are ways of making a heart connection. Many of us already talk to our cars, televisions, and radios, so why not the bees? Once you have gotten comfortable talking to the bees, feel free to give yourself permission to express to others how you feel toward the bees.

Once you have established a strong connection with the bees, it will carry over to other places.

When we develop a personal relationship with honey bees it can help us nurture relations with the rest of life on earth, as well as help us become better beekeepers. I am not claiming that honey bees share the same kind of feelings that we do, but bees do respond when we take the time to show love, appreciation, and respect for them. They can't help themselves. Such a response is shared by all living things. BC

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The Streets of Montalcino Are Paved With Honey

Marina **Marchese**

A few years ago, while cruising the Tuscan countryside, I found myself at the entrance of the Medieval town of Montalcino, greeted by a sign that read "La Citta del Miele" or the City of Honey. Little did I know that I had landed in honey heaven! As I wandered around the streets soaking up the culture, I noticed something peculiar that I had never come across here in the states. Honey was sold on the same shelves with the locally produced wine and olive oils. "Why not?" I thought. Suddenly it occurred to me that honey is an agricultural product harvested at the same time as grapes and olives. I would eventually learn that honey, here in Montalcino, commands the same respect as their prestigious Brunello wine.

This past September I returned to Montalcino to attend the 34th annual "Settimana del Miele" or Honey Festival. Held inside an ancient fortress, complete with turrets and allures commanding bird's eye views of the Tuscan landscape, beekeepers from the regions of Siena, Grosseto and Arezzo set up shop for three days displaying everything honey and bees. Apiculture is an art that is highly respected and is among one of the most important and oldest activities of Montalcino's economy.

Surrounded by observation hives and state-of-the-art beekeeping equipment in the season's most fashionable colors, as I caroused the aisles I was the recipient of generous samples of honey. Each jar of honey was fitted with a pump, making for a spotless delivery. The nectar sources seemed endless, with innovative packaging and label designs and it wasn't long before I found myself sitting in on one of the many honey-tasting seminars or "sensory analysis laboratory of honey."

A stunning row of stemmed wine glasses, each filled with honey lined the table in front of me. Fifty-one in all, arranged by color from lightest to darkest, each glass was labeled at the foot with its specific nectar source for identification. Two presenters led us through descriptions of each honey sample, beginning with nectar source, color, texture, aroma and taste. Many of these honeys, I learned, did not have U.S. equivalents. As each glass of honey was passed around we were invited to observe the color by lifting it up to the light. By swirling it around the bowl, one could clearly see its texture, then a gentle sniff into the glass to catch the aroma. Tasting sticks were available to scoop up a tiny sample. Each honey

had its own remarkable character and we were invited to share our own impressions. The concept of honey in wine glasses was not only dignified, but it made perfect sense to observe all of its marvelous qualities. A few of my favorites were Castagna, Corbezzolo, Sulla, Tarassaco, Cardo and Ailanto and I have listed translations and tasting notes below.

In Italy, honey has a strong culinary tradition and is tasted and evaluated to detect botanical sources as well as and to identify certain defects such as fermentation, impurities, off-odors and flavors. Honey is judged in its liquid state, with no extra straining or laborious preparation; just extracted honey, period. Clarity is not an issue and honey is allowed to naturally crystallize. More than anything else, honey is to be enjoyed for its distinctive flavor profiles and harmonious pairings with the local cheeses.

I took careful tasting notes of each honey throughout this amazing event. First, descriptive colors of honey

are simply light or dark with yellows, reds and browns. I learned that the four criteria for tasting honey are color, taste, flavor and most interesting, how well each honey pairs with cheeses. You may wonder about what is the difference between taste and flavor. Curiously, the mouth can only distinguish five taste sensations: sweet, sour, salty, bitter, and umami. Umami is that unexplainable sense of savoriness found in Japanese food. Flavor, on the other hand is based uniquely on perception and the nose can detect thousands of different ones that helps us distinguish between eating honey or pollen. The honey samples were referred to simply as either delicate, perfume, aromatic and bitter, other modifiers were animal or vegetable.

As with most foods in Italy, the flavors are distinct and crisp and I found this to be true also with the honeys. The secret is in the Tuscan "Terrior" or soil. Terroir (pronounced tair-wahr) is defined as the unique characteristics of a regions soil, climate, rainfall, temperature and topography and is responsible for imparting the distinctive flavors of the agricultural products of any particular region. Think Tupelo from Georgia or Blueberry from Michigan.

As I drove through the countryside, I could not help to notice how radically the soil changes from clay (grey), to volcanic (yellow) to iron (red.) The blazing sun would follow me through the rolling hillsides; bobbing in and out of the mountains while a gentle sea breeze cooled the dry air creating wildly diverse micro-climates for an array of plants to flourish. Bio-diversity is the rule, where eucalyptus and cactus can be found growing along side cypress trees, chestnuts and heathers accounting for the vast types of honeys harvested here. Tuscany is a poetic region where agencies protect the local breeds and varieties belonging to its natural heritage.

On the last day we were treated to the ultimate sensatory experience, a formal tasting of the local foods held within the ancient rooms of San Agostino monastery situated in the museum of Montalcino. Surrounded by Medieval statues and gilded religious paintings, we assembled among four intimate tables dressed with white linen tablecloths lit only by beeswax candlelight. Each place setting had three glasses of wine and one plate of locally produced cheeses, cured meats paired with honey. Throughout the two-hour event we were treated to a historical and culinary journey of the traditional foods from the region by a wine sommelier and president of the local beekeepers club, Hubert Ciacci. They are known as honey ambassadors, those who support the tradition of honey as an agricultural product with respect to the regions it is produced. Their passion was mesmerizing and the pairings of food, wine and honey were seductive. Before the tasting ended, the boundaries between wine and honey began to blur. My reverence for honey as a noble food grew deeper. Montalcino is a magical place that has earned the name "City of Honey," or in my mind, honey heaven!

If you are interested in attending next years honey festival in Montalcino, Italy I will be organizing a group visit with trips to the local apiaries. For more info email: redbeehoney@gmail.com.

A few of my favorite honeys harvested in Montalcino are:

Castagna-Chestnut
Color: dark amber with reddish tint
Aroma: herbal and pungent
Texture: thick
Tasting notes: deep, bitter often tannic

Corbezzolo- a type of strawberry bush native to Italy
Color: brown with green tint
Aroma: pungent and smoky
Texture: crystallized medium to thick granules
Tasting notes: bitter, astringent, herbaecous

Sulla-French honeysuckle
Color: wax or ice white
Aroma: delicate, floral
Texture: crystallized finely
Tasting Notes: refreshingly sweet, not cloying

Tiglio-French Linden Tree
Color: pale crystallized
Aroma: strong
Texture: large granular crystals
Tasting notes: herbal, spicy and bitter walnut tones

Cardo-Thistle
Color: beige to ochre
Aroma: pears, grapes, nuts
Texture: crystallized
Tasting notes: tangy, bitter, floral, artichoke

Erica-Heather
Color: dark amber reds and orange
Aroma: caramel and stewed fruits
Texture: crystallizes quickly
Tasting notes: fudge, tamarind, licorice BC

Marina Marchese runs Red Bee Studio and is the author of Accidental Beekeeper.

Young Harris

Cindy **Hodges**

This Master Beekeeper program and Beekeeping Institute in Georgia is one of the best.

Every Spring since 1992, the University of Georgia has co-sponsored the Beekeeping Institute with Young Harris College, a charming campus nestled in the heart of the north Georgia mountains. It is three days full of learning, experiencing, testing, and meeting some of the leading experts in the field of *Apis mellifera* L. Speakers are brought in from all over the U.S., South America, and "over the pond" to educate a maximum of 150 students, young and old, in the world of beekeeping.

For 20 years prior to this, a similar program, the Beekeeping Shortcourse, had been held at UGA and headed by Dr. Alfred Dietz, but it was really transformed by Dr. Dietz's successor, Keith Delaplane after he took over the bee program in 1990. Dr. Delaplane was hesitant to instantly resume the Shortcourse, preferring instead to let it rest a couple years while he reinvented the shortcourse concept. He knew that he would hear, "That's not how Dr. Dietz did it."

Dr. Delaplane had big shoes to fill and he filled them beautifully. The sold out program has had to turn people away for the last several years, as eager students register promptly to learn what is going on in the world of the honey bee from some of the world's most current researchers. Quality, expertise, and friendship abound at Young Harris at this program!

The Beekeeping Institute used to be set up with a beginner and advanced track. This year that changed a bit as each participant could select the classes that they attended, even though certain classes were recommended in preparation for testing. Oh yes, the testing! Testing is always optional but most attendees opt for "THE TEST". We'll discuss this again.

The **Georgia Master Beekeeper program** involves four levels of accomplishment over a period of several years. There are recommended study materials and practical experience levels for each stage of the program.

The first year, **"the individual should be familiar with the basic skills and knowledge necessary for the beginning hobby beekeeper."** The requested reading prior to coming is "The First Lessons in Beekeeping" by Dr. Keith Delaplane. That book is packed with everything most folks need to start beekeeping correctly. At Young Harris, you attend lectures and workshops, you have a practical test out at the hives and in the lab, and you have a written test. If you pass both parts of the exam, you become a Certified Beekeeper. This is the largest group of attendees, and they come from all over the United States. The speakers alone are worth the trip! We'll talk about them more shortly.

You must have been a **Certified Beekeeper** for at least a year before you can test for the second level of certification – The **Journeyman** exam. That's fine, because the first year's classes have "wet your whistle" to know more about the diseases, pests, honey shows, and hive vigor, so your library is growing. What did I read before going to bed at night? *The Biology of the Honey Bee* by Mark Winston was by my pillow for a year. I even started dreaming about bee parts!

The more you learn, the more you want to learn, but it's always easier to hear it from the experts, so everyone looks forward to Young Harris the second year . . . scared to take the test, but determined and hopeful.

Since **Certified,** you have had an additional list of requirements to accomplish prior to attending Young Harris this year. This is really quite brilliant, because as you accomplish these **Public Service Requirements**, you are fine tuning your speaking skills, you're helping educate your community about bees, you're taking swarm calls, and you are stepping up to the plate with your local or regional beekeeping clubs. I promise you that when you speak to a group or have a honey bee booth set up, that someone will ask you a question that you have no idea how to answer. Back to the books!

To accomplish Journeyman, the "**Individual should be functioning as a competent hobby beekeeper with the skills and knowledge for moving into sideline**

Cindy Bee, one of the instructors talkiing to a group about hive management.

Michael Young, honey judge, encaustic painter, and Five-Star chef preparing to do a 'Cooking With Honey' demonstration.

Cindy Bee demonstrating a safe and efficient way to melt cappings.

Dr. Delaplane administering an exam.

beekeeping if desired." The Journeyman exam includes a practical test again, as well as a difficult written exam. Things are getting harder – in fact, failure rate is highest at the Journeyman level – but you've been a beekeeper for another year and experiencing some of the issues that up until now you've only read about. It's great to see some familiar faces at Young Harris and there is camaraderie in the group going for Journeyman. Everybody wants that title!

After completing and passing the Journeyman requirements, the next goal is **Master Beekeeper: "Individual should be able to function as a sideline or commercial beekeeper. Can also demonstrate knowledge in such areas as bee botany, business aspects of beekeeping, honey and bee-related judging, bee behavior and other specialty areas."**

I failed to mention that the Journeyman level and above have an additional (third) day of lectures. Thursday is just for the Journeyman and Master Beekeeper level participants to attend class and ask questions. This small group attention from world-renowned beekeeping researchers is worth the trip. Imagine a class size of 6 with the head of the CAP project! (CAP stands for Managed Pollinator Coordinated Agriculture Program, a national research and extension initiative to reverse pollinator decline.) Participants are encouraged to read The Wisdom of the Hive by Tom Seeley, and this was added to my bedtime reading stack. (I may have to put a sugar syrup dish 300 meters from my hives now just to see how long it takes my bees to find me!)

The **Master Beekeeper** level involves **Public Service Requirements**, a written test, and a presentation of a portfolio showing your knowledge and accomplishments in five of 16 **Areas of Expertise**. The first one, **demonstrating theoretical knowledge of Integrated Pest Management** is required. Other areas from which to choose include being interviewed on television, winning in honey shows – only first or second will do, or documenting a legally-licensed honey processing facility. You can acquire a pesticide license, take an artificial insemination course, or take part in a honey bee research project as some of these requirements. As you can see, every area of beekeeping is covered during this multi-year **beekeeping** program!

The ultimate goal for a studying and practicing beekeeper is to accomplish **Master Craftsman**. To date only one person has completed the requirements and passed the oral examination at this level. For **Master Craftsman** the **"Individual must have a general knowledge of bee biology, bee management, and the broader impact of honey bees in ecosystems and agriculture. The successful candidate will demonstrate theoretical knowledge as well as particular expertise in one or more selected topics. Level is comparable to a graduate program in apiculture at a major U.S. university."**

The requirements for this level are long and involved. To make it short, plan to know and be able to do everything regarding bees. You have more advanced levels of requirements than were previously accomplished, as you are building on your knowledge and ability. In the oral examination, given by at least three individuals, including an Extension Apiculturist, there is a zero fail tolerance on the ability to diagnose and treat various bee diseases and bee pests. The website is **http://www.ent.uga.edu/bees/master-beekeeper/index.html** for more details on all of the levels.

I told you I would get back to the speakers, and I will tell that their quality each year is unmatched for an enrollment cap of 150 participants. In the years that I have attended, I've listened to and spoken with Maryann Frazier of Penn State University, Greg Hunt of Purdue University who helped map the honey bee genome, Ross Conrad who wrote *Natural Beekeeping*, Kim Flottum – editor of *Bee Culture* Magazine, Steve Sheppard of Washington State University, and the fabulous Michael Young of Belfast Metropolitan College, Northern Ireland. This is in addition

to the very knowledgeable folks from the UGA Bee Lab, our state's best county extension agents, and of course Dr. Paul Arnold, Dean of Mathematics and Science at Young Harris College. He has been irreplaceable for securing Young Harris College for the most beautiful beekeeping educational setting in the state. The atmosphere is relaxed and the content is far more than expected. These folks taught us, had meals with us, and were very accessible for questions and conversations.

Speaking of meals, a huge shrimp boil with corn, sausage, and potatoes is held on Friday night of the Institute. Everyone comes, has a beer, and loads up on the great cooking of Freda and J.M. Sikes. It's an all you-can-eat affair with the speakers and participants all lined up at big long tables for an evening of food and stories from the bee yard.

For the **Journeyman** and **Master Beekeeper** participants this is a really big night, as the people who pass those levels are announced after dinner. You want to hear your name that night! If you haven't passed, Dr. Delaplane will talk with you privately about what needs to be improved upon in the future. If you pass the practical exam, you don't have to take it again. The same goes for the written exam, but you must pass both to be awarded the title.

The honey contest awards are also given out during the cook out. There are thirteen categories to enter, and this year the Best of Show was reinstated as a new award. The **Michael William Young, MBE Award for Outstanding Entry** was named after Michael Young of Northern Ireland. He has spoken and led workshops at many Beekeeping Institutes over the years, and has also helped the Institute accomplish even higher goals. With Michael and Robert Brewer's help, the Beekeeping Institute, in conjunction with Welsh (U.K.) National Bee Keepers Association offers one of North America's only two licensing programs for honey judges (the other one is in Florida).

Michael Young is a Member of the Order of the British Empire (hence, the MBE) – an honor bestowed by the royal family upon British citizens for exceptional public service, in Michael's case, beekeeping. It was Michael who facilitated the official linkage between the Welsh Beekeepers Association and the Institute creating the Honey Judging program. Michael is a four-star chef, lead honey judge for the British National Honey Show, and creator of the Institute for Northern Ireland Beekeeping (taking the word "Institute" from us!). Robert Brewer is a Georgia County Extension Agent and has judged shows in the US as well as the United Kingdom. He is in charge of the Welsh Honey Judging program at Young Harris. This is the same level of honey judging that is used at The National Honey Show in England – the largest honey show in the world. The **Welsh Honey Judge certification requires attendance at training, documented experience as a YHC steward (judge's assistant), documented experience as a YHC honey show judge, and successful completion of the oral examination.** This program can take two or more years. The high standards of training are evident as new honey judges follow the international standards in honey judging after completing the Young Harris course.

At the end of the intensive three day program, things are just a little bit different. Many beekeepers have a new title; even more beekeepers have new ideas to set into motion in their own apiaries. As everyone finishes up classes, lectures, and labs on Saturday afternoon, there is a satisfied calm in the air. The **Certified** Beekeepers have been announced, new friends are exchanging e-mail addresses, and there's a line at the beekeeping suppliers to purchase new equipment. Everyone is exhausted, and those same people are already planning their return visit next year. Someone is asking Jennifer Berry if she has any queens for sale. Ohad Afik is being asked about beekeeping in Israel. Cindy Bee is asked if she can speak at a local club about bee removals. Keith Fielder is asked how to make his rich and delicious cherry melomel.

Jennifer Berry and Dr. Delaplane spend a lot of time preparing the program, teaching, giving and grading the exams.

As for me, I find Keith Delaplane. I want to thank him for another great program. I want to thank him for another year of unique education. I want to thank him for the opportunity to have earned my Master Beekeeper certification. I'll be back next year. I hope to see you there! BC

Cindy Hodges is a veteran of the Young Harris program, and is a Master Beekeeper. She lives in Dunwoody, Georgia.

ALMOND POLLINATION 2011

Let The Games Begin

Joe **Traynor**

Beekeeper Randy Oliver has likened price negotiations for almond pollination to a "high-stakes poker game." The analogy is apt and the "game" plays out every year between October and February. The players – almond growers on one side, beekeepers on the other – jockey for position as they try to make the best deal for themselves.

Growers are used to negotiating with ag chemical distributors, with large growers enjoying an advantage due to their greater volume. Almond farming, like all of agriculture, has changed significantly over the last 40 years, with small farmers either dropping out or being taken over by large corporations or farm management companies. In the 1960s and 70s, the vast majority of almond-bee contracts were negotiated one-on-one – beekeeper and almond grower. A few such relationships exist today, some of them passed on to the next generation of both almond grower and beekeeper. The most satisfying beekeeper-almond grower relationships are like a successful marriage; they have withstood the test of time based on a mutual respect between parties, with each party trusting the other when it comes time to determine almond pollination prices for a given year and with prices often not set until January.

Photo by Christi Heintz

Such one-to-one relationships as described above are rare in today's world. Beekeepers find themselves talking to a corporate representative who may or may not be in the same position the following year (or the following month). And that corporate representative has a stake in showing the corporation how much money he is saving them on bees. Large almond concerns are very attractive to beekeepers that want to enter the almond pollination game. One-stop shopping allows them to place all their colonies with one grower as opposed to taking the time and effort to hunt up and negotiate with five or 10 different growers. Large corporations attract offers from a multitude of beekeepers with price a major consideration for both grower and beekeeper. The end result is an overall drop in pollination prices as beekeepers compete to place their bees. At first glance, this appears to be good example of capitalism at work with the price competition benefitting the grower. A lower price, however, inevitably means that bee suppliers will shave expenses in order to make almond pollination profitable; the end result is often a sub-standard product.

In the larger world of business, we see the same type of price pressure that almond corporations apply to beekeepers. Walmart puts constant pressure on the suppliers of goods (including almonds and honey) to cut their prices to the bone. Amazon does the same thing with books, forcing publishers to supply books at rock-bottom prices to the point where many book stores have been driven out of business (and talented, unknown authors remain unpublished because no promotional money is available). Large almond operations that attempt to emulate Walmart and Amazon are missing a major point: a colony of bees is amorphous, constantly changing in strength from one month to the next (and in apparent strength from morning to afternoon). A book remains a book to Amazon and a pound of honey remains a pound of honey to Walmart, just as a five-gallon can of Roundup stays at five gallons no matter what the price.

Here is where the almond game morphs into the murky world of gamesmanship. A good pollination unit for almonds is eight frames of bees in a two-story colony. Eric Mussen has shown a linear relationship between colony strength for almonds and costs to attain a given strength: approx. $120/colony for four-frame strength; $140 for six frames and $200 for eight-frame colonies. (*UC Apiaries, Jan-Feb. 2010*). Put downward pressure on almond pollination prices and a beekeeper will adjust his input costs accordingly and hope and pray that his colonies will come up to contract standards in February, or if they don't, then hope and pray that he can, as some do, pass that six-frame colony off as an eight-framer and the four-framer as a six-framer. Many beekeepers benefit from the fact that many almond growers don't scrutinize colony strength closely. California counties offer colony strength inspections but counties are short on manpower and can't meet all requests and those they do meet are often done at petal fall rather than first bloom, making it impossible for growers to make adjustments if sub-par colonies are found.

Because a colony of bees can gain two or more frames from first bloom to petal fall, late inspections greatly benefit beekeepers. Almond growers want strong colonies at the beginning of bloom, but few inspections are made at that time. Beekeepers supplying four to six frame colonies at the start of bloom can often receive full payment on a six to eight-frame contract, if inspections are delayed until petal fall. The fact that colony strength evaluation is not a precise science serves to further muddy the price structure for almond pollination. Send five different people out to evaluate colony strength and you may get five different answers. This is particularly true on a warm day during bloom when most bees (four+ frames) will be out working almond blossoms and not accounted for by inspectors. The most accurate evaluation of colony strength during almond bloom would be in the middle of a warm rainy afternoon but county inspectors don't work in the rain. Beekeepers can benefit when growers only flight-check bees; robbing activity around weak hives (possibly from a neighbor's bees) can falsely imply strong colonies.

Grower considerations for almond pollination:

1. Work towards a long-term relationship with one or more bee suppliers.
2. Finalize bee contracts by September. Without supplemental Fall feeding, most colonies will be sub-par in February.
3. Pay enough so that beekeepers can invest in building strong colonies.
4. Trust but verify. Either look at your bees with the beekeeper(s) or hire a knowledgeable inspector. If you have the county inspect, get on their list early. Let your beekeeper know when inspections will take place.
5. Make sure your crop insurance specifies frames of bees per acre, not colonies per acre (a meaningless term).
6. Communicate with your beekeeper from December on to make sure your bees are in good condition when your almond trees start blooming.

Beekeeper considerations for almond pollination:

1. Work towards a long-term relationship with one or more growers.
2. Finalize contracts by September.
3. Initiate a Fall-feeding program in September (if natural forage is unavailable)
4. Charge enough to cover expenses, especially supplemental feeding expenses.
5. Secure a back-up bee supply to cover excessive Winter losses. Non-delivery is the surest way to lose an almond contract.
6. Take your grower(s) with you to look at your bees (or have your broker do this); or agree on an independent inspector. Know when your bees will be inspected.
7. Try to exceed your contract requirements; for a six-frame contract, aim for eight frames; for an eight-frame contract aim for 10 frames. Success here will render moot any possible complaints on colony strength.

Reliable information is critical when it comes to making good almond pollination decisions. The best source for such information is Project ApisM, **www.projectapism.org** At this site you can access *The Cummings Report*, Dan Cummings' up-to-date postings on the almond and bee status, and *The Bee Box*, Christi Heintz' bi-monthly column in Almond Facts. Both Dan and Christi have solid credentials in the almond industry and are well-versed in all facets of the bee industry. Eric Mussen's bi-monthly Newsletter, *From the UC Apiaries* (including the Jan-Feb issue cited above) can also be accessed at the ApisM site, along with many other links. You could easily spend a day at this site.

The 2011 Season: As of November, most almond-bee contracts have been finalized. Contracted prices range from $155 to $180 for eight-frame colonies and $120 to $140 for six-frame colonies. The ruling by APHIS to halt honey bee imports from Australia does not seem to have had much affect on price or availability. Many of these bees, it seems, were used to bolster weaker colonies. That may be an issue later in the Spring.

Almond growers are becoming increasingly aware that beekeepers need to know by September how much money to invest in a Fall feeding program – Fall feeding allows colonies to go into winter with young bees, which in turn translates to more populous colonies in February. Growers that wait until December to finalize bee contracts are looking at a diminished supply of strong colonies. This is what happened in 2010 – the good colonies were spoken for early-on and growers that waited wound up paying top-dollar for sub-par colonies. Many beekeepers feel that investing in a Fall-feeding program is not cost-effective. Besides wearing out expensive queen bees, doubling colony populations via fall feeding means continued expensive sugar and protein feeding right up to almond bloom, and additional feeding after almond bloom to prevent colony starvation. Beekeepers that succumb to grower pressure to lower prices will cut costs and hope that colonies of marginal strength, if inspected at all, will squeeze by the inspection gauntlet.

Some beekeepers, seeing the shortage of almond bees in 2010 and knowing that another 20,000 bearing almond acres is coming on line in 2011 are leaning towards not committing their bees until January, figuring prices will rise in late January, as they did this year. These beekeepers could well be fooled, as the 2010 bee supply was diminished due to drought conditions in many areas in 2009; bee forage conditions in 2010 are much better and as a result, Winter losses should be less. The only remaining question is that item ~ Winter losses. If they are less this year, as expected there will be an adequate supply. If they continue at the 30% or so of the past few years, the game begins.

Because almond pollination is a major source of income for almost all commercial beekeepers, some beekeepers are expanding colony numbers. On the demand end, a number of almond growers are cutting back from two to 1.5 colonies per acre, so the total demand may be less than in 2010 in spite of increased acreage. The true supply-demand picture for 2011 almond bees won't come into focus until sometime in January, after Winter bee losses have been tallied. Both growers and beekeepers that wait until January to finalize bee arrangements are gambling that the supply-demand equation will tilt in their direction, an expensive gamble if things don't break their way. BC

Joe Traynor is a pollination broker based in Bakersfield, California and a frequent contributor to these pages.

All The Buzzz in...

Dear Bee Buddies,

Happy Holidays from around the world!

Your Friend,

Bee B. Queen

What holiday traditions does your family have?

Jessica Miller, 7, IL

Melissa, TX

Guadal

Kaleigh Yurko, 7, MA

Aleyda, TX

Maya Jacob, 8, OR

Samantha, TX

What the World Needs Now is Holiday Sweets

Every culture has special treats for the holidays. Maybe your family has a holiday food tradition like making gingerbread or decorated sugar cookies. Try some of these breads and cakes for an international holiday celebration. There are many different ways to make each of these foods. Recipes can be found on the Internet.

Italian - Christmas Honey Fritters – Struffoli
These small, deep fried balls are crunchy on the outside and light inside. They are eaten with honey with bits of orange rind and chopped nuts.

Czech - Christmas Bread - Vánočka
This braided bread can be a little hard to make. There are a number of superstitions about this bread. One is that you should jump up and down while the dough is rising or that putting a few vánočka crumbs in front of the bee hive will make sure that the bees will make enough honey next year.

Polish - Gingerbread Cookies - Pierniczki
The Polish city of Torun has been making gingerbread since the Middle Ages using carved wooden molds. Today they are often cut into shapes.

Slovak - Bread Balls - Bobalki
These tasty baked dough balls are eaten with poppy seeds and honey or sauerkraut and onion. They are also eaten at their Christmas Eve supper.

Lithuanian - Christmas Bread Recipe - Kaledu Pyragas
There are many variations of this bread from a yeast bread to more of a fruit cake.

Slovak - Bread Recipe - Pagach
This bread is almost like a pizza with a potato or cabbage filling It is eaten at a Christmas Eve supper called Velija. The bread is dipped in honey as a symbol of the sweetness of life.

Greek - Christmas Sweets – Melomakarona (also called Phoenikia)
These spice cookies are made with cinnamon and cloves, are soaked in a honey syrup, and sprinkled with sesame seeds, walnuts, and cinnamon.

To find out more about the Slovak Christmas Eve Supper or Velija <www.easteuropeanfood.about.com>

CZECH REPUBLIC, D - GREECE, G - ITALY, A - LITHUANIA, F - POLAND, B - SLOVANIA, E - UKRAIN, C

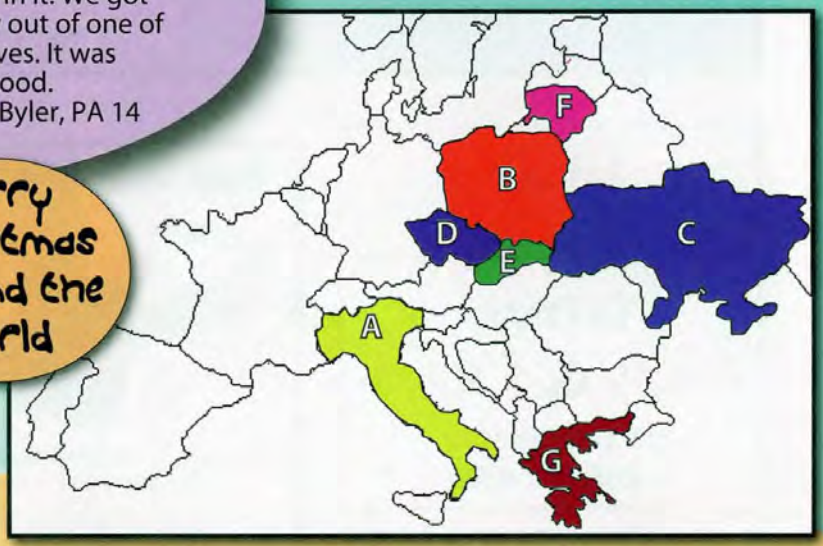
... Bee kid's corner

Produced by Kim Lehman - www.kim.lehman.com
www.beeculture.com
December 2010

My dad has bees. We have four hives that have bees. Two of the hives come from swarms that dad caught this summer. We also have a tree that has bees in it. We got honey out of one of the hives. It was very good.
Laura Byler, PA 14

Haley Zubrzycki, 8, MA

Merry Christmas around the World



Here is a list of countries and a Merry Christmas greeting in their language. Write the letter that is on the map next to the corresponding countries listed below.

___ CZECH REPUBLIC- Veselé Vánoce
___ GREECE- Καλά Χριστούγεννα
___ ITALY - Buon Natale
___ LITHUANIA - Linksmų Kalėdų
___ POLAND - Wesołych Świąt
___ SLOVANIA - Vesele Vianoce
___ UKRAIN - Різдвом Христовим

Ukrainian Medivnyk - Christmas Honey Cake

Most people use dark honey like buckwheat for this cake.

3 large eggs
3/4 cup sugar
3/4 cup honey
1/3 cup vegetable oil
3 tablespoons orange juice
1 1/2 tablespoons sour cream
1 1/2 teaspoons grated orange rind
2 2/3 cups unsifted all-purpose flour
3/4 teaspoon baking soda
3/4 teaspoon baking powder
3/4 teaspoon ground cinnamon

Directions:
1. Grease and flour one 12x 3 1/2 inch or two 8 1/2x 4 1/2 inch loaf pans. Heat oven to 325 degrees.

2. In large bowl, beat eggs, sugar, honey, oil, orange juice, sour cream, and orange rind until combined. On waxed paper, mix together flour, baking soda, baking powder, and cinnamon. Slowly beat flour mixture into egg mixture just until combined to make batter.

3. Spoon batter into greased pans and bake 45 minutes. Reduce oven temperature to 300 degrees and bake 15 -25 minutes longer or until center springs back when touched lightly with fingertip. Cool cakes in pans on wire rack for 10 minutes. Makes 16 servings. From <www.epicurean.com>

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 birthday surprise!

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.

Ann **Harman**

Dear Santa —

Dear Santa,

My bees have been very good all year. So I think they deserve some nice toys for Christmas. I've been looking through the catalogs and have made a list.

Since I've always admired my friend's uncapper I looked on the Maxant Industries website and there it was. It's the small chain uncapper. It does not take up much floor space and does a great job. My hand and wrist just got so tired using a knife that I got grumpy. My bees weren't happy being taken care of by a grumpy beekeeper.

I've read about providing enough ventilation for the bees so this coming bee season I am going to try a ventilated inner cover on some of my hives and see how the bees like it. I've used Rossman's cypress equipment from time to time and really like it. His ventilated inner cover will allow me to use my usual jugs for feeding syrup. I've already selected the eight hives for the trial so I'll need eight of those inner covers.

I've been thinking. Winter is such a quiet time in beekeeping so why don't I try to make some mead. I see that Dadant has a Wine & Mead Making Kit. That certainly will give me a good start. I've got some nice mild honey that I can use. Making mead sounds sort of complicated but I hear it really isn't. I think a book to go with the kit would be a good idea. I'll start with the one by Roger Morse called Making Mead.

Since you live at the North Pole I realize that you don't know much about bees. That's OK; I don't know much about reindeer except that yours must be really well-fed and taken care of to do all that work in such a short time. Anyway, where I live robbing can be quite a problem at certain times. Brushy Mountain Bee Farm has two really neat things to help my bees. I like the looks of that Manipulation Cloth. It should be good for working both strong and weak hives, especially if robbing could start. I just need one of those. However, that robbing screen might be a good idea, too. My bees are clever enough to figure out how to use it. Sixteen of those should be just right. If I need more during the year after catching swarms, I'll just order them myself.

My smoker is really old and pretty well banged up. It's hard opening and closing it. I tried to take the dents out but everything I do just makes it worse. I've had my eye on the Mann Lake smoker – the stainless steel one with the colorful bellows. I'll bet those bellows are easy to keep clean of sticky propolis. Go ahead and put one on the sleigh for me.

As long as I am thinking about some small things, I'd like to try the KW hive tool from the Walter T. Kelley Co. Although some all-in-one tools just don't work I'll bet this one does. You can just put it in my stocking. It's hung on the mantelpiece.

I know the chain uncapper is a bit heavy and bulky to get down the chimney so you can just leave it and the other equipment out in the honey house. I'll leave the door unlocked. Reassure the reindeer that all the bees will be inside their hives so there's no danger of stings.

Oh yes, the cookies and reindeer nibbles are made with honey. ~~I will be so happy~~ (Sorry for scribbling that out.) My bees will be so happy on Christmas Day that you'll hear their buzzing thanks all the way to the North Pole.

Merry Christmas to you, Mrs. Claus and all the Elves,

Beekeeper Burt

I just saw something in the Dadant catalog that will be so much fun. Mrs. Claus have you tried the Beehive Cake Pan? It's in the Dadant catalog. Since I frequently make some treats for our local association I am asking Santa to bring me one of those cake pans. I think I'll use my nice spice cake recipe, the one with honey. I've seen some candy bees that I can just stick on with icing. Oh, Burt just reminded me that there aren't any bees at the North Pole so even if you made a beehive cake your friends wouldn't know anything about skeps and bees. I guess you could make a skep cake look like an igloo. You'd have to use lots of white icing and stick a cupcake on for the front igloo tunnel.

I saw an ad in Bee Culture for the new two-ounce bear container. I've decided to start a little local business using those. The ad suggested wedding favors so I am going to contact some people who are wedding planners to see if they can recommend my little honey-filled bears. Then I'm going to advertise in the local newspaper and give suggestions for using these cute bears. If you can just put the 160-bear package with caps in your sleigh, I'll appreciate it. If my business goes well, next year you might have to bring me more. I'm really excited about the possibilities of that little bear. I'll bet that next Christmas you'll want some to put in children's stockings. If so, just let me know ahead of time.

I agree with Burt that a winter project would be interesting. He's thinking about making mead but I'm going to try soap. I saw The Regular Beginners Soap Making Kit in the Dadant catalog. That should be just perfect. Since soap has to sit around for a while before it can be sold, it'll be ready for Springtime sales. I just thought of something. If the soap making goes really well I could advertise it along with those cute little two-oz bears. I don't think I'll make bear-shaped soap though. Too many bear things. Burt said I could use a corner of the honey house during the Winter for my soap project. I'm not sure where he'll be setting up his mead but there's plenty of room in there.

Every year I try to add some new candle molds to my collection. I looked in the Mann Lake catalog and found their new one, the Wilderness Pillar. I sometimes paint the decorations on candles and I think this mold would be suitable for painting. I can also try different colors, too. I think they will sell well at our Harvest Festival next October.

I see that Brushy Mountain Bee Farm has two cookie cutters. One is a skep and the other one is a bee. Please put one each of those in my stocking on the fireplace mantel. You can tell the reindeer that the cookies this Christmas do not have a fancy bee-related shape but they are made with honey. Next year I'll use those two molds.

I always ask for something a little bit fancy for myself at Christmas and birthday. The Betterbee catalog has their very own Betterbee Honey Foaming Hand Soap. It sounds absolutely wonderful. I need something gentle for my hands because I always seem to be washing something off of them. You can just drop one of those in my stocking.

I think it would be fun to surprise Burt. He's been talking about nucs and what his beekeeper friends are doing with them. I am sure he'll appreciate having a nuc with a queen in the middle of Summer when he has accidently dropped a frame and smashed a queen. So if you could just drop off two five-frame nucs I am certain that he'll use and appreciate them. Thanks.

By the way, Betterbee has that delicious honey candy. It does come in several flavors but I think I'll ask you to put several handfuls of the assorted flavors in each of the stockings. I've got candy canes hanging on the tree but those aren't made with honey; they're just for decoration.

I'm sure I've forgotten something. I should have started my list earlier. But I know that I will appreciate everything and have fun with my cute little two-oz bears and my soap making kit.

I'll leave a note telling Santa to bring some of the honey cookies home to you and the Elves.

Thank you and Merry Christmas!

Burt's wife, Betty

Oooooohhhhh Santa! I just HAVE to have those Fuzzy Bumble Bee slippers from the Mann Lake catalog. They are soooooo cute! I just might wear them to my next party so everyone can see them. I know there'll be lots of silly jokes about them. I'll just say I'm "buzzing along." Won't that be fun!

I found something else cute. Betterbee has a miniature beehive. If you can bring me one of those I'll paint it so it looks really pretty. Maybe I'll paint some flowers on it. Then it will be a nice decoration. If Burt wants to borrow it for a demonstration it will certainly attract attention.

Now, I was looking around on the Internet and found a few totally super things so I put those on my wish list. First I went to Draper's Super Bee Apiaries, Inc., and in their gift items section there was this Glowing Beeswax Lantern. Oh that's so beautiful! I can just imagine it sitting on my little table and just glowing away. And I can replace the candle inside so it'll glow forever.

Next I opened up Beehive Botanicals. I think Beehive Botanicals has so many products that are good for your skin. In the winter I really need some soothing lotions and creams that make your skin feel soooo soft and smooth. I would really like their Bath and Body Gift Set, so that is definitely on my wish list.

Could you drop off a surprise for Burt when you deliver the other things? Mann Lake has a coffee mug that says Drone Bee. I think that's appropriate. Thanks for doing that.

I LOVE you Santa!!! Give each reindeer a hug from me. They're soooo cute.

"Honey"

GET THE RIGHT TRUCK

Neil **Shelton**

I grew up on a cattle ranch in the 1950s. Back then, I was not so interested in nature and practical pursuits so much as I am today. What I liked most back then were the Beat Generation (or what I imagined it to be) hot rods, and Donna Kay McAlister (not necessarily in that order).

So when I hear stories today about how "ah growed up on a farm, and mah daddy taught us all to work hard and blah, blah, blah . . .", I reflect that one can grow up on a farm and not really learn all that much about hard work etc. and I offer myself as living proof.

However, when the 70s came along and the back-to-the-land movement was luring young people my age into our rural area, I came to realize that even though I hadn't even been paying attention, just growing up on the farm had taught me quite a number of things that city kids didn't seem to have a clue about.

In fact, quite a few of these folks seemed completely

Bee Truck

unaware of how to even exist beyond pavement.

I realized that many of them were innocent of things I had learned, *despite myself*, as a bored, eye-rolling teenager.

In fact, compared even with someone as hopeless-appearing as myself, they seemed like complete sissy-boys, even the girls.

If you have just recognized yourself as a complete sissy-boy (or girl) this page is for you. If you're not sure, keep reading.

The complete sissy-boy makes his first mistake before he ever leaves the metro area. That is, he doesn't trade his car for something more appropriate to back roads and beeyards while he still has a job.

Do not make this mistake. You will need a pick-up truck from the first day you arrive on your land in the country. The good news is that you don't need the kind of truck you see towering over you at stop lights, the kind with sumptuous paint jobs, enormous tires and rumbling exhausts.

Those aren't really trucks, they're a young man's misinterpretation of what turns young girls on.

What you need is more of a tool than a toy, or a lure.

However, the sissy-boy's next bone-headed move is to buy a truck-wanna-be, perhaps because these wimpy half-steps seem less intimidating than a full-gendered real truck.

Again, you need a truck, not a car, and the fact is that a truck must begin its life as a truck – other wise, it's a car – and always will be.

Homesteaders, small-holders and beekeepers with beeyards need a vehicle with the following characteristics:

High Ground Clearance

Ground clearance doesn't matter much when you're on pavement all the time, but when you sink far enough into the mud, when one or both bumpers come to ground crossing a ravine, or when you drive across a rocky field, It's good to have the whole body of the vehicle sitting fairly high off the ground. Partly, this is achieved in the original design of the vehicle. Real trucks have a design in which the body sits high relative to the wheels, and which isn't too long with too much overhang.

That's not enough though, you also need to keep the differential(s) off the ground. In order to do this, you'll need . . .

Taller Tires/Wheels

Unless you have something hanging loose that shouldn't be, the lowest part of your vehicle will be the

Nope, not a bee truck.

differential housing on the axles between the wheels (what hillbilly mechanics call "the punkin"). The only (cheap) way to raise the differential height is with taller tires and/or wheels.

The monster-truck guys solve this problem with enormous, wide doughnuts that cost lots and lots of money. However, we're looking for something a little different.

Super-wide tires do have some innate advantages, they can float across boggy ground. Being very wide, they deliver a lot of traction in some situations.

What no-one ever tells you is that they are practically helpless in snow, especially crusted snow which they also want to float over. A narrower tire, with an equally aggressive tread, breaks through the snow and sinks into it enough to find traction on the earth beneath. If you think you're more likely to need to drive in snow, and less likely to want to jump over a line of school buses, choosing the narrower tire is a no-brainer.

Also, besides being terrifically expensive to begin with, wide tires are hard to keep in balance and rarely wear evenly, so they wear out prematurely.

Had you been paying attention to such plebian concerns rather than devoting your life to interpretive dance, you might have noticed that tires have been getting con-

stantly wider down through the years. Somewhat less obvious, is that they have also been getting lower, that is, what tire companies call the aspect ratio, the ratio of the tire's width to its height, has been getting lower. Typical passenger car ratios are now around 60% and delinquent in the modified Acura with the megaphone exhaust and dark-tinted windows probably has tires with a 50% aspect ratio.

What a beekeeper wants is a little old-fashioned, but still readily available and quite affordable. Look for at least a 75% ratio, you can read the ratio of the side of the tire. If yours says, for example, LT235/85R16, the "LT" refers to the speed rating, which we needn't worry about here, 235 is the width of the tire in millimeters, 85 is the aspect ratio, or profile, R denotes a radial tire, and 16 is the wheel diameter.

This is a pretty good size for a truck tire. When you're buying a vehicle, look for at least 75% aspect ratio and at least a 15" wheel size, for a quarter-ton truck, more for a half-ton.

Four-Wheel-Drive

Time was, even here in the hills, the four-wheel-drive was considered an expensive rarity, but now-days it's so common-place that you really shouldn't consider anything else for your beeyard ride. If you've never driven a 4WD, then you need to know that it provides a ***lot*** more pull than just twice what a two-wheel-drive can do.

Once again, there is the truck/not-quite truck divide.

If the truck you're considering has a system referred to as Four Wheel Drive (a/k/a part-time 4WD) then that almost certainly means a system which is truck-based, where the front-axle drive can (probably) be disengaged when on the highway by means of a two-speed transfer case.

What the beekeeper should avoid is ALL Wheel Drive (a/k/a full-time 4WD) meaning a car-based system which probably began as front-wheel-drive system to which a drive-shaft has been connected to drive the rear axle as well. Usually on a full-time basis.

Four-wheel-drive has benefits on the pavement as well as in the meadow, so full-time sounds like a better deal than part-time, but in today's world, that's not the case.

Technical esoterica aside, nearly all of the full-time AWD systems are of a lighter construction than the part-time 4WD systems, which are designed to withstand heavier loads and more extreme conditions, such as towing.

[One bit of warning here: in my experience, it's better to have controls on your 4WD system which are activated by long levers from which you can hear a satisfying "clunk" when you engage them as opposed to a button on the dashboard which engages an electric motor, or in the case of a Mazda B3000 I once owned, a deviously-complicated system that was supposed to lock and unlock the hubs, until it failed, at least. When I investigated the design – which involved sucking open a tiny switch in the front hubs with suction from the vacuum line, I was amazed that it ever worked in the first place. Very expensive to fix.]

The Bed

Despite how it looks in today's market, there are really only two bed sizes: those that will hold a 4x8 sheet of plywood lying flat, and those that are too small. The eight-foot length in particular is important because there are a LOT of things you'll be buying which require an eight-foot bed. Since you can get a bed with greater than 4x8 inside dimensions in even some of the smallest trucks, it's a good idea to make this choice.

The Engine

Interestingly enough, the engine is one of the less important considerations, partly because you don't have a lot of choices anyway.

A diesel engine would be superior for farm or homestead use (and probably any other use, for that matter) but currently diesels in light trucks are very rare in America. Izusu used to import a diesel pick-up, but those are getting harder and harder to find. Mahindra, the Indian tractor people, will be importing a small diesel pick-up with an eight-foot bed soon, and more diesels are headed our way in the future.

As for today, it would be hard for any earth-conscious person to choose a V-8 engine in anything as light as a quarter- or half-ton truck. You probably won't find any V-8s in quarter-tons at all, and six-cylinder half-tons are quite plentiful. You can get all the pull you need from lower gearing with a good four- or five-speed manual transmission, leaving us to the last item . . .

The Transmission

You can't operate a manual transmission? My goodness, you really ***are*** a si . . . well, let's not go there.

Being limited to an automatic transmission may be okay for a teenage girl (although I made it a point to teach my girls how to get home on their own, no matter the circumstances) but it's a very expensive weakness in the country.

Here's what you need to do before you leave the city, honey . . .

You need to learn how to use a clutch. The best way I know to do this is to go out and buy yourself a truck with a strong, truck-style transmission, with what's referred to as a "granny gear" low. By the time you get it home, you should know everything you need to about how to use the clutch, after that, the rest is just a matter of developing finesse.

A standard transmission and clutch system is simple, strong and repairable. An automatic transmission is none of these things; when one fails, the only practical solution is to replace the whole expensive mess.

In fact, that's probably the most beautiful aspect of the perfect beekeeping truck – it's the one with the fewest options, the lowest cost, and the most economical operation. Keep it lubricated and maintained, and you can depend on it for a lifetime of hauling, pulling and getting you in and out in the worst of weather.

It may not make you feel more macho, but you'll spend less time stuck in a beeyard, and save enough hard cash to finish those interpretive dance lessons. BC

Neil Shelton drives the right pick-up, and is in charge of ***www.homestead.org.***

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DECEMBER, 2010 • ALL THE NEWS THAT FITS

BEEKEEPING CONFERENCE & TRADE SHOW

The 2011 North American Beekeeping Conference & Tradeshow is right around the corner. A joint effort of the American Beekeeping Federation (ABF), the American Honey Producers Association (AHPA) and the Canadian Honey Council (CHC), this conference is sure to be the largest beekeeping event in the United States.

Please plan to join us in Galveston, Texas, January 4-8, 2011, for what promises to be an amazing event. The conference will be held at the San Luis Resort located right on the Gulf of Mexico.

The conference will begin on Tuesday evening with a complimentary Welcome Reception, then Wednesday morning with general sessions featuring presentations from Dave Mendes, president of ABF, Kenny Haff, president of AHPA, and Corey Bacon, president of CHC. We're also honored to have Dr. Jim Tew as our keynote speaker. The tradeshow will open at noon on Wednesday and will feature over 50 exhibitors. The afternoon will be dedicated to the Shared Interest Group meetings.

Thursday the General Session will begin at 8:25 a.m. and continue all day.

Friday will have a similar schedule with General Session, the ABRC, the Serious Sideliner Symposium and the Tradeshow continuing throughout the day.

Additional information, including registration rates, guest room accommodations, the conference schedule, invited speakers, session topics and much more, can be found on the conference Web site at www.nabeekeepingconference.com.

THINGS ARE ALWAYS CHANGING

The Dak Lak Honey Bee Joint Stock Co. in Vietnam aims to double its honey exports to 10,000 tonnes this year valued at more than US$20 million.

By late October, the company in the highland province of Dak Lak had collected 11,000 tonnes of honey and exported more than 8,000 tonnes of honey products to the U.S., Canada, Japan, and South Korea.

The U.S. buys 80% of the honey products from Dak Lak province.

To push honey exports, Dak Lak has expanded into other areas in Dak Lak province as well as to provinces in the Central Highland and Southwestern regions.

Dak Lak province this year is home to 200,000 flocks of bees with expected production of 11,500 tonnes of honey, twice the amount last year.

– Alan Harman

BBKA ENDS RELATIONSHIP WITH BAYER

The British Beekeepers' Association has announced plans to end its controversial practice of endorsing pesticides in return for cash from leading chemical manufacturers.

The endorsement of four products as "bee-friendly" in return for $27,200 a year caused outrage among many beekeepers because one of the companies, Bayer Crop Science, makes pesticides that are widely implicated in the deaths of honey bees worldwide.

But the BBKA denies that it has bowed to pressure from members who have been increasingly critical of the its stance. Bayer's clothianidin was identified as causing the death of two-thirds of honey bees in southern Germany in 2008.

In a statement sent to local beekeeping associations across the UK, BBKA's president, Martin Smith, said: "Following discussion with companies involved, BBKA trustees have decided endorsement and related product-specific payments will cease as soon as possible."

He added: "The four products subject to BBKA endorsement are of declining commercial importance and development of new classes of pesticides and application techniques means the relationship with the plant-protection industry should be reviewed."

The BBKA's position has polarised the 45,000-strong beekeeping community, but the majority of BBKA members upheld its policy at its annual delegate meeting earlier this year and in 2009.

In January, delegates will be asked to note this decision "with respect to the cessation of BBKA endorsement of certain pesticides".

But the organization has not ruled out accepting funds in the future from pesticide companies. "The trustees may wish to invite companies to exhibit at the BBKA's Spring convention or make a contribution to the research fund," said Smith.

"It is time to broaden the range of engagement with the crop-protection industry beyond the narrow focus of endorsing certain products; rather to contribute more directly to the development of new regulatory criteria for pesticide approval and to further support the industry in the general move to improve countryside stewardship," he added.

White says all ties to the pesticide industry should be immediately severed. "All of those who created and directed this policy of pesticide endorsement must be thrown out of the BBKA and replaced by real beekeepers. The BBKA is not fit for purpose and will never recover its moral integrity until it is reconstituted as a pure beekeeping organization that is willing to campaign against all use of systemic pesticides on British farms."

Meanwhile, Bayer acquires innovative product for the control of *Varroa* mites in honey bees from Exosect Ltd.

Exosect – leading provider of Intelligent Pest Management solutions - has announced the recent acquisition of its unique product, Exomite for the control of *Varroa* mites in honey bees by Bayer CropScience.

The acquisition was made for an undisclosed figure and gives Bayer CropScience worldwide rights to sell the product and further develop a portfolio of bee health products for the control of mites (including *Varroa* and tracheal mites) using Exosect's platform technology, Entostat.

Martin Brown, Exosect's Managing Director, comments, "After five years we are delighted to have finalized research and trials required for a regulatory data package." Brown continues, "Our platform technology, Entostat powder, has such huge potential in all sectors of pest control that despite our interest in the bee health sector we are unable to give the launch of this product the resource it deserves. This is an incredibly important sector and we believe that Bayer is very well placed to bring the product to market".

"Bayer is aware of its responsibility as a producer of crop protection products and bee health products", said Dr. Franz-Josef Placke, Head of Development at Bayer. "We are investing in research and development to provide beekeepers with sustainable solutions to improve the health of their bees and beehives."

Display Advertisers

Ed **Colby**

Senior Discounts

Driving into Carbondale, dead ahead the Elk Mountains lay cloaked in shadow, backlit by the pale dawn light. Mt. Sopris loomed over the town. I had the road to myself. For a moment, the world seemed perfect.

I wanted to be first to set up for Potato Day, Carbondale's Homecoming-weekend fall ritual. It's first come, first served, for booths. Last year, I arrived late and had to scramble for parking, then settle for a booth location that wasn't so handy.

I'd just put up my awning when Judy the salsa lady arrived. "Hey, you're in my spot!" she yelled. She was only kidding, right?

This year a gentleman was helping her. "Oh, good," I thought. "Judy has a boyfriend."

"Business must be booming if you have a hired hand," I teased.

"Hired hand?" she laughed. "This is my ex."

"Well, I'm pleased to see that you two still get along," I said.

"Oh, we're one big happy family," he chimed in. "One big, happy, dysfunctional family."

The beautiful hip couple setting up their booth next to mine took at least an hour to figure out how to erect their awning frame. They laid out the poles a dozen ways, but no way seemed to make sense. There were differences of opinion and some tense moments, but they of course ultimately prevailed, and in the meantime, nobody snapped.

Two months ago I lectured you about resisting the temptation to raise honey prices in a recession. Then at Potato Day I ignored my own advice.

I know I'm supposed to be cagey about prices, but we're all friends here. Just keep this under your hat, OK?

Last year I sold all my quarts for $11, and I wish to inform you that they were very popular. This time I bumped my price to $12 for the rabbit brush quarts, and to $15 for my high altitude Flat Tops wildflower. I did this because I had a poor harvest on the Flat Tops, and why not charge more for a scarce specialty honey? I also got the lowdown. I learned that my beekeeper friends in the valley charge some pretty fancy prices at local farmers' markets, with little apparent consumer resistance.

Still, folks know me and look for me at Potato Day, and they know what I charge. I didn't want to kill the goose that laid the golden egg, by appearing to have become suddenly avaricious. Despite the fact that I am old, I plan to live a lot longer. I can raise my prices over time, and nobody will ever notice.

One of my regular customers, a retired Swiss woman who lives up the Crystal, showed up at Potato Day. She buys for herself and her friends. She acted betrayed when I informed her of the new wildflower price. "Oh, no, Ed!" she wailed. "This is not Aspen. You cannot ask such a price!"

"I do have a senior discount," I said. "Twelve for the wildflower, for you." This satisfied her. She bought two quarts, and I agreed that I would honor her senior discount and her volume discounts when we occasionally rendezvous on my way home from work.

A woman who looked about 100 bought a little hex jar of wildflower. As she forked over her fiver, I said, "Are you a senior?"

She smiled. "Yes, I am," she said, with perhaps a bit of pride.

"Those are a dollar off with your senior discount," I said.

"Thank you," she said, beaming.

My senior discounts work like this: If you're dripping with gold, you don't get one. I don't care how old you are. But if you look Social Security thrifty, and especially if you're wearing a head scarf, I have a sliding price scale. I need all the good old-age karma I can get.

A kid wanted a $5 honey bear. He laid four ones on the table, and then he started counting out nickels. This was right out of Norman Rockwell. I said, "Kid, how old are you?"

"Nine," he said.

"Look," I said. "Honey bears are on sale today if you're under 10. Four bucks. So just keep your nickels."

"OK," he said, dead serious.

This amused some other folks looking to buy. Discounts are good for business. So is a sense of humor.

Folks love to compare honeys, and I have them use the finger test. I tell them to hold out a finger for a taste from a squeeze jar. Then I'll say, "OK, you got that flavor memorized, but your palate is clean, right? Right. Now, give me another finger, and you can try the wildflower. Because the health department says you can't use the same finger twice!"

Some people laugh when I say this, while others merely nod, as if this were a perfectly reasonable regulatory requirement.

The second finger proffered is often their middle finger, and when they chuckle at the gesture they're making, I'll say, "It's OK. I've been getting flipped off all day!"

Then comes the best part – deciding whether they prefer my thick, "buttery" rabbit brush honey or the delicate, "sweeter" Flat Tops wildflower. Because now I've closed the deal. It's not a matter of if, but of which.

By day's end, I knew that I'd sold less honey than a year ago. But when I counted my wad, I discovered that I'd grossed the same. Curiously, my expensive wildflower outsold the rabbit brush, three to two.

Everybody loves honey, so I guess you can charge whatever you want. You'll always sell some. Just don't forget those senior discounts!