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Bee Culture

May Features . . .

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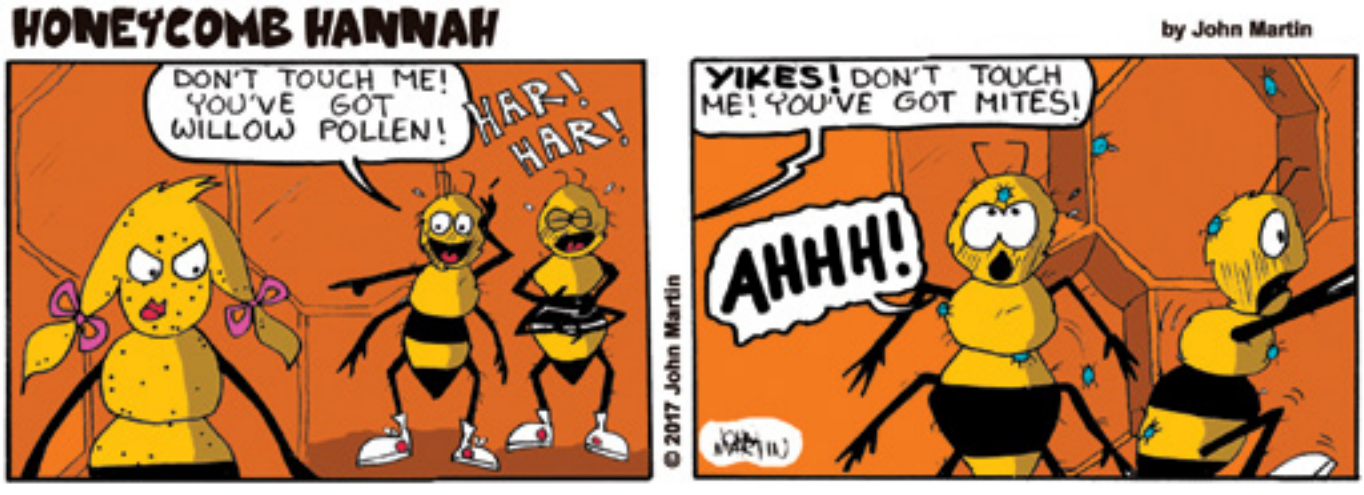

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Charger

What kind of battery charger (# amps) is the no name on page 68 in the March issue?

Walter Beck

Author's Response: This car jumper puts out 700 peak amps. It takes 24 hours + to charge from dead, and needs to be kept on current to maintain charge (or it is back to dead pretty quickly). I think it might be good to get a more powerful one, but the price starts climbing noticeably. Our choice was motivated in part by the fact that this unit was on sale for half price ($50). My guess is that the Black & Decker is generally OK, but the reviews show that experiences like ours are not that uncommon.

You also need to get to know your vaporizer and how it pairs up with the charger, as we have learned since the article came out and we added a second.

We have two complete field kits now with two vaporizer wands, one lighter-weight than the other. This jumper will do up to a dozen cycles on the lighter wand, with the wand cooling significantly between applications. It generally takes between one and two minutes for the light wand to begin vaporizing the oxalic powder. We did not have any information on the comparative weight of the wands when we acquired them. You might want to always buy from the same maker in order to know what you are getting. Try to know what their stats are for timing, etc.

For the heavier wand, we are only reliably getting two applications per charge cycle, which works for most of our members. We have had it take up to five minutes to initiate the first vaporization in a session. It holds onto its heat between applications, which means that by Colony #2 we prep everything between colonies, dump the pre-measured oxalic in the tray, and pop it immediately into the hive.

We cannot emphasize strongly enough that you need to use safety goggles, an N95 or better safety mask, and gloves, particularly with the heavier wand. It is a great idea to always do this with a partner, especially one watching the time and calling out each 30 seconds/minute.

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Not Happy?

"Don't look a gift horse in the mouth." That was a phrase my dad used to say. You see I was born in the thirties when mom and dad didn't give me everything I wanted. We didn't even have electricity until I was nine years old or running water until I was in high school which meant we didn't have inside plumbing. I think that was a great calendar and it even gives you room to write appointments in the dates. THANK YOU for the nice calendar.

R.O. Brenner

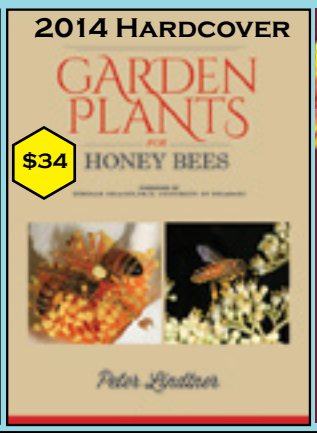
Layens Hives - Misleading

I am disappointed that *Bee Culture* published the article "The Layens Hive" by Leo Sharashkin in its March issue without first editing it to give it proper historical context. As published it was quite misleading.

In the first paragraph George de Layens is referred to in the present tense as "Europe's leading beekeeping authority." Again in the 6th paragraph he is again cast as being alive and well with "He writes . . ." Layens passed away 120 years ago, in 1897. His insights, beekeeping methods, and writings were not crafted in the context of today's parasites, diseases and insecticide pressures. There are no concrete references in this article to when Layen's work was conducted. Jean Hurpin's writings too are cast in the preset tense yet he passed away 50 years ago and his book, which is quoted, was in its third edition 70 years ago.

I am concerned that new beekeepers will read this piece and the statements contained therein, such as ". . . I visit only once per year I always find the bees in excellent shape with the hives full of honey, harvesting which becomes my sole task," and assume they do not have to monitor and manage their colonies (including treating when appropriate).

I expect to find fully honest and



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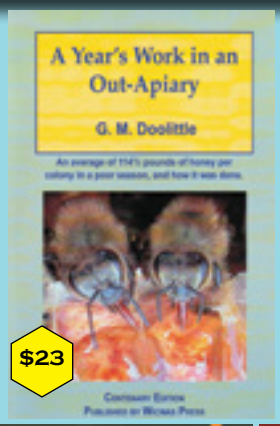

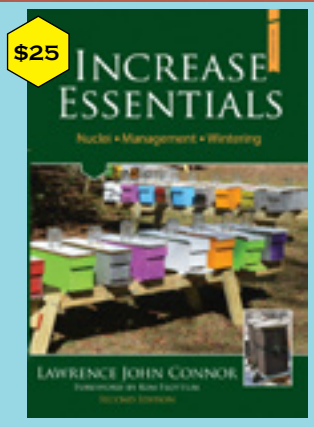

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transparent writing in *Bee Culture*. This article was neither.

Bob Ragsdale

Author's Response: *I am sorry to hear you found the article misleading, but, in all honesty, it was not my intent (let alone that of* Bee Culture) to confuse the reader.

You write that speaking about de Layens in present tense suggests he's still alive ("Layens writes"), but this is not so. If you google, for example, "Tolstoy writes," you'll have over 20,000 hits for this phrase alone, so it is accepted practice to speak in present tense of writings of deceased authors. And likewise Layens is indeed "Europe's leading beekeeping authority" the same way as "George Washington is the Father of the country" (present tense).

I totally agree that today beekeeping is more challenging than it was 100 years ago. Yet it is also an established fact that treatment-free beekeeping with two hive visits per year is fully practicable with survivor stock bees. This is how we keep bees (my family has been doing it since 1972), and I have not lost a single hive this Winter (the long-term survival is 85 to 90%, treatment-free). Likewise, Dr. Tom Seeley in Cornell University just completed a SIX-year study in which treatment-free colonies had 85% survival rate per year with minimal management. The reason de Layens' book is more relevant today than when it was first written is his amazing insight 100 years ago that certain procedures (like breaking the brood cycle) can go a long way to assure healthy colonies (and yes Layens describes mites in his book as well). And the basic biological principles underlying the functioning of bee colonies did NOT change with the arrival of Varroa *mites or any other disease or parasite: natural selection is still at work – and this is why feral bee colonies today do just as good as they did pre-*Varroa. *I'm just coming back from presenting a keynote address to the joint South Carolina/ North Carolina conference that had 650 attendees. I am clearly seeing that people crave information on sustainable beekeeping alternatives, and got to meet a number of honey producers with hundreds of hives each who have been completely*

treatment-free for 10+ years, relying on the same techniques described by de Layens (e.g., the emphasis on locally-adapted stock) for keeping their colonies healthy in the age of Varroa.

More than other branches of agriculture, beekeeping is about diversity and locale. What works in one location or for one beekeeper won't work for everyone else. By publishing my article, Bee Culture *shared actual experience of present-time beekeepers like myself or Dr. Seeley. Does it apply to every beekeeper? Certainly not. This is why even the title of the article clearly states that the approach is not conventional. Should this information be shared with* Bee Culture's *readership? I*

think the answer is "yes" because having the broad representation of beekeeping approaches and practices is what great magazines are all about, enriching the knowledge base of beekeepers large and small. This is probably why authorities like Diana Sammataro wholeheartedly endorse de Layens' book.

Dr. Leo Sharashkin
HorizontalHive.com

Flooded Beehives

When I saw the picture of the flooded beehives in the California almond orchard it gave me a bad feeling. Unless those eight hives (two pallets) had some form of upper entrance, cracks, openings, etc, the bees most likely suffocated.

I had seen it before when another beekeepers beehive entrances were covered by water for a few days – none lived through it.

After that, I was determined to prevent that kind of disaster in my own hives and I have since incorporated an additional small upper entrance. It is only a 3/8" x 3/4" dado cut at the front of the migratory lids, but I believe it can make the difference for the bees survival if they ever need it.

Thank you for your articles.

Kevin Bradley
Lakeport, CA

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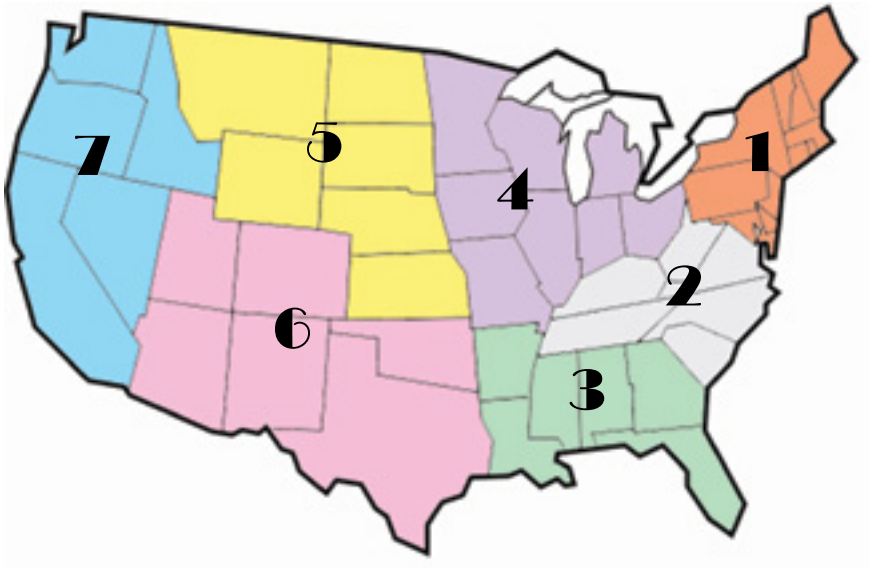

Business Plans

So, what to expect, and what to do this honey season. With prices at best flat, and not looking very promising for the near future, and even with consumption strong, though most of that is from off shore, what should you expect this Summer? That's what we asked our reporters this month, and the responses were less than exciting. For good reasons we suspect.

First, what kind of demand for their honey were they anticipating this year. More, less or the same? Well, only 47% were expecting an increase, while the remaining 53% expected it to be business as usual. Regions 1 and 3 expressed the most increase in demand, especially region 1 with nearly 70% expressing confidence in rising demand this Summer. Region 6, on the other hand was just the opposite, with only 40% thinking sales may increase. Interestingly, across all regions, nobody felt demand would decrease.

Will retail honey prices increase this year? Only 28% plan to increase their prices, while 72% will keep them the same. Region 7 was the most aggressive, with 50% feeling prices need to go up. Interestingly, Region 1 was 2:1 to keep prices the same, even with increased demand.

Because of the demand expectation it should come as no surprise that two thirds of our reporters won't be ramping up production this year, and only 61% will be expanding their operations. Region 3 is the exception to both of these though, with 50% planning to both increase production and expand their operations. Pretty much everybody else falls in to the two thirds:one third grouping though. There were more reporters thinking of downsizing their operations than we've seen in the past, but it's still under 10%, so I guess we're safe for a bit yet.

But think for a moment on this. Expanding, but not raising prices and not expecting increased demand. Where is all that energy going to go do you suppose? We didn't ask, and should have, but everything else we hear is that expansion will be for bees, not honey. Bees are where the money is now, and if you are looking to grow your business, where would you put you resources? In an iffy honey crop, or in a for-sure sale of nucs? An easy choice.

Our reporter turnover continues, and we are reaching out to Regions 3 and 7 for additional reporters. If you sell honey bulk, wholesale and retail, or at least 2 of the 3 noted, sell beeswax and pollinate too, and can fill out the survey every month (the survey is where all this information comes from each month) we'd be interested in working with you. Drop the editor an email if you are and we'll see how it works out. There is a tiny bit of compensation we offer (you won't retire on it, but you will be able to read our magazine each month when you do), so let us know.

	REPORTING REGIONS							SUMMARY			History	
	1	2	3	4	5	6	7	Range	Avg.	$/lb	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	1.75	2.06	2.14	2.12	2.06	2.18	2.06	1.50-2.55	2.09	2.09	2.24	2.21
55 Gal. Drum, Ambr	1.68	2.02	2.00	2.18	2.01	1.99	2.01	1.35-2.70	2.00	2.00	2.10	2.10
60# Light (retail)	212.50	187.50	198.75	182.28	171.00	183.68	197.77	120.00-280.00	195.54	3.26	208.78	200.91
60# Amber (retail)	217.50	185.40	197.50	177.60	199.02	193.56	199.02	120.00-280.00	198.05	3.30	207.88	197.16
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	86.76	76.67	88.80	63.96	51.84	86.40	87.54	51.84-134.40	81.97	6.83	83.36	77.67
1# 24/case	127.14	107.73	121.87	105.80	127.16	111.58	123.46	45.00-211.20	118.81	4.95	121.98	118.50
2# 12/case	116.25	95.00	107.88	102.58	97.44	101.60	119.57	79.20-182.40	108.33	4.51	108.17	105.48
12.oz. Plas. 24/cs	105.87	84.40	91.50	87.25	74.40	105.30	107.69	66.00-172.40	96.17	5.34	102.15	92.91
5# 6/case	134.79	106.00	142.00	91.76	102.30	117.67	111.25	19.00-186.00	120.00	4.00	124.47	116.61
Quarts 12/case	213.13	127.13	128.84	142.37	155.32	138.09	179.84	110.00-310.00	149.68	4.16	143.83	140.01
Pints 12/case	115.03	86.30	73.20	74.54	111.00	76.32	98.27	60.00-156.00	88.55	4.92	87.65	89.98
RETAIL SHELF PRICES												
1/2#	5.09	3.97	4.65	3.75	3.59	6.25	5.22	1.98-9.50	4.70	9.39	4.64	4.24
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1# Glass/Plastic	7.53	7.12	6.55	6.42	6.67	6.82	7.26	3.00-12.00	7.01	7.01	7.13	6.88
2# Glass/Plastic	13.21	9.71	12.09	10.77	11.43	10.65	12.16	6.00-19.00	11.82	5.91	11.98	11.90
Pint	14.41	9.57	8.77	9.38	8.69	9.94	12.06	4.00-24.00	10.11	6.74	9.85	9.65
Quart	18.91	15.77	16.12	16.56	15.43	16.30	18.02	8.00-31.00	16.55	5.52	16.95	16.35
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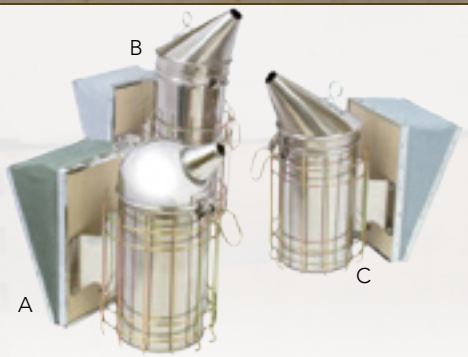

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SAVE the BEE

INNER COVER

Did you take a good look at that photo? It was taken several years ago by Sylvia Jadczak. If her last name sounds familiar it's because her husband is Tony Jadczak, who was, until just recently the State Apiary Inspector in Maine. The hives belonged to Dave Mendes she told me, and they are sitting on the blueberry barrens of SE Maine. You'll note the bear fence protecting them from Maine's marauders, and the million or so bees in the air, all looking for lunch.

Maine's blueberries get short shrift when it comes to pollination events. These are wild blueberries you know, low to the ground and a lot less demanding of pest and disease protection than a lot of crops. They are native to the region, and, mostly, growers simply remove the trees and shrubs and let the plants do their thing. There is some chemical protection, sometimes, occasional irrigation and they have figured out easy ways to help them reproduce and spread, but they are about as close to a natural crop as you'll find.

When you get in the middle of a large stand of these, you'll notice different colored clumps here and there. These are different varieties and, like apples, are needed to cross pollinate to set fruit.

They bloom right about Memorial Day every year, so a lot of beekeepers travel from the west coast to the east coast in the time between finishing almonds and before blueberries bloom. It's a lot of miles for those beekeepers. Many however, that keep bees on the east side of the river don't do almonds and stick to blueberries and other more local croops. That much travel is hard on equipment, people and bees, but almonds are an attractive crop, financially, and it's hard to say no.

Some years, some beekeepers make a wild blueberry honey crop, and if you've tasted it, you'll envy the beekeepers who live there and can simply let their bees make all the wild blueberry honey possible. It has a wonderful fragrance and has a kind of blueberry jam aftertaste that I've not found anywhere. I don't know if the high bush blueberries grown in the southeast – Georgia has a lot for instance, but they had a late freeze and lost most of them this year – have similar honey because either the beekeepers don't share with us northern folks, or the bees simply don't make it. Perhaps someone can let us know. Better, if there is some regular blueberry honey out there, sharing would be in order. You can send it to me here at the magazine office.

I mentioned short shrift compared to almonds. That crop commands something like a couple million colonies to pollinate a million acres of trees. There aren't a million acres of wild blueberries, but there are tens of thousands….I think the last number I heard was about 70,000 but it may be more than that. But they have to give half their crop a year off, so they are only producing on half those acres each year. There is production competition from the Canadian Provinces just north and east of Maine, and the market for wild blueberries is only so big, so expansion may have slowed some since I was there last. That, and growers are getting better at producing more berries on the same amount of land

You can kind of figure out how many colonies are used when you see that the recommendations for renting colonies are, depending on the isolation of the blueberry field, from three colonies to five per acre. So, you can round that out to, say, 150,000 colonies roll into Maine the middle of May to make wild blueberries.

Like I said, you can't compare them to almonds, but they are second to no other crop, and a lot bigger than whatever comes next. Almonds may get all the ink, but once you taste wild blueberry honey, you won't ever look back.

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I encourage you to take a long look at the Annual Honey Report that starts on page 28. We do this every year, and it takes us about a week to gather and grind out all the numbers. We use the USDA NASS report that tells us colonies in every state,

The 2016 National Honey Report And More

yield per colony, how much honey was produced, how much is still sitting in warehouses, and the calculated value of all that.

We use those numbers, then look at the USDA ERS report that tells us all about honey imports and exports, where to, where from and for how much. And we touch the Farm Service Agency to find out how much honey is under loan, so it was made last year, but hasn't been sold, so it gets grouped kind of like regular stocks in warehouses. And then look to the Census Bureau for a head count on July first each year.

One thing we didn't include in the report is that as of January 1, fully 25% of last year's crop hadn't been sold. Was that normal, we wondered? So we looked back 5 more years, and, it seems, it's exactly normal. Crop sold by year's end ranged from 88% to 74%, but most years right about 25% is sold when they take the survey. Which means, right about 75% of the US honey crop is moved between harvest, which is, what, say over by mid-October or so, to end of year. 10 weeks.

Another interesting note is the number of people working in operations with more than five colonies. This year, 24,000 folks are employed by these commercial operations. Or sideline and commercial operations to be more exact. With 2.8 million colonies, that comes to each person being responsible for 116 colonies, when averaged out. We know that's not the case because the rule of thumb, sorta-kinda, is in a commercial operation it runs about 1000 colonies/employee, or 10 times the average. Interestingly, if you look at USDA recognized farms that have fewer than five colonies, you have 19,000 employees running 24,000 colonies, or an inner cover over one colony/employee. One can twist these numbers in a lot of ways that tell a gibberish story, but at least this year there's a better picture of some of the industry.

Input cost differences between the two groups bears notice. One would expect there to be a differential cost when purchasing in quantity. When you buy a 1000 queens, pre-ordered a year in advance, you should expect a better price and probably better service than when you need just one the end of June. Tomorrow.

But the cost/colony difference that caught my eye was Varroa control. The big guys are paying half of what the small counts are paying. Half. And, I'll bet you a buck, the small counts aren't counting labor. Who counts labor, anyway. Unless you're paying salaries. You can bet that price includes labor for the bigger operations. So why half? Buying in quantity? Maybe. Using very cheap controls? Maybe. Not treating when needed, or, treating just when needed and not just because? Maybe.

Compare that difference to the cost of feed. Almost identical. And I'll bet another buck that the big operations are getting quantity discounts and using cheaper material – imagine a tanker of HFCS compared to a 10 pound bag of sugar to make syrup. No contest.

Well, this is all new this year, so there may be some bumps in the road. Or not. A few year's experience will show patterns that will be predictable and useful.

Other interesting numbers from the per capita calculation. In six years we have increased honey in by 30%, and honey out by 50%. Our total consumption went from 368 million pounds in 2012 to 520 million pounds last year – a 30% increase. And the population has increased by 16 million, 5%, in the same time frame.

USDA NASS is doing several surveys a year now, looking at colony losses, causes of losses, numbers of colonies, cost of pollination and more. We'll keep tabs on those and see if we can't get a whole series going, and then tie them together for what will be a first good look at our whole beekeeping industry.

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I'm getting ready to go to Florida about the middle of this month to give a talk to members of the National Candle Association at their annual meeting. Our parent company here, Root Candles, is an active member with two of our staff holding offices. They invited me to give a talk several years ago when they met in Phoenix. It's not unlike a beekeeper's meeting, with business sessions, vendors, talks and workshops, lots of networking and social stuff to keep folks busy for several days.

We have Varroa, but they have their problems too. The EU, and pretty soon California are worrying about the smoke and soot and what not that candles give off when burned. And when you think of the fragrances, dyes and different waxes used in candles it can get pretty complicated. And there's more to waxes. Different waxes of course burn differently. Paraffin is often used, especially in cheaper candles, and it is a petroleum product with all those issues. Soy wax is renewable and a clean burning wax and is used quite a bit, but can't be used for every kind of candle. Palm is renewable, or, as they want you to think, sustainable. Something like three football fields worth of land a day are felled to plant more palms for the oil. That can be an issue. But it, too, can't be used for every kind of candle. And then there's beeswax. That's where I come in. They want to know what's going on and what will be going on with beeswax.

Because of the cost, beeswax has typically been used mostly for the liturgical market. Beekeepers of course make pure beeswax candles, and rightfully charge an arm and a leg for them. Beeswax is clean burning, sweet smelling and attractive.

But issues of availability, cost and foreign substances in the wax have candle manufacturers asking questions because they have to plan three to five years out for sourcing their waxes and production schedules. And they want to know.

I don't know if what I'm going to tell them will be reassuring. Beeswax comes from honey production, and you know where that's going in this country. I'll let you know how it turns out. Wish me luck.

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1 - Nasr et al, Efficacy of Apivar on the Varroa Mite, Varroa destructor in Alberta, Canada. 2012 Canadian Pest Surveillance Branch, Research and Innovation Division, Agriculture and Rural Development
2 - National Management Survey Bee informed partnership 2015 (USA)

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It's Summers Time –

Deadlines, Travel, Chicks And More

As I write this we are hurrying to meet our deadline for this issue because in two days we get on a plane to fly to Sacramento. We're going to visit Olivarez Honey for their amazing Hobby Day. Kim, Larry Connor and Randy Oliver will be talking all day Saturday to beginning beekeepers who are arriving to pick up their packages. It should be a great day. I'll have photos in the next issue. Maybe you saw photos on our Social Media pages.

We are a week and a half away from Easter and it's going to snow Friday. Then it will be in the 60s on Saturday. Spring is always interesting in Northeast Ohio.

Next week we have 10 chicks and six ducklings arriving. That will put us at 23 chickens. We've lost two or three of the older girls this Winter. So looking forward to building up the flock. I've been reading a lot about planting herbs around the chicken pen and also giving herbs to the chickens in their food or just tossing them into the pen. I guess like people, herbs are good for all. So we're going to try that – oregano is a big one. I've also read that putting a spoonful of apple cider vinegar in their water is good for them. I'm still reading all I can and trying to keep improving their 'lifestyle.' I think it's like beekeeping and everything else – I won't live long enough to learn everything about anything.

Kim has tomatoes, herbs and lots of peppers started in the basement and is talking making the garden bigger. I did a lettuce bed last Summer and it was OK, but I know how to do it better this year. We have a big black rubber watering tub that you get at Tractor Supply that we bought for the first batch of baby chicks five years ago. I was going to make a water garden out of it, but – a story for another time – it got a big hole in it. So then I got the idea of a lettuce bed. My biggest mistake was planting too many different kinds all at the same time, so we ended up with way more lettuce than we could eat. Of course the chickens love lettuce so it didn't go to waste. This year I will stagger my plantings and try and keep things under control. I did have to keep an eye on our two big girl cats. At first they seemed to think it was a big giant litter box I had put out for them.

We've ordered a few more packages. We've got four or five hives alive so far this year. That's out of eight that we went into Winter with. So not too bad I guess. We're hearing big losses though from friends here in Medina County – even with the mild Winter we had. So it wasn't Winter that killed them. What was it?

Spring is always busy for all of us whether you are a beekeeper, a gardener, an editor or just living life. Spring is busy – getting ready for gardens, planting flowers, sports, kids, just living the dream.

I thought we had limited our travel for this year but it turns out we didn't do so well with that. California in April; Florida in May for the National Candle Association Meeting; New York in May, Massachusetts in June. I think we're home all of July – trying to catch up and holding our Pollinator Day – Delaware and North Carolina in August, back to California in September and England in October for the National Honey Show. It's going to be a typically crazy year for us. We might just bump into a few of you on our travels.

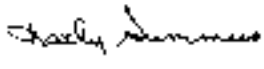
The next new thing I want to try is small fruit trees. I just read a book called *Grow A Little Fruit Tree* and the concept is two-fold. By keeping fruit trees small, by doing drastic pruning, you're able to manage them with both feet on the ground – no ladders and you have just enough fruit to enjoy – not bushels. This technique also allows for more trees in a smaller space. I think I've convinced Kim to give it a try and we have enough room.

Then there are the deadlines each month and events that are going on locally. We have two events coming up this Summer right here in Medina at the Root Company. Read more details in this issue, but our Pollinator Day is July 15 – if you're close by stop and say hello. The gardens should be beautiful that time of year.

And register now for our annual event, which in the past has been in October, but is in September this year because that's when we could gather most of our regular *Bee Culture* writers. This is going to be a great time. Just go to our web page – **www.beeculture.com** – and sign up. We hope you can make it.

It's going to be another busy Summer, but we're enjoying life and living the dream. Hope you are too.

See you soon.



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VitaFeed Nutri

A new feed for honey bees from honey bee health specialist Vita (Europe) Ltd will help boost colony health and increase honey production. VitaFeed Nutri is a rigorously tested, GMO-free nutritional supplement that can be used at almost any time of year to promote controlled colony growth.

Packed with easily digestible proteins, VitaFeed Nutri can make up for nutritional deficiencies in honey bees' diet, thereby stimulating egg-laying, extending bees' lifespans and ultimately increasing honey production.

Dr. Max Watkins, technical director of Vita (Europe), explained "Honey bees need protein, but not all pollen has the same protein content. VitaFeed Nutri ensures that bees have sufficient protein to enable healthier colony development and thereby increased honey production. The year-round suitability and simplicity of applying the feed in syrup make it an ideal product for any beekeeper wanting to keep healthier and more productive bees."

Rigorous trials in different countries have shown the remarkable effects of using the VitaFeed Nutri supplement. Studies show that bees increase their pollen consumption by 50% when the percentage of protein in pollen drops from 30% to 20%. When protein content drops, bees turn to their own body reserves. This in turn reduces their lifespan, their brood-rearing capability and therefore the development of the colony. VitaFeed Nutri compensates for protein deficiencies.

Paulo Mielgo, Vita's technical manager, helped develop the project when he worked for Vita's Argentinian partner Apilab. He said, "I have worked in many countries across the world and witnessed the environmental stresses that honey bees endure. We identified poor protein diet as a major inhibitor of colony growth and developed VitaFeed Nutri. In scientific trials in several countries, we have recorded average increases in honey production of more than 2 kg per colony and sometimes as high as 11 kg.

VitaFeed Nutri will be available in the UK this Spring and will soon become available worldwide through Vita's distributor network.

See **www.vita-europe.com** for more information and a web app which can be accessed at **www.healthybeeguide.com**.

Five-Frame Hive Perch Beekeeping Caddy

Grant Dickson didn't like the frame holders on the market, so he came up with one of his own. Features include nests for storage and transportation, holds up to five frames and isn't stressed under that big a load, is super stable, is made in the U.S., is designed in, and shipped from Colorado, is light weight and weather proof. Retail price shipping included is $34.99. Grant is open to retail, wholesale and other ideas, for sale now and can be reached at **ColoCold@zoho.com**

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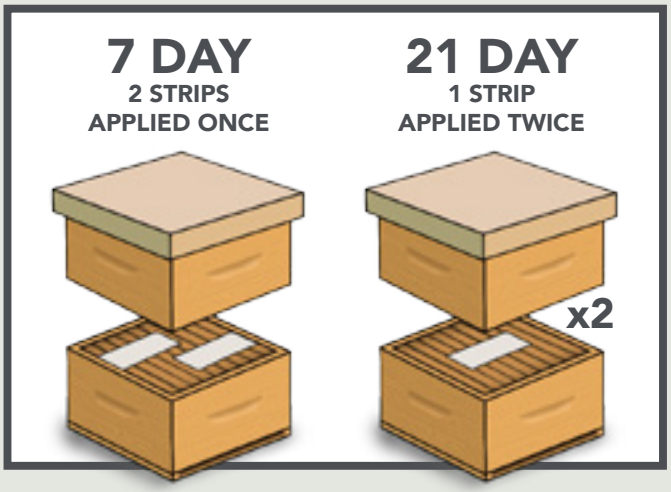

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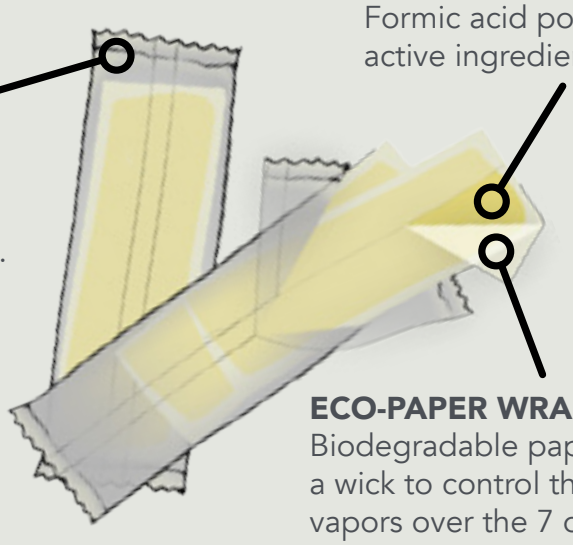

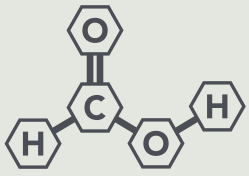

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Using our machine, honey, and maple syrup demonstrates your support for products made in America and your concern for the environment. For more information, you can visit our website at **www.thehoneysqueeze.com** or call us at 570-245-7411.

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Whether you're into backyard beekeeping as a hobby or as something more serious, our product is the only one that keeps your beehives ultimately free from beetles. With over 50 years of beekeeping experience on our side, you can trust in us to provide you with only the best in beehive protection. Contact us today and we'll work with one of our many distributors to get our product straight to you.

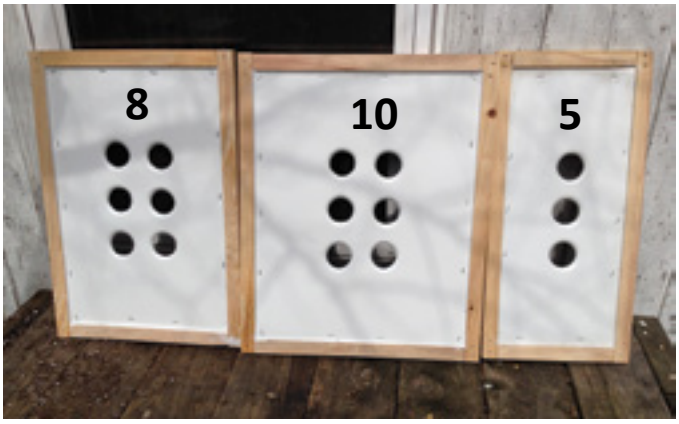
Our specialized beetle blocker shim is composed of a Cyprus wooden frame and an aluminum metal insert. It guarantees that problematic beetles won't be able to damage your beehives.

When installed between the bottom board and the first brood box (installed Dark Side Down), the SHB is unable to navigate the special lipped holes because they can't cling to the underside (dark side) of the BBS (Beetle Blocker Shim), and even if they could, their exoskeleton will not flex on the turn to get a grip on the holes.

One big thing to realize is most types of beetles can flatten their bodies and squeeze through the tightest of cracks, and once the BBS is installed they will search out these cracks to get in! So one must be diligent in sealing any other gateways the SHB's can find.

Do this and the only beetles in your hives will enter only during inspections.

Check out our Facebook page "Clark's Beetle Blocker Shim" for more info and educational videos. Visit **www.mcssl.com/store/clarksbeetleblockershim**.



BEE COUNTED

Citizen science needs you!

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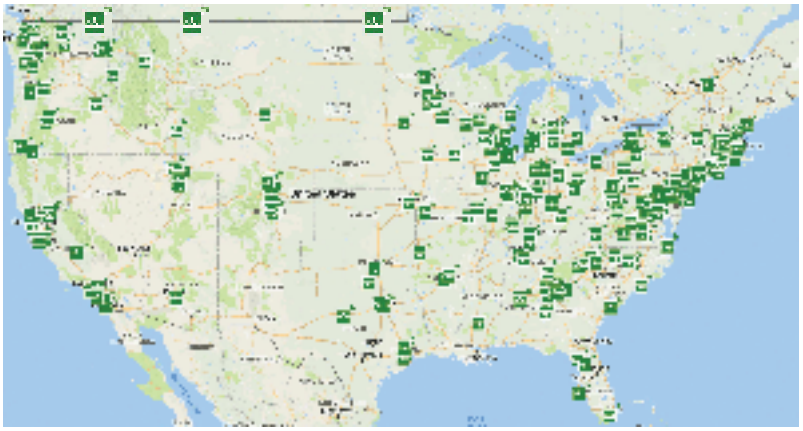

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Every Hive Counts

U.S. Honey Industry Report – 2016

A somewhat new look and a lot of new data come with the Department Of Agriculture's National Agricultural Statistics Service Annual Honey Report this year, making the information more useful and offering a bigger, better picture of the U.S. Honey Industry. There are, of course, some of the usual issues with the data, but they are consistent with previous year's data so are predictable.

Beginning this year new tables have been added with estimates on expenditures, incomes, and other data related to beekeeping.

United States honey production in 2016 from producers with five or more colonies totaled 161.9 million pounds, up three percent from 2015. There were 2.78 million colonies from which honey was harvested in 2016, up four percent from 2015. Yield of honey harvested per colony averaged 58.3 pounds, down one percent from the 58.9 pounds in 2015. Colonies which produced honey in more than one State were counted in each State where the honey was produced. Therefore, at the United States level yield per colony may be understated, but total production would not be impacted. Colonies were not included if honey was not harvested. Producer honey stocks were 41.3 million pounds on December 15, 2016, down 2 percent from a year earlier. This means that honey was produced, but did not enter the stream of commerce so would not be counted as consumed in 2016. Stocks held by producers exclude those held under the commodity loan program, which also would not be considered as entering the stream of commerce, so would not be counted as being consumed in 2016.

United States honey production in 2016 from producers with fewer than five colonies totaled 766 thousand pounds, up 6 percent from 2015. There were 24 thousand colonies from which honey was harvested in 2016, up 4 percent from 2015. The average yield was 31.9 pounds per colony in 2016, up 2 percent from the previous year. This yield is 26.4 pounds less than what was harvested per colony on operations with five or more colonies. To be considered in this count the business where these colonies were kept needed to meet the USDA requirements of being a farm, thus excluding colony count and honey production from many backyard hobby beekeepers and even sideline beekeepers with more than just colonies in the backyard. Requirements for being a farm include being a business, taxes and the like, which most backyard beekeepers do not qualify for.

United States honey prices decreased during 2016 to 207.5 cents per pound, down slightly from 208.3 cents per pound in 2015. United States and State level prices reflect the portions of honey sold through cooperatives, private, and retail channels. Prices for each color class are derived by weighting the quantities sold for each marketing channel. Prices for the 2015 crop reflect

Honey: Number of Colonies, Yield, Production, Stocks, Price, and Value by State and United States, 2016

State	Honey Producing Colonies[1]	Yield per Colony	Production	Stocks, Pounds Dec 15[2]	Average Price per Pound[3]	Value of Production[4]
	x1,000	Pounds	x1,000	x1,000	Cents	1,000 Dollars
AL	7	52	364	33	337	1,227
AZ	27	46	1,242	261	199	2,472
AR	24	69	1,656	99	184	3,047
CA	310	36	11,160	2,009	200	22,320
CO	32	40	1,280	282	217	2,778
FL	215	50	10,750	538	244	26,230
GA	96	39	3,744	899	269	10,071
HI	16	113	1,808	127	231	4,176
ID	97	34	3,298	1,253	172	5,673
IL	10	48	480	77	539	2,587
IN	7	62	434	208	336	1,458
IA	37	48	1,776	746	207	3,676
KS	7	48	336	54	297	998
KY	5	46	230	48	402	925
LA	50	86	4,300	301	193	8,299
ME	12	34	408	65	321	1,310
MI	89	60	5,340	1,709	225	12,015
MN	124	59	7,316	1,390	164	11,998
MS	19	85	1,615	113	174	2,810
MO	8	62	496	30	218	1,081
MT	159	77	12,243	3,183	175	21,425
NE	48	46	2,208	640	188	4,151
NJ	12	27	324	198	669	2,168
NY	64	57	3,648	1,167	320	11,674
NC	12	37	444	89	461	2,047
ND	485	78	37,830	6,809	173	65,446
OH	15	79	1,185	664	384	4,550
OR	74	35	2,590	622	206	5,335
PA	19	50	950	266	315	2,993
SC	16	45	720	36	450	3,240
SD	280	71	19,880	12,127	174	34,591
TN	6	55	330	69	478	1,577
TX	133	70	9,310	2,607	196	18,248
UT	31	32	992	169	191	1,895
VT	6	52	312	69	282	880
VA	5	38	190	30	582	1,106
WA	84	35	2,940	412	188	5,527
WV	5	32	160	43	373	597
WI	54	62	3,348	1,205	244	8,169
WY	40	68	2,720	190	176	4,787
Other States[5,6]	35	44	1,525	416	426	6,497
U.S.[6,7]	2,775	58.3	161,882	41,253	207.5	335,905

[1]Honey producing colonies are the maximum number of colonies from which honey was harvested during the year. It is possible to harvest honey from colonies which did not survive the entire year.
[2]Stocks held by producers.
[3]Average price per pound based on expanded sales.
[4]Value of production is equal to production multiplied by average price per pound.
[5]Alaska, Connecticut, Delaware, Maryland, Massachusetts, Nevada, New Hampshire, New Mexico, Oklahoma, and Rhode Island not published separately to avoid disclosing data for individual operations.
[6]Due to rounding, total colonies multiplied by total yield may not exactly equal production.
[7]U.S. value of production will not equal summation of States.

Honey Prices 1998-2016

Cents/lb.	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All Honey	65.5	60.1	59.7	70.4	132.7	138.7	108.5	90.4	104.2	103.2	141	144.5	160.3	172.9	195.1	212.6	216.1	209.0	207.5
Retail Shelf	114.7	126.6	130.4	142.2	152.5	188.5	188.7	183.3	191.0	196.1	197.6	278.4	305.4	328.4	340.5	373.5	406.6	409.6	462.
%Difference	34%	53%	54%	51%	13%	26%	42%	51%	46%	29%	28%	48%	48%	48%	43%	43%	47%	51%	45%

honey sold in 2015 and 2016. Some 2015 honey was sold in 2016, which caused some revisions to the 2015 honey prices. Price data was not collected for operations with fewer than five colonies.

New on this report are prices paid for bees by operations with five or fewer colonies and for those with five or more colonies, the average prices paid in 2016 for honey bee queens, packages, and nucs were $19, $89, and $117 respectively. The average prices paid in 2016 for operations with fewer than five colonies were $33 per queen, $109 per package, and $122 per nuc. Comparable data is not available for 2015. For operations with five or more colonies, pollination income for 2016 was $338 million, down 1 percent from 2015. Other income from honey bees for operations with five or more colonies in 2016 was $149 million, or $56/colony, down 10 percent from 2015.

The NASS Honey Report this year is a whole new animal. They got a budget boost a while back and they have put it to good use in providing our industry with useful information. This year they have added a Cost Of Pollination Report, a Winter Loss Report, and a quarterly loss report which includes what caused those losses, additional information from those beekeepers who have five or fewer colonies, and are considered a farm by USDA (which, unfortunately, leaves out thousands of backyard beekeepers with five or fewer colonies), plus employee numbers, how much beekeepers paid for Varroa controls, feed, foundation, woodenware, and queens and nucs – all for both beekeepers with five or fewer and beekeepers with more than five colonies. It is an exhaustingly thorough report on where we are right now.

Bee Culture surveys its Honey Reporters each October for an estimate of what the honey crop will be, and we come pretty close to the right amount most years. In 2015 we missed it by less than 1%, the year before by 3%...not bad when dealing with millions of colonies out there. This year, well, for 2016 that is, we had predicted 168.5 million pounds of honey would be produced in the US, but NASS numbers indicate 161.9 million pounds were produced. We over estimated by 6.6 million pounds, about a 4% error. We're happy with that, and when we looked at the numbers we were counting fewer colonies this year, which are up from last year by 100,000, from 2.7 to 2.8 million colonies, a 3% increase, so our guess was pretty good, given the data we had.

Five Or More, Or Less

Check out the chart that shows these numbers comparing the two groups. Varroa control costs/colony are enlightening. Fewer colony beekeepers are, according to the data, paying twice as much per colony to control Varroa as do larger beekeepers - $10.92 vs $5.77.

Conversely, the larger beekeepers are making essentially twice the honey per colony as the smaller beekeepers. Take a look at the rest of these differences on the chart.

	2015		2016	
	>5	5+	>5	5+
X1000 # Colonies	23	2.66	24	2.775
Yield/Colony #s	31.3	58.9	31.9	58.3
Production x1000 lbs.	720	156.5	766	161.9
Queen Costs	-	-	33	19
Pkg. Cost $	-	-	109	89
Nuc Cost $	-	-	122	117
Other Income x 1000	173	406.0	242	486.3
Varroa Control Cost/ Colony $	11.48	6.06	10.92	5.77
Workers x 1000	19	23	19	24
Feed Cost/Colony $	24.30	18.90	20.08	18.13

The Top 10 Producing States

It's still true. If you want to make a honey crop, these are the places to go. The top 10 jockey for position each year, but only the bottom one or two ever change. That happened this year, with NY dropping off from position 10 last year, while GA regained its position on the list with the help of a gain of 27,000 colonies since last year. Combined these 10 states command 70% of all the colonies counted in the U.S. and fully 75% of the honey produced here and those percentages, no matter the states involved are almost identical every year. A shift this year in this top 10 group shows they've gained 69,000 colonies since last year, with CA gaining 35,000, and GA gaining 27,000. But other states bear mentioning. ID +8,000, WA, +11,000, MT +13,000, NY +6,000, TX +7,000. Meanwhile, FL lost 5,000, and even ND lost 5,000, but SD dropped 10,000 and NE lost 9,000. Totaled, some states lost 37,000 colonies, but others gained, either by simply adding or moving colonies, about 112,00 colonies for the 2,775,000 total this year.

Top Ten Producing States Each Year

2010			2011			2012			2013			2014			2015			2016		
State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	X1000 Col	X1000 Prod lbs	State	X1000 Col	X1000 Prod lbs	State	X1000 Col	X1000 Prod lbs
ND	510	46.4	ND	460	32.6	ND	495	34.2	ND	480	33.2	ND	490	42.1	ND	490	36.2	ND	485	37.7
CA	410	27.5	CA	370	17.7	SD	270	17.0	MT	159	14.9	SD	230	24.4	SD	290	19.1	SD	280	19.9
SD	265	15.6	SD	250	16.5	FL	199	12.7	SD	265	14.8	FL	245	14.7	MT	146	12.1	MT	159	12.2
FL	200	13.8	MT	145	13.3	CA	340	11.9	FL	220	13.4	MT	162	14.3	FL	220	11.8	CA	310	11.2
MT	157	11.6	FL	180	10.9	MN	130	8.7	CA	330	10.8	CA	320	12.5	TX	126	8.3	FL	215	10.8
MN	126	8.3	MN	120	6.3	MT	149	7.7	MN	130	7.5	TX	116	9.0	MN	122	8.2	TX	133	9.3
TX	100	7.2	MI	74	4.7	TX	95	4.9	TX	106	6.2	MN	132	7.9	CA	275	8.2	MN	124	7.3
WI	68	4.4	TX	78	4.5	MI	76	4.3	LA	50	4.9	MI	91	5.7	MI	90	5.2	MI	89	5.3
MI	70	4.0	WI	57	3.6	WI	63	4.3	WI	59	3.5	GA	73	4.5	LA	44	4.3	LA	50	4.3
NY	47	3.0	GA	65	2.8	LA	41	3.5	GA	67	3.3	LA	48	4.0	NY	58	3.5	GA	96	3.7
Total	1953	141.9		1799	112.9		1858	109.1		1866	112.5		1957	139.1		1861	117.4		1941	121.8
All Sts.	2684	175.9		2491	148.4		2624	144.4		2640	149.5		2740	178.3		2660	156.5		2775	161.8
% of Tot.	73%	80.6%		72.2%	76.1%		71%	76%		71%	75%		71%	78%		70%	75%		70%	75%

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We calculate the per capita consumption of honey each year using data from USDA NASS, USDA ERS, The Farm Service Agency and the US Census Bureau. Basically, we measure honey in (US production, imports, stocks used from the previous year), and we measure honey out (how much went into stocks, how much went under loan, exports). We calculate the difference and make somewhat of an assumption that the difference is what we consumed during the year. We then take that figure and divide it by the U.S. population, using the July 1 figure the Census Bureau provides each year and arrive at a pounds consumed per person.

Figures This Year For Honey In:

U.S. production – 162.6 million pounds (which includes all producers counted), plus imports of 369.3 million pounds, plus stocks held over from 2015 of 42.2 million pounds, and there was no honey under loan from the previous year, for a total of 574.1 million pounds.

Figures This Year For Honey Out:

We exported 11.1 million pounds, stored 41.2 million pounds to be sold this calendar year and have 4 million pounds still under loan to be released later this year for a total of 56.3 million pounds.

U.S. population on July 1, 2016 was 323.1 million.

To calculate:

honey in = 574.1 million pounds
Honey out = 563 million pounds
Total consumption = 517.8 million pounds
U.S. Population July 1 = 323.1 million people

Per capita consumption = 1.61 pounds (25.8 ounces) of honey/person. This is up from the 1.51 pounds per person last year which is a good, and bad problem.

The good part of the problem is that people are consuming more honey. The bad part is that only 29% of that honey is produced in the U.S., or, looking at it another way, only 7.1 ounces of that, less than a half pound, came from here.

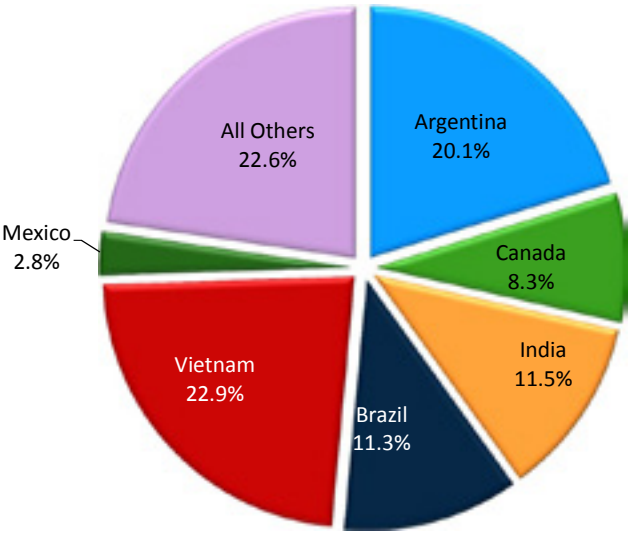
Per Capita honey consumption and the average price of all honey in the U.S. for the following years:

2010 – 1.20 pounds/person, @ $0.160.3/lb.
2011 – 1.27 pounds/person, @$0.172.9/lb.
2012 – 1.26 pounds/person, @$0.195.1/lb.
2013 – 1.44 pounds/person, @$0.212.6/lb.
2014 – 1.55 pounds/person, @$0.217.3/lb.
2015 – 1.51 pounds/person, @$0.209.0/lb.
2016 – 1.60 pounds/person, @$0.207/lb.

Year	Million lbs honey in	million lbs honey out	million population	lbs/person
2010	398	29	307	1.20
2011	470	80	309	1.27
2012	487	53	312	1.26
2013	500	49	314	1.44
2014	547	56	318	1.55
2015	544	58	321	1.51
2016	573	55	323	1.61

Per Capita Consumption 2016

The Big Seven For U.S. Honey Imports 2016



Three Year Export History

Country	Millions/lbs 2014	Millions/lbs 2015	Millions/lbs 2016
Vietnam	103.4	81.5	84.7
India	44.8	79.7	42.5
Argentina	81.2	59.6	75.9
Brazil	42.3	34.0	41.8
Mexico	16.4	11.2	10.3

Snap Shot Of Colony & Honey Production

YEAR	COLONIES (x000)	PRODUCTION (000 lbs)
1993	2875	230.6
1994	2783	218.2
1995	2655	211.1
1996	2581	199.5
1997	2631	196.5
1998	2637	220.5
1999	2652	203.1
2000	2622	220.3
2001	2550	186.1
2002	2574	171.7
2003	2599	181.7
2004	2554	183.5
2005	2409	174.6
2006	2394	154.9
2007	2443	148.3
2008	2342	163.7
2009	2498	146.4
2010	2692	176.4
2011	2491	148.4
2012	2624	147.1
2013	2640	149.5
2014	2740	178.3
2015	2660	156.5
2016	2775	161.4

The rest is from off shore. And just where off shore, you ask? Well, let's take a look.

Essentially 75% of our imported honey comes from only five countries, officially. You can see on the graph how much of the total each country contributes, with Vietnam leading the way with 23%. Argentina is next with 20%, the other three total 31%. All the rest of the world only contributes just over 22%. The big change from last year of course is India sending less than half this year compared to last.

And what's imported. Extra light amber and light amber account for 45% of what comes on shore. The rest is mostly white or undetermined color at about 30%. About 12% is reported to be organic, and almost all of that comes from the jungles of Brazil.

For comparison, the most recent data on global export dollar value countries is below. Dollars, not pounds

Below are the 15 countries that exported to all countries the highest *dollar value* worth of natural honey during 2015 (2016 data not included):

China: US$288.7 million (12.3% of total natural honey exports)
New Zealand: $199.3 million (8.5%) (think Manuka)
Argentina: $163.6 million (7%)
Mexico: $156 million (6.6%)
Germany: $139.4 million (5.9%)
India: $121.7 million (5.2%)
Vietnam: $111.4 million (4.7%)
Spain: $101.5 million (4.3%)
Ukraine: $95.9 million (4.1%)
Belgium: $83.4 million (3.5%)
Brazil: $81.7 million (3.5%)
Hungary: $79.3 million (3.4%)
Canada: $52.1 million (2.2%)
Thailand: $47.5 million (2%)
Romania: $46 million (2%)

Among the above countries, the fastest-growing natural honey exporters since 2011 were: Ukraine (up 244.6%), Thailand (up 167.7%), New Zealand (up 128.8%) and Mexico (up 72.6%).

Those countries that posted declines in their exported natural honey sales were led by: Argentina (down 26.8%), Romania (down 11.4%), Brazil (down 15.3%) and Germany (down 15.5%).

Prices

The header of the AMS National Honey Report for the month of January, 2017 states: Prices paid to beekeepers for extracted, unprocessed honey in major producing states by packer, handler and other large users, cents/pound, f.o.b. or delivered nearby, container exchanged or returned, prompt delivery and payment unless otherwise stated.

These prices range from a high of $2.50 for basswood in New York, to an average of about $1.60 for white to light amber. Import prices, however, are significantly lower, ranging from a low of $0.70 for light amber from Vietnam, $0.90 for extra light from Ukraine, to $0.97 for mixed flower from Canada, to as much as $2.50 for orange blossom from Brazil. Over a buck, however, is by far the exception, and only orange blossom commands that price. US beekeepers are, on average charging about $0.70/lb more for their honey than US packers can buy, apparently, imported honey for. This certainly is part of the reason the US is importing more honey than it is producing.

Conclusion

The data presented here adds to the observation that the US Honey industry is evolving into the US Pollination and Bee industry. Small operations, even though there are thousands of them, coupled with many more thousands of backyard beekeeping hobby beekeepers are producing very little honey in the scheme of things. And those beekeepers with thousands of colonies, though still making a mark in the amount of honey consumed here, are obviously focusing on producing bees – for their own use in pollination, and for other beekeepers, whether large or small for replacements, or for the smaller operations in the form of packages or nucs for starters, replacers or growth.

It is a slow evolution because keeping bees without making honey is, in many instances, difficult to do – bees make honey, that's what they do. So, some is produced that can't be recycled back into food for bees. But the labor cost of harvesting, extracting and dealing with this product, at less than $2.00 and often less than a buck a pound is becoming a financial drain. Bees, or pollination. That, it seems, is becoming the name of the game. BC

Honey Price by Color Class - U.S.: 2014 - 2016
[Producers with 5 or more colonies that also qualify as a farm]

Color class	Price								
	Co-op and private			Retail			All		
	2014	2015	2016	2014	2015	2016	2014	2015	2016
	cents per pound			cents per pound			cents per pound		
Water white, extra white, white	204.6	189.0	185.1	328.5	354.2	490.8	206.2	191.0	192.9
Extra light amber	209.6	204.0	187.7	392.2	411.8	377.5	218.3	215.4	195.1
Light amber, amber, dark amber	208.8	198.8	189.4	417.1	398.4	436.4	234.2	230.5	224.8
All other honey, area specialties	255.4	238.3	244.0	535.2	647.0	792.8	317.2	330.3	385.6
All honey	207.1	195.5	188.1	405.4	409.6	462.0	217.3	209.0	207.5

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A Closer LOOK

QUEEN REARING BEHAVIORS

Clarence **Collison**

Conflict and cooperation during queen replacement.

The production of new queens is a colony level process involving the coordinated activities of hundreds or thousands of adult workers through a series of sequential stages. Honey bee queens are reared under three situations: emergency queen replacement (when the queen is lost or dies suddenly), supersedure (when the queen is old or otherwise unacceptable) and as a colony prepares for swarming (colony division). In cases of emergency queen replacement or supersedure, workers first build special queen cells from a small fraction of available worker cells with young larvae. The precise factors determining which larvae are reared as queens are unknown, but workers preferentially build queen cells from worker cells that contain brood of particular ages (Fletcher 1978; Fell and Morse 1984; Hatch et al. 1999; Tofilski and Czekonska 2004). Most queens that are raised, at least under "emergency" circumstances, originate from the oldest eggs or from the youngest larvae present at the initiation of queen earing.

AL-Kahtani and Bienefeld (2012) observed four worker behavioral patterns in the initial phase of queen rearing. First was the inspection of queen cups by nurse bees. They entered the queen cups and inspected the larvae with their antennae and mouthparts. Secondly, when worker bees were standing on the queen cups, they exposed their Nasonov glands and released Nasonov pheromone. Thirdly, fanning occurred when worker bees grasped the queen cups with their legs and started beating their wings while slightly raising their abdomen without exposing the Nasonov gland. Lastly, initiation of queen cup construction occurred when worker bees on queen cups brushed their abdominal segments with their hind legs and started chewing wax with their mandibles.

Workers determine which queen-destined brood is actually allowed to survive to adulthood. Workers frequently tear down queen cells after they have been constructed (Allen 1956; Gary and Morse 1962; Winston and Taylor 1980; Melathopoulos et al. 1996), and queen cells that are started with older brood are destroyed more often than cells initiated with eggs (Hatch et al. 1999). Given that queen reproductive potential (i.e. body size, predicted mating success, fecundity and longevity; Tarpy et al. 2011; Rangel et al. 2013) is negatively correlated with the age at which an egg or larva is initiated as a queen (Woyke 1971; Fischer and Maul 1991; Dedej et al. 1998; Gilley et al. 2003), this bias in cell destruction might suggest that workers affect the outcome of the queen-rearing process by decreasing the variation in queen traits in general, and specifically queen reproductive potential (Winston 1987).

"Colonies regulate queen quality traits by curtailing low-quality queens from fully developing, which is further evidence that cooperation predominates over potential conflict within honey bee colonies."

Over the course of larval development, nurse-aged workers provide queen and worker cells with qualitatively and quantitatively different nutrition (colloquially known as "royal jelly" versus "worker jelly"; Haydak 1970; Brouwers et al. 1987), which induces divergent queen versus worker developmental trajectories. This social control of the larval nutritional environment is critically important, as demonstrated by the fact that queen-worker dimorphism disappears when social control is eliminated and larvae are reared in vitro (Linksvayer et al. 2011).

In honey bee colonies, reproduction is monopolized by the queen while her daughter workers are facultatively sterile. Caste determination is a consequence of environmental conditions during development, during which female larvae may become either queens or workers depending on their larval diet. This bipotency introduces significant variation in the reproductive potential of queen bees, with queens raised from young worker larvae exhibiting high reproductive potential and queens raised from older worker larvae exhibiting lower reproductive potential. Tarpy et al. (2011) verified that low-quality queens are indeed produced from older worker larvae, as measured morphometrically

(e.g., body size) and by stored sperm counts. They also showed, for the first time, that low-quality queens mate with significantly fewer males, which significantly influences the resultant intra-colony genetic diversity of the worker force of their future colonies.

The influence of relatedness on the pre- and post-emergent survival of honey bee queens was investigated (Tarpy and Fletcher 1998). Workers did not preferentially rear sisters over non-siblings under conditions of natural queen replacement. After queen emergence, however, there was a significant effect of a queen's relatedness to the workers on her survivorship during fights with rival queens. The mechanism of this bias towards related queens is unknown. The difference in post-emergent survivability suggests that kin selection may operate during competition among adult queens at this crucial stage of honey bee reproduction.

Tarpy et al. (2015) studied the degree to which colonies regulate adult queen traits by controlling access to developing queens that survived from pupation to adulthood. They also searched for evidence of strong conflict among patrilines (offspring from different male lines) by comparing the contribution of patrilines to new queens and new workers, although they found no evidence for the existence of

"Honey bee colonies replace their queens by constructing many queen cells and then eliminating supernumerary (in excess of normal number) queens until only one remains."

significantly queen-biased patrilines or for any association between patriline contribution to new queens and queen traits. However, adult queens emerging from cells accessible to workers were larger compared to adult queens emerging from cells that were not accessible to workers. These results suggest that colonies regulate queen quality traits by curtailing low-quality queens from fully developing, which is further evidence that cooperation predominates over potential conflict within honey bee colonies.

Honey bee colonies replace their queens by constructing many queen cells and then eliminating supernumerary (in excess of normal number) queens until only one remains. The ages of the queens and the variation in their reproductive potential are important factors in the outcome of such events. Selection would favor colonies that requeen as quickly as possible to minimize the brood hiatus, therefore selecting for queens reared from older larvae. Conversely, reproductive potential (queen 'quality') is maximized by rearing queens from younger larvae. This potential trade-off was tested during two phases of queen replacement, queen rearing and polygyny reduction. Their results suggest that queen age is a significant element during both queen rearing and polygyny reduction, whereas queen quality, at least to the magnitude tested in this experiment, has little impact on the outcome of either process (Tarpy et al. 2000).

Queens from three feral colonies were removed and placed in separate nucleus colonies. For each colony, eggs and larvae were taken from the nucleus and placed in the main hive on each of three to four consecutive weeks. Workers in the queenless parts selected young larvae to rear as queens. Queen pupae, together with the surrounding worker pupae, were removed from each colony and analyzed at two to three microsatellite loci to determine their paternity. In all three colonies, the paternity of larvae chosen by the bees to rear as queens was not a random sample of the paternities in the worker brood, with certain subfamilies being over-represented in queens. These results support an important prediction of kin selection theory: when colonies are queenless, unequal relatedness within colonies could lead to the evolution of reproductive competition, that is some subfamilies achieving greater reproductive success than others. The mechanism by which such dominance is achieved could be through a system of kin recognition and nepotism, but they concluded that genetically based differential attractiveness of larvae for rearing as queens is more likely (Tilley and Oldroyd 1997).

Vibration Signals

Temporary polygyny (the presence of multiple queens) occurs in honey bee colonies when virgin queens are reared for reproductive swarming or queen replacement. During these events, workers perform vibration signals on queen cells and emerged queens, and these signals may influence which virgin queen becomes the new laying queen of a colony. Schneider et al. (2001) examined the role of vibration signals during queen competition in two African and six European honey bee colonies. There was pronounced variability in vibration activity between colonies and among queens reared within the same colony. Despite this variation, all colonies showed similar trends in the relationships between the vibration signal and queen replacement. Vibration signals performed on queen cells were not associated with emergence success. Likewise, the signal was not associated with queen emergence order. Early emerging and late-emerging queens were vibrated at similar rates, and there was no clear relationship between emergence order and virgin queen survival. However, the signals performed on virgin queens after they emerged were associated with their behavior and success during the queen elimination period. Emerged virgin queens that were vibrated at higher rates survived

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2017 Bayer Bee Care Community Leadership Award

The 2017 Bayer Bee Care Community Leadership Award recognizes a partnership between a beekeeper and a grower, researcher, golf course superintendent or other stakeholder whose collaboration protects pollinators and benefits their community. The winning partners will be awarded a $5,000 prize to continue their valuable collaborative work with bees in the community.

New in 2017, a $1,000 prize will be presented to one young beekeeper (under 18) to support honey bee-focused initiatives in the student's school or community, such as researching ways to improve honey bee health, establishing an apiary on their school campus or amplifying existing beekeeping efforts. Any student under 18 who has approval from a legal guardian and sponsoring mentor, such as an apiarist, grower, community leader, school official, beekeeper, etc., may apply.

The award winners are selected from a pool of applicants by a panel of judges.

The timeline for the 2017 process is as follows:

May 19	Deadline for applications
June 16	Notification to award winner
Week of June 19	Awards ceremony

To review application requirements and expectations of the award winner, download an entry form, and meet former award recipients, please visit https://beehealth.bayer.us/beekeepers/community-leadership-award.

Enter online or return your application by mail or electronically to:

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bee care

"When colonies are queenless, unequal relatedness within colonies could lead to the evolution of reproductive competition, that is some subfamilies achieving greater reproductive success than others."

longer, performed more bouts of piping (a characteristic sound produced by queens), eliminated more rivals and were more likely to become the new queens of the colonies. The vibration signal may therefore allow workers a degree of control over the behavior of emerged virgin queens, and may influence the outcome of queen competition in honey bees. Differences in vibration activity within and among colonies may reflect differences in the extent to which workers and queens conflict over the timing and outcome of polygyny reduction.

The different vibration rates experienced by virgin queens within the same colony suggest that workers preferentially direct their signaling activity towards certain queens. Such discriminations could be based on cues that reflect relatedness (Tarpy and Fletcher 1998), reproductive capacities (Tarpy et al. 2000), or virgin queen size and fighting ability (Grooters 1987; Bernasconi et al. 2000).

Queen Replacement

The extended phenotype of a social insect colony enables selection to act at both the individual level (within-colony selection) and the colony level (between-colony selection). Whether a particular trait persists over time depends on the relative within- and between-colony selection pressures. Queen replacement in honey bee colonies exemplifies how selection may act at these different levels in opposing directions. Normally, a honey bee colony has only one queen, but a colony rears many new queens during the process of colony reproduction. The replacement of the mother queen has two distinct phases: queen rearing, where many queens develop and emerge from their cells, and queen elimination, where most queens die in a series of fatal duels. Which queens are reared to adulthood and which queens ultimately survive the elimination process depends on the strength and direction of selection at both the individual and colony levels. If within-colony selection is predominant, then conflict is expected to occur among nestmates over which queens are produced. If between-colony selection is predominant, then cooperation is expected among nestmates. Tarpy et al. (2004) reviewed the current evidence for conflict and cooperation during queen replacement in honey bees during both the queen rearing and queen elimination phases. In particular, they examined whether workers of different subfamilies exhibit conflict by acting nepotistically toward queens before and after they have emerged from their cells, and whether workers exhibit cooperation by collectively producing queens of high reproductive quality. They concluded that although workers may weakly compete through nepotism during queen rearing, workers largely cooperate to raise queens of similar reproductive potential so that any queen is suitable to inherit the nest. Thus it appears that potential conflict over queen replacement in honey bees has not translated into actual conflict, suggesting that between-colony selection predominates during these important events in a colony's life cycle.

Long et al. (2017) investigated the different levels of selection that may influence the queen replacement process in honey bees by monitoring queen-queen and worker-queen interactions in queenless observation colonies containing populations of paint-marked workers that were either related or not related to introduced virgin queens experimentally reared to be of low- and high-quality, as estimated by differences in size and potential reproductive capacities. The high-quality queens were more likely to survive and become the new laying queen of their colonies. Queen survival was positively associated with both queen fighting ability and worker-queen interactions. Surviving queens were more aggressive and had greater fighting success. However, surviving queens were not bigger than killed queens nor were they the first queens to emerge, suggesting that queen size and early emergence alone are not the determining factors of queen fighting ability. The worker-queen interaction that was most strongly associated with the outcome of queen replacement was the vibration signal, which is a communication signal that workers perform on virgin queens. Surviving queens were vibrated at rates three or four times those experienced by killed queens and a queen's vibration rate was positively correlated with her fighting ability and the number of rivals killed. Workers showed no consistent preferences for related vs. unrelated queens and the proportion of interactions received from related workers was not associated with any aspect of queen fighting ability and success monitored. Their results suggest that caste interactions during queen replacement have been shaped by both selection acting at the level of the individual queen (which favors higher quality queens with greater fighting ability) and selection acting at the level of the colony (which favors workers directing vibration signals towards queens with greater fighting potential), ultimately resulting in a higher quality queen becoming the new laying queen of

the colony. Selection acting at the level of the individual worker through kin selection, which would favor preferential treatment of related queens, did not consistently influence caste interactions or the outcome of the replacement process. Thus, the outcome of queen replacement in honey bees may be determined primarily by a combination of a queen's inherent fighting ability coupled with the rate at which she receives some interactions (particularly vibration signals) from workers. BC

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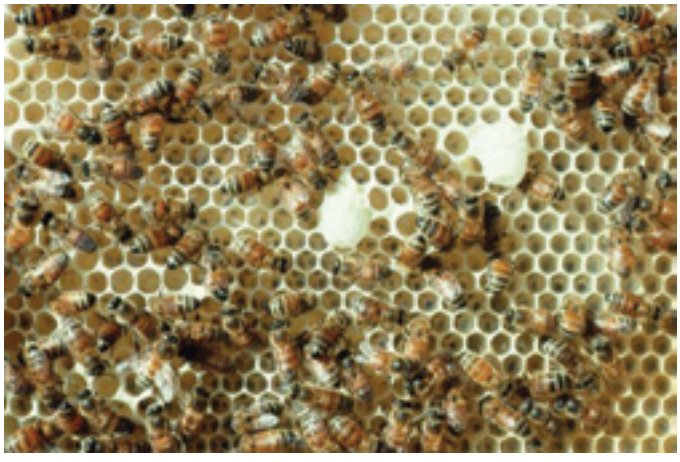

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FOUND IN TRANSLATION

Prime Time. Passing Along Immunity.

Jay **Evans**, USDA Beltsville Bee Lab

What if you could predict the disease environment of your offspring and then do something to increase their odds of surviving specific disease threats? This seems like a good deal, but the devil would be in the details. . . How accurately could future threats be predicted? How costly would it be if things changed? Finally, how on earth could a mom or dad predict the future, let alone send a warning to progeny they might never meet. Two recent studies suggest that queen bees can do just that, raising interesting research questions and suggesting novel ways that queen breeders might (might! these are early days) improve their product.

Honey bees and other insects receive little respect from medical and veterinary researchers studying immunity. It is accepted that insects possess an immune response but this response was for the most part seen as more of a hammer than a Swiss army knife, something capable of recognizing and reducing bacteria and fungi but not in an especially sophisticated way. Begrudgingly, most scientists now accept that insect immunity is complex and capable of targeting specific pathogen groups with a range of strategies. This acceptance resulted from many excellent studies showing how insect immunity both improves insect health and reduces the risk to humans of parasites that are vectored by insects. Still, the research 'establishment' drew the line on the ability of insects to prepare for a future threat. While it is clear that the insect immune system does not have the same adaptive immune mechanisms found in our own bodies, it has been shown multiple times that insects can use prior experience with pathogens and parasites to be better prepared for later attacks. More controversial is whether that preparation crosses generations from parents to their offspring.

Paul Schmid-Hempel and his scientific progeny in Switzerland have been generating insights into bumble bee immunity for decades. They are driven by natural curiosity and perhaps a desire to prove wrong those who underestimate the insect immune system. Alongside lasting work showing how bumble bees and their parasites punch and counter-punch each other, they were the first to show that a queen's disease exposure early in life could impact how her worker bees survived their own disease threats. More recently, they have focused on the 'how' aspects of this discovery. Seth Barribeau, Schmid-Hempel, and Ben Sadd describe the immune outcomes of trans-generational immune priming in a recently published paper in the open-access journal PLoS One (**http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0159635**).

Prior to egg laying, one set of bumble bee queens was injected with a salt solution containing two million cells of a common soil bacterium, one set was injected with the salt solution alone, and one set was not injected at all. Adult worker bee progeny of these queens were further divided into those that were themselves injected with bacteria and those that received only a shot of salt. A key result from this study is that worker bees produced by queens exposed to bacteria showed high levels of known immune genes (the precursors of antimicrobial peptides). In fact, those bees showed a typical response to bacterial challenge, even when they themselves were not exposed to bacteria. This study also explored changes in these worker offspring more broadly, identifying many more similarities between the progeny of challenged queens and bees that had themselves been exposed to bacteria.

Bee Culture readers will likely be more interested to know whether trans-generational priming works for honey bee queens and their offspring. One recent paper provides evidence that this might be the case. Javier Hernandez-Lopez and colleagues in Austria challenged queens with heat-killed cells of *Paenibacillus larvae*, the cause of American foulbrood disease. For a study described in the Proceedings of the Royal Society (public access at **http://rspb.royalsocietypublishing.org/content/281/1785/20140454**), they injected queens with two million heat-killed *P. larvae* cells. They then raised larvae from these queens in the lab, feeding them an infective dose of *P. larvae.* Offspring produced by exposed queens survived substantially better in the face of *P. larvae* than did offspring from control queens. Further, larvae from the challenged queens showed higher numbers of a class of blood cells linked to immunity. While it appears certain that mom is sending disease cues to her worker offspring, exactly how these cues are sent remains unclear.

So, can trans-generational immune priming be co-opted to improve honey bee health? It seems likely, although much work is needed in order to optimize this and make it an important tool. Should anyone try this approach they will have to be extremely patient, and I would **not** recommend using *P. larvae* unless you are absolutely sure you have killed all cells. Should these insights lead to improved bee immunity, this will be yet another applied breakthrough primed by work of a prior generation focused on uncovering fundamental facts of life. BC

Searching For Pollen In Honey

It's Not As Easy As You Think!

Vaughn **Bryant**
Texas A&M

"*Houston, we have a problem*!" Those were words that echoed around the world on April 13, 1970, when Jack Swigert, pilot of Apollo 13 reported an explosion on his spacecraft that caused the loss of almost all of their reserve power and oxygen. Fortunately, the story had a happy ending because the astronauts were able to solve their problems as the World listened breathlessly to every hourly report of progress.

"Honey, we have a problem!" That statement may not be as earth-shaking but for us in the United States we do have some serious problems with the purchase and sale of honey. I know this because I have been analyzing honey samples for more than 40 years and I have been working on this problem for almost as long. The major problem is the identification and labeling of honey sold in North America. The federal laws that govern labeling honey are minimal and pertain only to the definition of "raw and natural" honey as being a product to which you cannot add anything else such as additional water or other ingredients including high fructose corn or rice syrup. The laws do allow a person to "remove" unwanted materials such as insect parts and other debris, including all of the pollen in honey. It is this last point that has created the biggest problem in terms of identifying the geographical origin and floral sources of a honey sample.

The January 16, 2017, issue of *TIME MAGAZINE* featured a story on health called "The growing fight against food fraud," which focused on the misidentification of foods on US grocery shelves. Their testing showed that for some products what is stated on the label is not what is actually in the box or jar! One of the food items they discussed was honey. They noted their testing found Italian olive oil that was neither from Italy nor from olives, cumin spices consisting of ground-peanut powder, and "natural" honey that was laced with antibiotics. But this is just the tip of the iceberg! So why doesn't the Food and Drug Administration (FDA) enforce truth in labeling? For the most part they argue that they are overworked and underfunded and that their primary concerns are investigating serious, life-threating outbreaks of bacteria and viruses that endanger people's lives. Therefore, checking the accuracy of food labels is not one of their high priorities. After all, an incorrectly labeled honey sample probably isn't going to kill you!

Incorrect labeling on a jar of honey might not kill you but should you pay a premium price for sourwood or buckwheat honey, tupelo or orange blossom honey, or even Manuka honey when what is in the jar is cheap junk and not the premium honey you think you are buying? I know about this problem because we have done a number of investigations to discover if labels on jars of honey match the contents.

In 2011, Andrew Schneider (AKA, the Food Watchdog) and I teamed up to see just how accurate honey labeling might be in grocery stores throughout the U.S. We purchased more than 60 jars of honey on store shelves in 10 different states and Washington, DC. We then conducted pollen testing of each sample to determine the geographical origin and floral contents. We wanted to see if the actual contents matched what was written on the labels. What we discovered is that 76% of all the honey samples purchased in grocery stores had all the pollen removed from the honey. All of the varieties of honey sold at Walgreens, Rite-Aid, and CVS pharmacies contained no pollen. All of the small packets labeled as "honey" that were sold or used by Smucker, McDonald's, and Kentucky Fried Chicken contained no pollen. Seventy-one percent of the honey samples we purchased that claimed they were organic and from Brazil, actually did match the labels; at least we could prove they were from Brazil but we could not prove they were organic. In other tests we purchased "local honey" from roadside stands and in local grocery stores and found that the majority of those samples were not "local" but actually came from distant locations, often from some place in the Great Plains of the Central United States. We also purchased honey at health food stores and from whole food stores that champion their organic and wholesome foods only to find that they also were selling mislabeled honey, which often surprised them.

In one food store in Texas I purchased honey from a large five-gallon container labeled, "pure Texas Huisache honey." That is a premium honey that comes from a native Texas bush called *Acacia farnesiana*. When I analyzed the sample I discovered that it was not Huisache honey; instead, it was a blend of honey from several different locations, one of which was Texas but there was no trace of

Huisache in the sample. When the store manager was confronted with that information he replied that he didn't realize the label was wrong because the person who sold him the honey said it was Huisache. When I suggested he might want to change the label he said he didn't think so because, "after all, that is what his customers wanted: Huisache honey!" He added that probably most of those buying the honey didn't care what it was anyway.

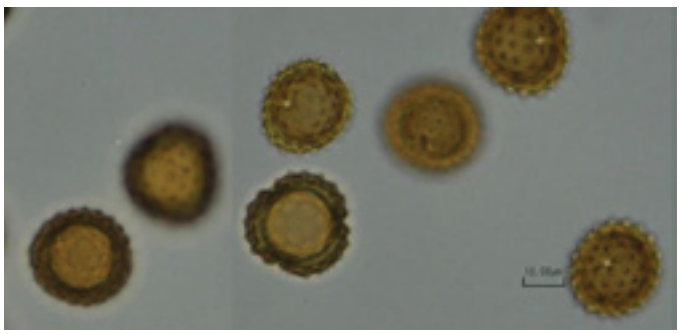
So, do consumers really care what they buy? Do they mind paying top dollar for mislabeled products that enable the sellers to reap huge profits by selling cheap alternatives instead? Unfortunately, many people who enjoy honey don't seem to care what they buy so long as it is cheap. They will buy the cheapest honey product regardless of what it says on the label. However, there are others who are concerned. Those customers expect to get what they pay for. If they buy sourwood or some other premium honey and pay a premium price, they expect the honey to match the label.

Unfortunately, we can't turn to the Federal Government for any type of help with this problem. According to federal laws, requested by the USDA and then passed by Congress, the United States has the following rules and definitions for honey produced locally or imported, and sold in the United States. This law is part of the FDA's ***United States Standards for Grades of Extracted Honey*** that went into effect on May 23, 1985. One part of that law states: "Filtered honey is honey of any type defined in these standards that has been filtered to the extent that all or most of the fine particles, pollen grains, air bubbles, or other materials normally found in suspension, have been removed." Therefore, it appears that the FDA does not have any problem with allowing honey to be highly filtered to remove all particles, including pollen grains.

Although legal, removing all of the pollen does have consequences. For example, there is no way to prevent commercial honey companies from buying, producing, or selling highly filtered honey where all the pollen has been removed. Unfortunately, by removing all the pollen some of the food value of the honey and the taste is altered from the original, pure, raw honey that is taken from the hive. In addition, this law ***makes it possible*** for any type of illegal honey to become part of "legal" honey sold commercially in the United States. For example studies show that in 2014, an estimated 91,000,000+ pounds of illegal honey was imported and then sold in the United States with the vast majority of it going undetected because it contained no pollen that could be used to confirm it was illegal.

Once all pollen traces are removed from honey produced in other countries, some of which carry high tariffs when imported into the U.S., and honey that has been illegally transshipped to other countries and then exported to the United States cannot be identified through traditional studies. Those illegal honey samples can sometimes be identified as to their actual floral and geographical sources though the examination of DNA, isotopes, or the protein contents found in honey. However, those procedures cannot be tested on honey produced in many regions of the world because we lack the needed reference databases to use for standard comparisons. In addition those techniques are time-consuming, require special equipment and trained personnel, and they are expensive to conduct.

If the federal government isn't going to police truth in labeling for honey sold in the U.S., then what can any other state legislature or



agency do; unfortunately, not much. California, Wisconsin, and Florida all passed state laws that prohibit the removal of pollen from honey and also imposed truth in labeling laws for honey. However, none of those states could enforce their laws because the Federal Nutrition Labeling and Education Act (NLEA) states that no State or any political subdivision of a State may directly or indirectly establish under any authority any requirement for the labeling of food that is not identical to the requirement of such section by the NLEA. In other words, since the NLEA enforces the guidelines for foods that are established by the FDA, and since the FDA does not require truth in labeling for honey, then no State or agency in the US can require that honey be labeled accurately. California legislators, who were upset by the rulings against their truth in labeling laws for honey sold in California, tried another tactic. The legislature then passed a law saying that any honey, which has had all of its pollen removed, must state that on the label of the jar. Unfortunately, California lost that case as well because companies, such as Sioux Honey pointed out successfully that there were no federal laws that would require such action.

After these court defeats the North Carolina Beekeepers decided to try a new approach, which could not be enforced by legal authorities, but could be used to convince consumers what honey products could be trusted to be authentic. North Carolina

honey producers pride themselves on producing excellent sourwood honey, which will command a premium market price. Because of this, the NC beekeepers began to find that a number of suspicious honey samples were appearing throughout the state and were being sold as sourwood, when in fact many doubted they were authentic. The solution was to agree among themselves that they would only sell authentic sourwood honey and also agreed that their sourwood samples would be tested to prove they were indeed sourwood. Authentic sourwood honey that had been tested could state that on the label with the hope that consumers would learn to look for the seal before purchasing sourwood honey. Beekeepers also purchased suspicious samples that were being sold and had them tested. If proven not to be sourwood then those selling the non-sourwood honey were asked to remove it for sale. How successful this program will become and whether other beekeeping organizations might try similar techniques remains to be seen. This type of testing can also be used to identify true "local honey" from non-authentic honey claiming to be locally produced.

There are others who are also trying to change the way honey is being labeled inaccurately. Lawyers in a Northeastern law firm have been engaged by conscientious groups who are trying a new approach to ensure truth in labeling for honey products. The law firm has selected several dozen commercial honey samples, that are produced by well-known companies, that claim their labels accurately reflect the contents in their jars of honey. This law firm then has the honey samples tested to determine the country of origin and the nectar contents in order to check the statements on the product's labels. When the contents of the honey products do not match what is written on the label then those companies are sent a copy of the test results and asked to amend what is written on the labels of their honey products. Whether or not this will change the way some companies label their honey products remains to be seen, but the effort is certainly admirable.

We have identified the problem and recognize that there are no current legal methods to ensure truth in labeling for honey products sold in the United States. There is no penalty for those unscrupulous individuals or companies who seek to earn high profits by selling products labeled as premium types of honey when in fact the contents are common canola or clover honey. Federal laws prohibit the adding of anything to honey that is labeled as being honey, but those same federal laws permit the removal of all sorts of particles including all of the pollen.

We need to petition our senators and legislators asking them to pass new laws regarding truth in labeling for many food products, including honey. Unfortunately, to date those types of attempts by individuals and even attempts by the American Beekeeping Federation have fallen on deaf ears. I have often said that the unfortunate reality is that the FDA will probably do nothing about truth in labeling until some type of tainted honey causes the death of individual consumers. BC

Vaughn Bryant is Professor and Director of the Palynology Lab at Texas A&M, College Station, Texas. He is a frequent contributor to these pages.

Detecting Hone

Using Infrared Spectroscopy. It's as easy as A, Bee, C.

Food adulteration: A global problem

While many people are aware of the threat of accidental contamination in the food supply chain it is only in recent years that the intentional adulteration of foods for economic gain has come to light. This was highlighted by the 2007/08 melamine crisis in China where the increasing number of renal failures in dogs and cats alerted the authorities to a problem in the pet food supply chain. We now know this was due to a mixture of melamine and cyanuric acid, which was found inside the pet food.[1]

The story is however not new, with fraud and adulteration reported as far back as ancient Roman times with wine reportedly adulterated with water. In recent years, the problem has been exacerbated by globalization of supply chains increasing complexity and decreasing visibility to the multiple members in the chain.

Honey Fraud

So how does food fraud impact Honey? The most common types of honey fraud are:

1) Addition of corn or rice syrup
2) Falsification of single pollen honeys for lower quality products

Like other food fraud types, these are also not a new case. In 1889 Dr. Harvey W. Wiley, the first chief chemist of the U.S. Department of Agriculture, said honey was the most adulterated product in the country. In testimony before the U.S. Congress on behalf of what became the Pure Food and Drug Act, Wiley brought along a bottle of adulterated honey, complete with a dead bee on top of the viscous liquid. The bee, he explained, was meant to dupe buyers into thinking the honey was 100% pure. Instead, Wiley testified, the sugary liquid masked a number of harmful ingredients to consumers[2]. While the situation has improved over the past century there are still problems. With a 2011 headline stating, "more than three-fourths of the honey sold in U.S. grocery stores isn't exactly what the bees produce." [3] As such in recent years a lot of focus has been placed on identifying if high fructose corn syrup is being added to honey and if high value honeys, such as Manuka, are pure and truly authentic.

Detecting Rice and Corn syrup adulteration into honey

To detect these types of fraud, chromatography and mass spectrometry are effective at detecting adulterants. However, Infrared and Near Infrared technologies are easier to operate, easier-to-use, quicker and are less expensive, making them an ideal solution for honey producers. To allow these technologies to be utilized, chemometrics, that is extracting information from chemical systems by data-driven means, must be employed facilitating the simplification of complex spectral fingerprints to either be grouped into certain honey types or have calibration models generated to identify levels of adulterants. To show near infrared spectroscopy's ability to detect syrup adulteration into various honey types, NIR Spectra of the following pure samples were measured[4]:

- Clover honey
- Wildflower honey
- Orange blossom honey
- Organic honey
- Corn syrup
- Rice syrup

Ten replicate spectra were measured for each of these pure materials. In addition, dilutions of the pure material using corn syrup were prepared yielding the following concentrations:

- Clover Honey
  - ♦ 0%, 2%, 4%, 6%, 8%, 10%, 12%, 14%, 16%, 18%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 92%, 94%, 96%, 98%, 100%
- Wildflower Honey
  - ♦ 0%, 20%, 40%, 60%, 80%, 100%
- Organic Honey
  - ♦ 0%, 20%, 40%, 60%, 80%, 100%

Figure 1 contains the scans of three different samples with varying concentrations of honey (0% honey is Cory Syrup). There are clear spectral differences between the samples at these high concentrations. With obvious absorption changes at around 4450, 4900cm-1 and in the region from 5500 to 7000cm-1.

Using these differences a partial least squares (PLS) quantitative model was generated from all the honey/corn syrup standard mixtures and is shown in figure 2.

Analysis of Figure 2 shows that the honey type has very little effect on the ability of NIR to be used as a technique to detect corn syrup adulteration. As such, the similar levels of adulteration between different honey types are shown to cluster together and the overall best fit line indicates good agreement between estimated and specified levels of corn syrup. Furthermore, a validation sample was used of 41.25% corn syrup and was identified as 41.89% showing within a 1% agreement.

This model indicated that it could detect a minimum level of about 4% corn syrup in honey with a high degree of certainty. If the adulterant spectra were more different to honey spectra however, it would be certainly able to detect lower levels.

ey Adulteration

Robert **Packer**

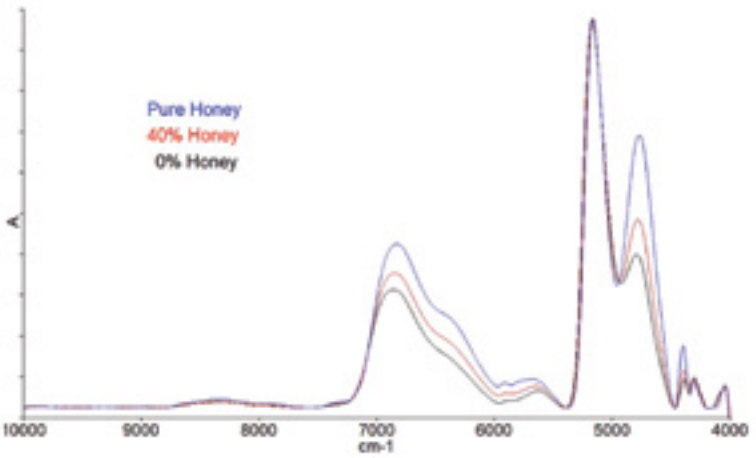


Figure 1: *NIR Spectra of Pure Honey, Corn Syrup and Corn Syrup Adulterrated Honey.*

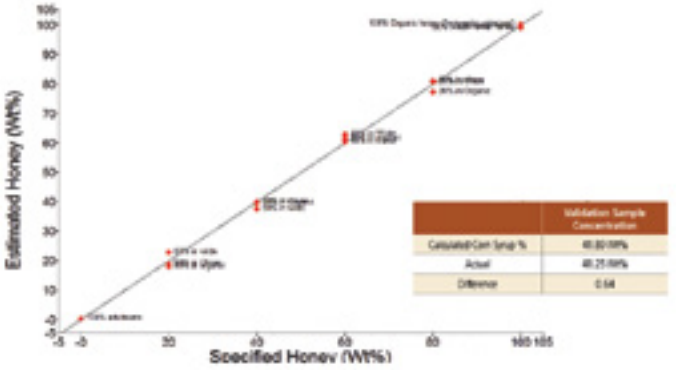


Figure 2. *PLS model of multiple honey types adulterated with corn syrup. The table inset shows the results of a validation sample.*

Single pollen honey detection

As well as detecting corn syrup adulteration, it is feasible to predict that MIR and/or NIR could be used to confirm the authenticity of high value, single pollen honey such as Manuka honey. In this case using principle component analysis or PCA, the techniques could be utilized to predict the origin and species of the honey quickly and without sample prep. This has been utilized for many different food groups but not as yet used for a wide study of honey.

Conclusion

Food fraud is widespread and honey is not immune. It is possible to use NIR spectroscopy to detect adulteration of honey with corn syrup and can potentially be used to identify honey origin however more work is required in this area.

PerkinElmer, Inc., a global leader committed to innovating for a healthier world, has innovative detection, imaging, informatics, and service capabilities to help customers and consumers transform data into informed decisions that accelerate insights to better protect our environment, our food supply and the health of our families. The ability to rapidly detect known and unknown contaminants in our food, water, and air or to monitor their quality consistently is an important part of ensuring the health of our environment. In addition, chemicals, advanced materials, and nanomaterials are playing an increasingly important role in our environment. PerkinElmer's systems and services help scientists understand all these complexities and ensure compliance.

Dr. Robert Packer is the Portfolio Director, IR at PerkinElmer and has worked for the company for over 8 years. Following an undergraduate degree in Chemistry he then went to Imperial College in London to pursue a PhD in Materials Science specializing in analytical techniques. On completion of his PhD he joined PerkinElmer as an application scientist in their thermal analysis division before moving into product management for both Thermal Analysis and then Infrared Spectroscopy. He then became the segment strategy leader for the food and pharma testing markets across all PerkinElmer product lines. In this role he moved from the UK to Connecticut.

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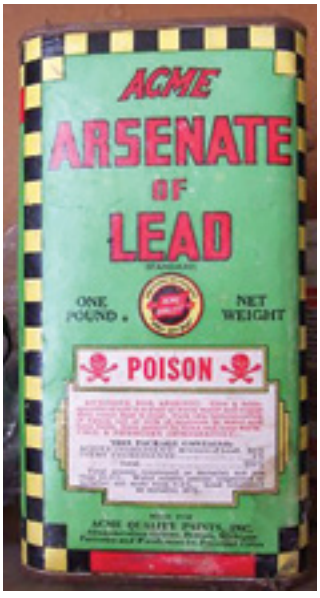
The Politics Of Killing Bees – PESTICIDES

Katherine **Kiefer**

Interest in honey bees and beekeeping in the U.S. has never been greater. Despite increased interest in the plight of honey bees and wild pollinators, political decisions addressing and mitigating the actual causes of pollinator decline have been limited. In Part 1 of The Politics of Killing Bees articles (Feb. 2016 *Bee Culture*), the role of abundant clean forage was opened for consideration and political action. Abundant, or merely enough, beneficial and clean forage usually means accepting the critical role of non-native plant species. Part 2 of The Politics of Killing Bees will explore the collision course between the suppression of pest insects and harm to beneficial insects with chemical remedies. There is currently a headlong retreat from Integrated Pest Management (IPM) with pervasive use of seed coatings of systemic pesticides. There will be a discussion of the Environmental Protection Agency's (EPA's) somewhat limited charge of registering and labeling the chemicals.



Europeans brought honey bees to North America in the early 1600s. These colonists brought seeds to grow forage for bees as well as agricultural seeds and plants for their own nutrition and other benefits. As late nineteenth and twentieth century agriculture moved toward the cultivation of monoculture crops, pollination by bees for pay became a necessity. Beneficial insects and pest insects are harmed in the same way by the same chemicals. All insects are attracted to flowers and fruit by the sugar and protein content of the nectar and pollen of the ripening cherry, apple, pear, etc. People grow these foods because we like nutrients too. Ironically the chemicals used to prevent pest harm in the growing cycle to the nut or fruit also kill the pollinator required to produce the product.

In the 1890s apple growers needed to discourage, if not kill off, the coddling moth – an insect whose larvae burrow into fruit, eat for three or four weeks, then emerge to pupate and return to the moth form, which then lays eggs on the apple or other fruit tree to continue the cycle, year after year. Lead arsenate was the chemical of choice to kill these insects until resistance to it developed. Lead arsenate causes multi-system organ failure by interfering with basic cellular processes. Some tracts of land that have been used as orchards for decades currently have so much lead arsenate present in the soils that the land is unfit for human dwellings and habitation.

In the late 1930s, after resistance to lead arsenate was noted, and when DDT's insecticidal characteristics were uncovered, growers began using DDT, an organo-chloride that had been first synthesized in 1874. DDT interferes with nerve function, causing tremors, convulsions and the cessation of basic cellular process in insects and mammals. It is absorbed very easily through the exoskeletons of insects. The devastating wake of DDT use was observed in avian populations, in fish near the sites of application or in run-off, in amphibians (primarily frogs) as well as in all insects. This was an inspiration for the book *Silent Spring* by Rachael Carson in the early 60s. This book changed lives, viewpoints, and was the wakeup call that created many environmental activists. The banning of DDT in 1972 was an early test case for the newly created Federal Environmental Protection Agency. DDT is still manufactured in the U.S.A., and exported to Africa and South America. It may be allowed again in the U.S. to combat the mosquitoes carrying the Zika virus.

The next major insecticide to be developed was Carbryl, a.k.a. Sevin, in 1958. Carbryl is still one of the most popular insecticides in the world. It interferes with neurotransmitters mostly in the brain and brain stem of the insect, causing death by attacking nerve function. Carbryl is not as harmful to mammals as the earlier insecticides so has not yet been banned in the U.S. and is used commercially in forestry, ranching, agriculture and by home gardeners.

Concurrently the thions (organophosphates) were developed, registered and marketed as insecticides. During WW2, the Germans developed parathion. At the end of that war, that patent was stolen from the war devastated Germans and its manufacture began in the U.S. This chemical is absorbed through the skin, mucous membranes and orally. It causes headaches, convulsions and generally disrupts the nervous system causing unconsciousness, usually with lung-edema ending its host's life in respiratory arrest.

In Europe it is still a drug of choice for suicide and of course is very toxic to insects, fish and wildlife. It is banned or restricted in 23 countries with import bans in an additional 50 countries.

Malathion has low human toxicity, though it does induce DNA and chromosomal damage in humans (see the article: *Carcogenicity of tetrachlorvinphos, parathion, malathion, diazinon, and glycosphate*: on behalf of the International Agency for Research on Cancer Monograph Working Group, Lyon France, Published 20 March 2015). This chemical is deadly to bees, mosquitoes, fruit flies

So easy to buy.

and any other insect. It is used against mosquito born diseases, head lice in humans and was added to corn syrup in the 1980's to bait and kill Mediterranean fruit flies in California. Obviously it killed any insect that was attracted to corn syrup because the poison works on all insects. It attacks nerve synapse so nerve signals never stop firing. The insect cannot move or breathe and so convulses to death.

Although current EPA regulations do not require testing on amphibians, a 2008 study done by the University of Pittsburgh found that cocktails of contaminants frequently found in nature as residues from preceding applications, were lethal to leopard frog tadpoles. These same scientists found that a *combination* of five widely used insecticides (carbaryl, chlorpyrifos, diazinon, endosulfan, and malathion) in concentrations far below the limits set by the EPA killed 99% of leopard frog tadpoles. Residues and traces of pesticides found in the environment are very, very dangerous. (from Science Daily Nov.18, 2008.)

Currently the most commonly used insecticides are the neonicotinoids (neonics). The neonicotinoid family includes acetamiprid, clothianidin, imidacloprid, nitenpyram, nithiazine, thiacloprid and thiamethoxam (trade name Actara). They are called neonics because of their molecular resemblance to nicotine, a natural insecticide synthesized by the tobacco plant to protect itself. Neonics are key ingredients of seed coatings and can also be applied by foliar sprays and by drenching.

The difference between neonic pesticides and most other previously used chemicals is that neonics are systemic, meaning they are absorbed by the plant. The half-life of neonics in soils exceeds one thousand days so repeated applications can lead to off label build-ups and toxicity. There is usually runoff into water systems, which are used for irrigation, drinking and other uses natural to humans.

Neonics affect the nerve functions of insects with particular efficacy against sucking insects and exhibit long residual activity in the host plant and in the soil. Insect targets and beneficials are also exposed through direct contact with dust during the drilling for planting, and consumption of contaminated pollen and nectar from crops and in wildflowers and trees growing near treated crops. Neonics are used as prophylactic applications. They are present whether or not pest insects are present, and are therefore always present when beneficial insects are present. The worst is yet to come.

Neonics are pervasive in our environment because of their use as seed coatings. Recognizing and understanding this basic fact is key in the politics of killing bees. Crop pollination for pay on crops, like almonds, apples, blueberries, cranberries, squashes and melons, has always posed risk of pesticide and fungicide exposure to the pollinators. Beekeepers have always assumed that some harm would come to their insects (honey bees, bumblebees, Mason or horn-faced bees) during any pollination work.

Over the past 12 or 13 years, from 2005 to present, seed coatings on corn have increased to 80% - 100%, and in soybeans coated seeds are up to 45% of all that is planted. These crops blanket over 190 million acres. Neonic coated seeds were recently discovered on the seed in bags distributed by the Pheasants Forever – a conservation group which is trying to help the honey bee industry, wild bees and butterflies by providing safe, pesticide-free, wildflower forage on their lands and to those people buying their seeds. To summarize, it is hard and getting harder for beneficial insects to escape the reach of neonic remedies. And it is hard and getting harder to buy seed that is not treated with neonics.

In the world of agriculture, honey bees need their interests and lives defended. Currently the beekeeper has the burden to prove harm to his colonies. The chemical companies do *not* currently have a burden to prove "no harm" to bees, all the while conclusively proving harm and death to target pest insects. That concept is the fulcrum of this article about the Politics of Killing Bees.

Ours is a capitalist system. Making money matters. The former norm of seed collection for planting in the next growing season is limited to home gardeners, small vegetable growers and third world countries. Coated seeds "ready for planting" are the new norm in the U.S. Agricultural chemicals are manufactured commodities. The chemicals are marketed by sales people, who are usually paid a commission, or at minimum, are paid based on their sales volume. Ours is a litigious society, and disputes are settled after proof of harm, with an attempt to attach a monetary value so that the entity suffering the harm or loss can be restored to "wholeness."

Note: IPM is a four-pronged process to control or prevent pests in agricultural practice. The prongs are: (a) biological control, (b) habitat manipulation, (c) changes in management practice, and (d) use of resistant plant varieties. "At the core of IPM is the desire to reduce pesticide use and human incursion into the ecosystem unless monitoring of pest populations indicates intervention is necessary." (see University of California website)

Idyllic and dangerous for insects.

In 1970 there were approximately 5,000,000 (five million) colonies of bees in the U.S. In 2016 the USDA recorded a bit more than 2.6 million colonies of bees. At the moment, there is incredible interest in bees and beekeeping likely being stimulated by all the press and chatter about CCD. This current pattern of decrease in numbers of colonies is unacceptable. Political action is required now.

The EPA (Environmental Protection Agency) was created in 1970 by executive order of the Nixon administration. The agency conducts environmental assessment, research, and education. It has the responsibility of maintaining and enforcing national standards under a variety of environmental laws, in consultation with state, tribal, and local governments. It delegates some permitting, monitoring and enforcement responsibility to **the States** and the **Federally Recognized Tribes**. EPA enforcement powers include fines, **sanctions**, and other measures. The agency also works with industries and all levels of government in a wide variety of voluntary pollution prevention programs and energy conservation efforts. Early examples of actions involving EPA action include banning DDT and resolution of the pollution surrounding the Love Canal in Niagara Falls, New York in the late 70s.

Death for pollinators on the job.

The focus of the EPA is to protect *human* health and the environment. Over the nearly 50 years of its existence the agency has grown to employ over 15,000 people with an annual budget in excess of 8.5 billion dollars (2016). Among the wide variety of regulatory powers encompassed by EPA is responsibility for review and registration of pesticides and fungicides. This includes insecticides and fungicides registered since the early seventies. The problem with many of the older materials was their possible carcinogenic effects as well as relatively slow rate of decay in the environment. The EPA approved these materials (i.e. the thions, organophosphates etc.) with certain restrictions despite drawbacks probably because of political pressures by the registrant, by farmers and by the bureaucratic system. There may not have been safer alternatives, so the risk analysis was conducted inter agency. The problem is that despite label restrictions regarding application during blooming periods of crops, many of these materials, such as Sevin (carbaryl), on corn result in severe and lethal exposure to the beneficial insects. In spite of their lethal effects, these materials were applied externally to the plant tissues by aerial, tank or irrigation sprinkler systems, and honey bees were exposed to the chemicals mostly during crop pollination for pay. This changed in the early 1990s.

Neonicotinoid insecticides represent a class of insecticides so named because of their chemical resemblance to nicotine, a natural insecticide produced by the tobacco plant. Though the chemical bears a structural resemblance to natural nicotine, the manufactured products are up to 10,000 times more toxic than nicotine. As with previous submissions to the EPA, neonic efficacy studies are put together by the registrant and kept confidential for commercial reasons. The relatively low toxicity of these materials to mammals and humans facilitated their registration. Remember, the EPA works first to discover and mitigate environmental harms to humans.

The use of these chemicals proceeded slowly from their dates of registration till 2005-06. Then their use as seed coatings skyrocketed to approximately 90% of all seeds planted in the U.S. today. Use of these insecticides as seed coatings runs contrary to all principals of integrated pest management as developed in the 1980s. Prophylactic applications like this harm all insects, and cause harmful, unanticipated buildup of toxins in the soils used for agriculture. Period.

If coated seeds are a common denominator for 90% of the seeds planted in this country, it follows that corn pollen is a common denominator exposing pollinators to neonic contaminated pollen. There are millions of acres of corn planted throughout the primary habitat of honey bees and wild pollinators. There are some in agriculture and in the scientific community who will argue that the amount of corn pollen collected by honey bees is insignificant. Others may say that bees don't use corn pollen because of its poor nutritional value. A large commercial beekeeper has supplied the following facts: he trapped pollen during the Summers of 2015 and 2016 from his bees. When corn was blooming, 40% of the pollen collected in the traps was from corn (USDA verified). From years of experience and observation, he suggests that multiple feedings of low level neonics embedded in pollen may be the cause of queen failure, and queen failure is

a major topic in any discussion of the causes of colony collapse disorder.

As to the insignificance of the "low levels "of neonics present in corn pollen, it is important to note that this same beekeeper operates in some areas where corn is not produced. He has kept bees for 50 years, and he currently has 30,000 colonies, allowing him to make these observations with confidence as he sees trends in the large numbers of his outfit.

The possible effects of neonic insecticides have received worldwide recognition. While the actual causes of CCD, discovered in 2007, continues to be a subject of debate, the recognition of the potential damage to honey bee and wild bee populations due to exposure to neonic insecticides is obvious. Numerous scientific articles and studies have been written since 2007 and as a result the EPA has agreed to review certain aspects of registration of these chemicals, which may lead to new labeling requirements. But will the EPA curb the prophylactic use of these materials as universal seed treatments? The coated seeds are planted in so many acres whether the chemicals are necessary or not, and in total disregard for the principals of integrated pest management. Can beekeepers and friends of pollinators push back effectively, or will the political power of the chemical industries prevail?

My point? Don't give up. More importantly, make sure that there is adequate press, agricultural co-operative and social media exposure of these issues. Rally environmentalists, beekeepers, and anyone concerned about safe forage for pollinators and safe food for humans to expose the risks and potential harms from chemical interventions in agriculture. (Interesting footnote: A recent study has implicated acetamiprid (a neonic) as a cause of erectile dysfunction in human males. **"Potential pathways of pesticide action on erectile function – A contributory factor in male infertility"**. Asian Pacific Journal of Reproduction. 4: 322–330.) Why include this last thought? It got your attention. You'll remember it. So, I ask you to do what it takes. Change how people think. Ask the EPA to move the burden of proof to the chemical companies to prove safety for beneficial insects, and stop asking the beekeeper to prove harm. BC

Katherine Kiefer, **beesweet1@gmail.com**

Source list for Politics of Killing Bees #2 by Katherine Kiefer

EPA.gov has many sections, including How We Assess Risks to Pollinators, History of EPA, Registration of various chemicals, Pollinator Protection, management practices, Pesticides, Pesticide Registration, Colony Collapse Disorder. I would encourage the reader to watch the dates of the publications, and to remember that the EPA has no enforcement powers – the EPA is a Federal bureaucracy.

FIFRA (Federal Insecticide, Fungicide and Rodenticide Act) first passed 1947 with major revisions in 1972)

Journal of Applied Ecology – published by the British Ecology Society- "Neonicotinoid insecticide travels through soil food chain, disrupting control of non-target pests and decreasing soya bean yield."

Proceedings of the Royal Society, "A Restatement of recent advances in the natural science evidence base concerning neonicotinoid insecticides and insect pollinators."

Look up and at various sales pitches for corn seed, soybean seed, etc. They link to various other papers and studies.

I made a list of chemicals that beekeepers have encountered and suffered losses from during pollination contracts – pesticides, herbicides, fungicides – and then went to the websites of the chemical companies and the EPA to see how the companies described the effects of their chemicals, and how the EPA listened to the chemical companies and used their information.

"Aspects of the Beekeeper Indemnity Payment Program" from Agricultural Stabilization and Conservation Service of the Department of Agriculture – 1973 – plus USDA reports about honey bee losses reported

Clemson University, Department of Pesticide Regulation article "How to Protect Honeybees from Pesticides" Bulletin 5 [is not dated but seems to be from 2014-2015] – has a great list of chemicals and degrees of toxicity

Then, look at mosquito control for municipalities – IGRs (Insect Growth Regulators), and at University of New Hampshire Cooperative Extension article "how Insecticides Work," and The Journal of the American Mosquito Control Association paper published in 1995 – "The Future of Insect Growth Regulators in Vector Control", author Mulla and, **www.pollinatorstewardship.org**

The Polariscope

Jim **Thompson**

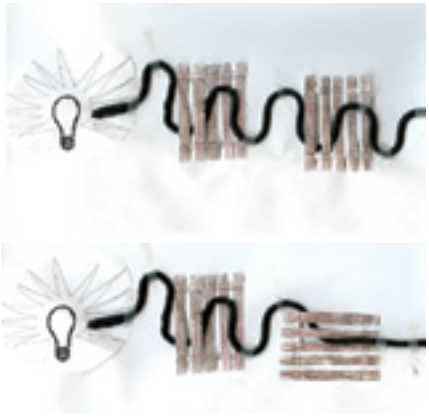
A Useful Tool For Judging Honey

A polariscope, according to the Random House Dictionary is: "an instrument for measuring or exhibiting the polarization of light or for examining substances in polarized light, often to determine stress and strain in glass and other substances." The origin of the polariscope was in Italy during Medieval Times between 1820 and 1830.

The early polariscopes used a nicol prism or a selenite crystal, whereas today's polarizer's use plastic or Mylar film. A common polariscope consists of two polarizing lenses and a light source. One of the lenses is called the polarizer and the other is called the analyzer. Both of the lenses are the same and their purpose is to filter the light into a one directional wave.

There are polarized sun glasses which use this principle. They have only one lens for each eye and filter some of the many rays from reaching the eyes. Thus one will notice that glare is reduced and colors are brighter. The lenses in the glasses are both set alike, so the rays are entering the eyes on the horizontal plane.

If both of the polarized lenses in the polariscope are in the same plane, the result is a filtered light in one plane. However if the lenses are at right angles to each other, the light is blocked by the second lens. This is illustrated by the drawings where the fence represents the filter and the wavy line is a light ray. In the first drawing, a light wave that is on the same plane as the gap of the picket fence can make it through. Light waves that do not line up with the gap are blocked. When it comes to a fence that has the same orientation, the light wave continues. If the second fence is at right angles, the light wave is blocked and only a small amount of light gets through.



The Duboscq Polariscope was developed by Jules Duboscq of Paris, and was made from 1864 to 1886. Jules apprenticed with Jean Baptiste Francois Soleil and married his daughter and later assumed control of the scientific side of Soleil's business in 1849. He remained in business until his death in 1886.

Polarisationsbänder von Wild

Jules Duboscq is also given credit for developing the Norremberg Polariscope Apparatus in 1860.

Norremberg Polariscope

I purchased a page of polariscope drawings that were in an 1890 Polish book. It shows eleven polariscopes of the time and I would like to point out two items. All of the polariscopes had circular lenses and all of them used natural light. These two points are important as the lenses found in the honey polariscopes are square or rectangular and the light usually supplied by an incandescent bulb.

From 1882 to 1910, there was a problem of sugar being imported into the United States. The importers thought the normal trade test should be used in determining the tariff. The government wanted to use the polariscope as it would reveal the color and crystal make up. This also could tell if the sugar was from floor sweepings or had additional water added. Dark sugar was treated as raw sugar and subjected to various tariffs whereas white sugar was treated as refined sugar and had an additional duty called "differential."

Most of the polariscopes were made for gemstone analyzing as the light beam is polarized to go through the gemstone and the second filter is rotated. During the rotation the observer watches the light rays and can count the number of times that the light "blinks" in the 360 degrees of travel. Thus one can check for real verses artificial stones, natural color verses artificial colored stones, and if chemicals have been added. The stones are usually placed in the polariscope in at least three different positions and the gemologist can determine if it is Isotropic or singly refractive (SR), Anisotropic or doubly refractive (DR), Aggregate (AGG), or Amonalous Double Refractive (ADR). No one test is conclusive to the stone's identification. Some colored stones often give misleading results and Garnet and Diamonds sometimes display the ADR or twinkling phenomena. Actually they are in the SR category along with: Spinel, Opal, Amber, Glass, and plastic. Stones usually in the DR category are: Zircon, Quartz, Beryl, Apatite, Corundum, Tourmaline, Topaz, Zoisite (Tanzanite) Peridot, Orthoclase, Spodumene, Labradorite, Axenite, and Mossenite (Syn. Diamond).

For more than 60 years Tiedemann & Betz have made polariscopes and one model is similar to the current honey polariscope in that it has a light box and two filters on two rails. However the filters are glued in between glass and are circular so at least one of them can be turned. Perhaps this was the inspiration for the honey polariscope.

At a recent honey show, I was asked "What are you going to do when you can no longer buy the regular incandescent light bulb?" I replied,"I know people that have used the fluorescent light bulbs for years." In fact, I have a friend that is working on a design of a polariscope that can be folded up and put in a briefcase. The two filters can be hinged or on "pegs" that will fit in holes in the base board or rails. There is no specification as to the distance in between the lenses except that you can put a jar of honey between them. You might as well figure on a five pound jar, because there are some shows that have them. The lenses must be at right angles to each other and I suggest that they be taped in between glass sheets to protect them from being scratched.


Typical Honey Polariscope

The light source could be something like LED light bulbs, similar to what is used in small flashlights. It may take several of them, but you would have a battery powered device that wouldn't require you searching for an electrical outlet. A real easy solution would be to use one or two flashlights. Then you would only have to work out the mounting bracket. The LED bulbs do not produce heat as incandescent bulbs will, so you don't have to worry about venting. The base of the polariscope could be made out of something lighter than wood, like aluminum. Do the lenses have to be six inches square? Nope! The reason that the original polariscopes had six x six lenses was that Polaroid made


Tiedemann Polariscope

the film in four foot by eight foot sheets and it was very expensive. If the sheet was cut into the six x six squares, there would be no waste and there was an even number for polariscopes. Polaroid sold the rights to make the film to another company and so the large sheets seem to be no longer available. Thus you can buy the film from places like Edmunds Scientific in odd sizes or look on the internet under photography polarizing filter sheets. Your task is to figure out how to cut the piece in two to get two somewhat equal pieces when they are turned at 90 degrees to each other. Keep in mind that when you are using the polariscope you usually hold the jar by the top and move it around between the lenses. It might not be a bad idea to have a "perch" for the jar to sit on. That way you can see the bottom of the jar where granulation usually begins and possibly use smaller lenses.

What do you expect to see with a polariscope? The polariscope makes it easy to see imperfections in the jar. You should always have a glass jar as the filters are made of plastic and a plastic jar reveals strange colored rays in many directions. Any foreign particles are highlighted and so you may see air bubbles, pollen, wax, lint, granulation, bee parts, and other debris. You should move the jar around to see if the objects are inside the jar or on the outside surface. Depending upon the show, you may overlook the fingerprints on the outside of the jar at a county fair because many people may have picked up the jar. However at a national show, no one is to have touched the jar so the fingerprints and other things are reasons for deductions. In the lighter colored honey classes, you can see through the jar easily, but in the amber and dark amber classes it is more difficult and you may have to turn the jar so that you can see through small areas near the edges.

Some judges will use a flashlight to shine through the jar and that will reveal many of the impurities but not as many as with the polariscope because of the filtering lenses. If a regular gem polariscope has the capacity to hold a jar of honey, it could be used as a honey polariscope as long as the analyzer lens is set on 90 degrees. BC

Jim Thompson is a long time beekeeper and historian living in Smithville, Ohio.

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Random House Dictionary
Polish polariscope plate
Colored Gemstones Guide, from the internet
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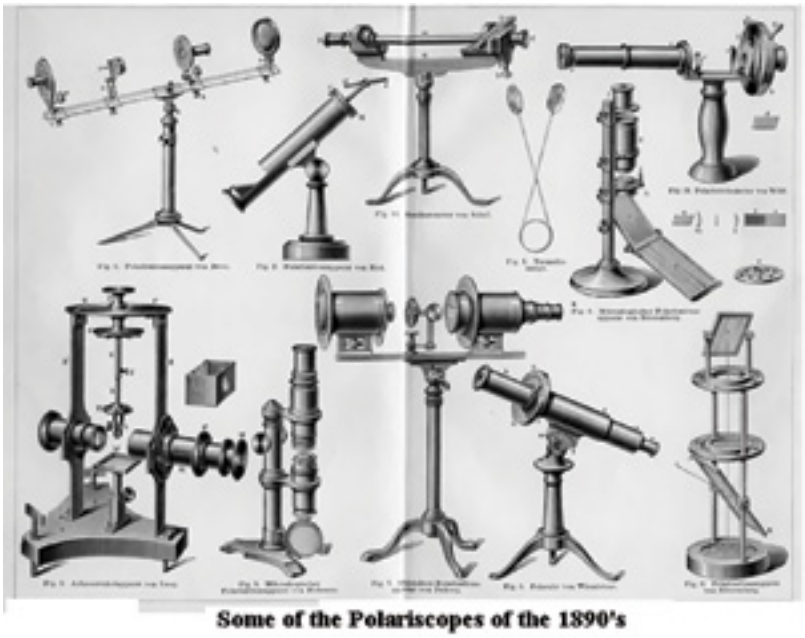
Some of the Polariscopes of the 1890's

The American Bee Research Report

A Summary Of The Proceedings From Galveston

Elina L. **Niño**

This year marked yet another tremendous joint conference of the American Beekeeping Federation, The American Honey Producers Association and the Canadian Honey Council. What an event! But, what you might not know is that this was also the time when the American Association of Professional Apiculturists (AAPA), Canadian Association of Professional Apiculturists (CAPA) and Apiary Inspectors of America (AIA) conducted the annual American Bee Research Conference (ABRC). The ABRC is a scientific conference focused solely on current honey bee research and held annually with one of the beekeeping conventions. The goal is to encourage interactions within the apicultural communities and allow beekeepers to see the latest and greatest research that may be of interest to them.

In our talks with many, many beekeepers we did note that not many are familiar with the AAPA so here is a quick overview of why we exist. AAPA has the following three primary purposes: 1) Promote communication within and between industry, academia, and beekeepers; 2) Develop and foster research on fundamental questions to help understand honey bee biology and improve the beekeeping industry; and 3) Create a venue to rapidly share new techniques to advance the field while maintaining focus on our favorite organism, the honey bee. As representatives of AAPA we wanted to highlight some of the impressive research presented at the ABRC, as well as provide a brief update of our business meeting.

We kicked off the conference with a great historical presentation from our first plenary speaker Dr. Jeff Pettis (University of Bern). He briefly spoke about the history of AAPA and ABRC and it is worth noting here the names of those who started it all: John Harbo, Eric Mussen, and Malcolm Sanford. The conversation continued with the discussion of regulation of queen supersedure and ended on a high note with the conclusion that we are indeed most likely in the golden age of honey bee research.

The session continued with some excellent presentations from students and touched on various topics including characterization of honey bee cellular immune components, effects of pesticides, control of overwintering processes, colony management, queen physiology and *Varroa* mite management. A very interesting talk by Samuel Ramsey (University of Maryland) revealed a new understanding of *Varroa* behavior. Samuel discovered that *Varroa* mites primarily consume honey bee fat stores dispelling a widely-accepted notion that *Varroa* feeds primarily on bee hemolymph. Time to re-write some books! Talks by Kelly Kulhanek and Nathalie Steinhauer (University of Maryland) discussed results of the multi-year beekeeper survey which provides information for developing best management practices for U.S. beekeepers.

Being that *Varroa* mites and access to clean forage are on most beekeepers' minds, it is no wonder we had a large number of talks covering these topics. Several researchers presented their efforts to develop and evaluate various synthetic and bio-miticides. Many others discussed their

findings about honey bee foraging habits and what we can do to improve pollinator access to valuable food sources, including work done by James Wolfin (University of Minnesota) on how to make our lawns bee friendly. Not to be forgotten, several researchers spoke about the effects of other stressors on bees, particularly viruses and *Nosema* spp. Highlighting the need for improving our understanding of multi-stressor interactions, Frank Rinkevich (USDA-ARS, Baton Rouge, LA) discussed the effects of *Varroa* and management practices on honey bee pesticide sensitivity. The first day concluded with a poster session and a buzzing social graciously sponsored by Veto-pharma.

Our second plenary speaker, Dr. Steve Pernal (Agriculture and Agri-Food Canada; CAPA), started us off on the second day by providing an excellent discussion of the progress of the marker-assisted selection guided by proteomics. This collaborative effort of Canadian scientists has built on their previous breeding efforts in order to use protein expression in various bee tissues from colonies exhibiting different resistance characteristics to American Foulbrood and *Varroa* mites. This is very exciting research as it is the first demonstration of using protein markers for selective breeding efforts which could make this challenging job a bit easier.

The remainder of the day was packed with great talks touching on everything from disease and pest detection to how to improve honey bee health with nutritional supplements. Much needed information on the levels of neonicotinoids and other pesticides found in nectar and pollen in ornamental plants was presented by several researchers, including Brian Eitzer (Connecticut Agricultural Experiment Station). We would be amiss if we didn't mention that there were a few talks about our favorite bee individual – the queen. On a more practical note, Marta Guarna (Agriculture and Agri-Food Canada) reminded us just how delicate queens can be when talking about the effects of queen exposure to temperature fluctuations (i.e. during transport) on subsequent colony performance.

The conference proceedings, where you can find the abstracts and details of the research presented, has been published in *Bee World* volume 94, Issue 3. The link to the proceedings can be accessed through the AAPA website (**http://aapa.cyberbee.net/**) and directly through *Bee World*.

The final day of the conference concluded with a very insightful Panel Discussion organized by Mark Dykes (Texas Apiary Inspection Service). The panel brought together members of academia, industry, extension services and apiary inspectors for exchange of current issues in the field and discussion of the immediate research needs to provide solutions for beekeepers. This discussion certainly brought the meeting full circle, as queen health issues were on the minds of beekeepers as brought up by Jeff Pettis in the opening plenary.

This certainly was a productive and informative conference offering something for everyone. It would not have been successful without ALL of the presenters, as the meeting featured 59 talks, including 19 student talks, and 14 poster presentations. We extend sincere thanks to our CAPA co-organizers Shelley Hoover and Leonard Foster, AIA members and specifically Mark Dykes, and Tara Zeravsky of Meeting Expectations. We also want to congratulate our student presentation winners (in no particular order): Courtney MacInnis (University of Alberta), Alexandria Payne (Texas A&M University) and Samuel Ramsey (University of Maryland). This year's AAPA student scholarship winner was Mehmet Ali Doke (Penn State University).

Our business meeting was completed in a record 63 minutes, but we certainly were very efficient and managed to finalize a lot of pending business. We even have some good news to report. In 2017, AAPA will be offering a competitive Postdoctoral Travel Award as well as a competitive Extension Award. The details will be announced soon so make sure you visit our website **http://aapa.cyberbee.net/** Thank you for reading and we hope to see you all in January 2018 in Reno, NV! BC

Reference

Proceedings of the 2017 American Bee Research Conference. *Bee World*. Volume 94, Issue 3; **doi:10.1080/0005772X.2017.1294471**

Beeyard Thoughts, Observations, and Updates

Extracting honey at the wrong time (Part 1). Some unsubstantiated thoughts on propolis.

Extracting honey at the wrong time

Just a bit more than a year ago (March, 2016), my 91-year old Mom was diagnosed with a terminal medical condition. Though very difficult to endure, this news was simply one of life's rites of passage for my family and me. There was, as is, no way to avoid it.

My two brothers and I did our best to support Mom and help her through this stage of her life. She lived about 800 miles from me. My wife and my family made many trips to southern Alabama to visit, to offer support, and to plan for the inevitable. We phoned nearly every night. Mom's ordeal ended in mid-October, 2016.

My bees have always been the center of my professional life, but for about nine months, I had to let them make their own way. I am not apologetic to you or my bees. My priorities and energy had to be elsewhere.

Now that gloomy but loving period has passed. I am left with a peculiar situation in my beeyard. I have full deeps of honey from last year – both Spring and Fall honey. My colonies were rarely fully inspected. If any of you truly believe that *"bee space"* is the end-all solution to removable frames, try this. Do not open your powerful colonies for about a year. Then open them.

You will find that propolis-bonding combined with propolis-reinforced beeswax will make a traditional hive tool a laughable device. Could it be worse? Sure! I only use deeps[1]. My bees were busy while I was distracted. They filled deeps with honey. Presently, I have about ten 90-pound boxes that are block solid. I had to get them off of hives that were five deeps high, and there are still yet a few more in the apiary.

Wrecking bars and jimmies as hive tools

For hives that have not been opened in many months, a standard hive tool was just not enough. It flexed to the point of either bending or breaking. I needed much heavier firepower.

Many years ago, I used an aggressive procedure for opening a soundly glued hive that I had seen being employed by Australian beekeepers. When I later used the procedure in Ohio, the hives were near the ground – only about 8" above ground level. The procedure was to tip the colony backward and as gently as possible let it drop to the ground – laying on its back. I would then use a hammer to drive a common hive tool into the glued joints – banging and driving – until I could begin to break the beehive apart. The bees were well aware that all of this was ongoing. Being fully suited with smoker blasting was a good idea. It is not so much the propolis that holds the hive together as it is the bridge combs (ladder combs) that firmly glue all together. When the equipment breaks apart, drone brood and leaking honey are everywhere.

Of course the frames were cemented in place. After breaking a hive box from the main colony and while the box was sitting on one end, I would strike the bottom bars on each end until – finally – I was able to separate a frame or two. I carried a short-handled hammer just for that purpose. It was a scene. I have no photos.

This *"hive on the back"* thing will not work for me now

I increasingly became a proponent of raising my hives higher from the ground. They are all now 18-24" high on various types of hive stands. Simply pushing the hive backward and letting it fall to the ground would be catastrophic.

I had to break the solidly stuck boxes apart while they were on the hive stand. I did this process late this past Winter, but on a day the bees could fly. I knew the disturbance would be great. I wanted the exiting

[1]At this stage of my life, I never run more than 20 colonies. I have limited energy, time, space, and devotion. (I also have six grandkids.) Years ago, for simplicity, I began to only only use deeps. Nucs, splits, combining colonies, swarm boxes, frame replacement – all were standardized with one size of frame - deep. The big negative – my equipment, when full, is really heavy. It was not always that way. Years ago, full deeps seemed to have been lighter. Maybe honey is heavier today than it was when I was a younger man.

defensive bees to be able to return the hive.

The small bluish pry bar on the bottom left, with the upturned blade was critical to my procedure. It opened the first small crack that I could then use to get the larger pry bars into hive. I found that I had to pry from the tops of two or three frames. If I put leverage force on the 3/8" edge on the top end of hive body, the weight and pressure would frequently crush or dent that narrow edge.

In the photo, the heavier pry bar was in use after the initial break was over. Once the boxes had been separated, the heavy bars could be used anywhere on the hive box edges.

Heavy pry bars being used to break stuck hive bodies. The back pry bar is holding the weight so I can lever from the front.

The next step was probably the worst step

I have written about these heavy deep supers and their use by beekeepers with limited strength (or waning strength). Increasingly, that description seems to be mine. Several years ago, I had my shoulder screwed back together. It works well now, but I do not want to return to those physical therapy days.

My arsenal of heavy duty hive tools. The regular tool is of little use.

A common response would be to *"take the frames out one at a time,"* I ask you, the reader, to please review the part above where I mentioned that my hives had not been opened in months. Even if I could manage to remove the first frame, followed by the remaining nine frames, and finally get them all back in the box, too much time would be required for keeping the hive open. In some instances, the top bar would have pulled off before the frame would pull free. Unworked hives for this long, become a beehive battle fortress. This characteristic would have survival value in both wild colonies and managed colonies.

If only a frame or two were soundly stuck, my short hammer could be used to drive out one of the easier frames from the bottom allowing the stuck frames to be more readily moved. However, as stuck as these frames were, using a hammer would have destroyed the bottom bar ends.

I brought my work stand as near as possible. I made certain that the box to be removed was thoroughly freed, and with a heave-ho, I moved the deep to the work stand. Then I took a break. Only nine more to go.

Soundly propolis/ wax glued top bars.

The 1969 Cub Cadet

After I got the heavy box to my work stand, I backed my old garden tractor with a small, narrow trailer near the scene and moved the deeps from the work stand to the trailer. All went pretty well. The weather was cool enough that there were not many bees in the deeps that I removed. I took another break.

You see, I have a plan or two...

Ultimately, I have a two-part (probably harebrained) plan. At this point the first load of honey deeps are now in my shop. That is the beginning of my first plan. I used my heat gun to soften the propolis and wax enough for me to experiment with removing the stuck frames. That seems to work very well. Before extracting, I will need to take out the frames and scrape all sides to remove wax and propolis. I have the temperature set to 70°F in the shop, but that will not be warm enough to make the cold, low moisture honey freely flow while extracting. At this point, part of my plan is untested. I will let you know next month.

My second plan concerns extracting the honey from these thick-honeyed frames. I will need these boxes in a few weeks for the 2017 nectar flow (I hope). I have an idea how I will apply extra heat to get the frames warmed and scraped. I will also be warming my small extractor.

So far, I have won more than I have lost

Thus far, I have had fairly good luck. Many of the deeps are off, and I have not hurt myself. Now comes

My small 48-year old International Cub Cadet 104 does a decent job int he tight spaces of the beeyard. (All four tires original - 10hp.) Ironically, one of the tires on the trailer is an Atlas tire that is about 50 years old, too. It has been in the weather all those years. I just replaced tires on my road trailer that dry rotted in hardly 10 years. It's clear; many things are just not made the way they once were.

stuck frame removal, scraping, and extracting. I will stop at this point and finish next month. Big late season snow is predicted for tonight. I duly hope that the weather will be much more Spring like for the extracting experience.

Propolis production and application is an on-going job for the bee colony

Propolis needs and water needs within the colony are two colony topics that I require more tutelage to understand. While I have written many pieces about water foragers and their suicidal collecting trips, I have only given passing note to propolis.

I have said many times…..

I have said on oh-so-many occasions that one or two year-old frames in a new, small colony are glorious to work. They come out so easily. Apparently, the bees know this, too, or they have other reasons for gluing frames in place. If given abundant time, bees will profoundly apply propolis on everything – especially frames. It seems to me to be an on-going job. It seems never to be finished. Every Spring, more gums and resins come into the hive. Why do you think that would be? Are the bees continually bringing in gums and resins for propolis production to stabilize and coat the colony's internal cavity? Are they bringing in the building materials for propolis because the plasticity or its healthy qualities need refurbishing? In other words, does propolis have a specific lifespan?

Do different cavities in different areas present different propolis needs? A hundred times, years ago, I heard it said so I, too, have said that bees preferred wooden hives and frames over plastic hives and frames. *"It's more natural."* If either wood or plastic feels or does not feel natural, why are both these surfaces targets for propolis applications – especially wood. Given enough time, bees will coat the entire hive surface with a thin layer of this product. As is everything else in the bee world, this task is seemingly a lot of work. It is also seasonal work. In my area, Spring seems to be the best time for propolis production. Summer sources provide only a small bit of production while fall offers a little bump of propolis production activity.

Wads of propolis atop a small cake of rendered wax.

Then the colony dies

For whatever reason, the colony that is doing all of this propolis collection will die. Starvation, predation, mites, pesticides, and queen loss – the list is long. Colonies die. Could it be propolis as much as wax combs that scout bees find appealing when they find a cavity that has been vacated by a previous colony. When bait hives are put out, should we slather the inside surfaces with propolis as well as installing a few old combs. Would this make them more attractive? Possibly, the old combs have enough propolis already to allure the bees.

The smell of propolis

I have been conducting a multi-week program on basic beekeeping. I covered all the common topics for these new and newish bee people. In any such training program, two major events are missing – the exhilarating feel of a sting and the smells of the colony and the apiary. Propolis does not stand alone, but I suspect that the odors that propolis produce are one of the primary ingredients that give beekeeping its characteristic odor. What a major stimulus all bee audiences miss by not being able to "*smell*" the topic being presented. How cool it would be to be discussing apple pollination as the odor of millions of apple blossoms drifted across the room. And that characteristic bee/beekeeper/beehive/storage building smell – it has become an odor of my professional life. The primary colony/apiary odors are: new pine wood, wax, smoke, and propolis and sometimes warm honey. Propolis may contribute more than we realize. Do bees use that odor in some way – or are other animals/insects aware of this odor? Certainly, I do not know.

It should get more respect

I posit that propolis does not get enough respect. Nearly every year, I bang and bam on a hive that is profoundly stuck together. It's hard work and at the time, I don't especially care that propolis is generally unloved. Beeswax alone cannot hold a hive together so tightly. In our pillaging of the bee world as we strive to get more honey and understand more about pollination, we figuratively trample propolis. The bees certainly want the product. They will even recycle the material when it is warm enough. I'll keep pondering. If you have any thoughts, let me know. BC

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REQUEENING

Larry **Connor**

Queen cell cutting.

In Nature

In Nature, queen replacement is a family event. When a queen is being a replaced, the worker bees recognize the new queen as the daughter of their mother. In other words, the queen is a sister – sharing half of her genetic make-up with the workers. A portion of the workers are full sisters (often called super sisters) of the queen because they also share the same father. They are more closely related than the workers that have different fathers.

The three methods of queen replacement – supersedure, swarming and emergency replacement – use sisters as new queens. While the mechanism or motivation of queen replacement vary with these methods, the result in Nature is the same – the new queen is genetically related to the workers.

Queen Detection

This all links to the workers' detection of a new queen, and how they respond to her. Workers respond to their sister queen from the time the queen is deposited in a queen cup (making it a queen cell), and at every stage of the queen's development. Here is a step-by-step summary of this activity:

Egg in queen cup – Since the egg in the cell is apparently the same as an egg in a worker cell, we conclude that the queen factors attracting bees and causing feeding behavior is *triggered by the size, shape and position of the queen cup.*

Larva in queen cell – Once the egg hatches, the bees feed her a diet of royal jelly. Wait a minute, during the first 48 to 50 hours of a worker and drone bee's life, they are also fed royal jelly! Thus the food must not be the initial trigger for queen recognition. *It must be the size, shape and position of the queen cup*, the same as the egg. There is strong evidence that *the queen larva receives more food during the first two days of feeding than the worker*. She also is living in a cell that is built into a queen cell. The trigger is there to develop this sister into a queen.

As the cell grows, the worker bees respect it. The cell inserts or hangs in the 'sacred' bee space, and if it was anything else it would be torn down, retrofitted or covered with wax and propolis.

As the queen pre-pupae (the last stage of larval development) and the pupae mature, the bees start to detect small amounts of queen pheromone (queen substance).

There is often competition between developing queen cells, especially in emergency response queen cells. A colony may start many queen cells, but will eventually trim (destroy) the numbers to a dozen or more queen cells. Possible explanations for elimination of these developing cells include: genetically defective queen larva/pupa, lack of relatedness to the majority of worker bees, poor feeding, and bad location on the comb. Few beekeepers can predict which cells the bees will destroy and which they will continue with development. Random 'luck' or the lack of it may be a larger factor than we realize. Developing queens cannot go back to being worker bees once the process begins.

Mature queen cells, a term we use to describe cells within 24 hours of emergence, are very attractive to worker bees. Sometimes they remove the wax covering off the tip of the cell and expose the silk cocoon underneath. It is thought that the workers are making close contact or inspection of the queen's pheromone production. So, even before a queen emerges, the pupa produces a simple queen pheromone signature that workers use to recognize the cell, and later on, the newly emerged queen.

Newly emerged queen – I enjoy watching queens emerge from their cells. They often crawl out of the cell and walk to an open cell of honey and take a long drink. Or they will be fed by worker bees. They are clearly recognized as a queen but at a lower level than when she is a year old. Young queens immediately start searching the hive for their same-age sister queens and queen cells in order to kill them.

12-hour old queen – Queens seem to experience an increase in pheromone production once they hit the first half day of their life. From this point on, the queen must be handled as a queen, and provided with a proper delay in introduction. We will discuss this below.

Newly mated queen – After successful mating, queens produce egg-laying hormones that correlates with an increase in the production of new queen pheromones. These additional chemicals continue to be added as the queen ages.

Year-old queen – At the one-year mark, queens seem to be at their peak

Virgin queen.

Queen in cage with workers.

queen pheromone production level. This correlates with their period of maximum output as a queen, laying one to two thousand eggs per day during the peak season.

Failing queens – Along with a reduction in egg-laying rate, failing queens (regardless of age) appear to experience a reduction or change in their queen pheromone production. I suspect the two are related, as anytime we see a colony with about half of the brood of surrounding colonies, we often see, or will see, developing supercedure cells.

What this means to the beekeeper

Unrelated stocks are hard to requeen while genetically related stocks are easier to requeen. Unrelated bee stocks will experience a lower queen introduction rate, lower longevity of the queens (as seen in early supersedure) and other problems. When I ran the Starline program in the 1970s, one of the inbred lines – the F line – was of a Carniolan origin while the other three inbred lines used in the four-way hybrid were developed from Italian colonies. When we raised drones from the F line, we had to introduce new queens into colonies that carried that F line in their pedigree. Otherwise we experienced poor queen acceptance and early queen replacement.

Today we have heard stories about beekeepers experiencing difficulty introducing certain queen lines into their hives or nuclei. One that receives a great deal of attention is the Russian strain released by USDA and maintained by a bee breeder cooperative.

Time – Regardless of the age of the queen, take your time during queen introduction. For same-race queens you can easily use a three to five day delay in the introduction process, while for different-race queens you should use a five to seven day delay before the new queen is allowed to emerge from a queen cage. This often means you, as beekeeper, need to make a return visit to remove the cork or plug from the candy end of the queen cage.

Young workers – As you set up colonies for queen introduction, make sure they are filled with emerging worker bees, so the new queen has a large number of 'naive' workers – those that have never been adult bees in the presence of another queen – to care for the new queen and help her grow the colony. This is especially true when you are building nuclei or increase colonies. Use the Doolittle method or another method to ensure that you have plenty of young bees in your new colony.

Incoming food – Make sure that colonies being requeened (or packages with a new queen being released) are well fed and are receiving supplemental sugar syrup to increase the acceptability of the queen. Why is this important? We know that bees share a community stomach, sharing food with one another. During this feeding process they are also sharing the odor of the queen. When you put a new queen into a cage and leave her between two frames of brood, do not expect all the worker bees to walk over to the queen cage and get their allotment of queen pheromone. The bees use a smaller number of worker bees to serve as the queen's retinue (attendants), and the identity of these bees continually changes. After a worker has fed or groomed the queen, she will walk out onto the comb and spread the odor of the queen, not unlike the human who has been exposed to high levels of radiation and exposes others as she walks away from the location of exposure. Queen pheromones are not radioactive, thankfully, but the impact on the colony is highly significant to colony success and queen acceptance. The presence of a jar/can/feeder of syrup will greatly increase queen introduction success. Yes, even during a nectar flow.

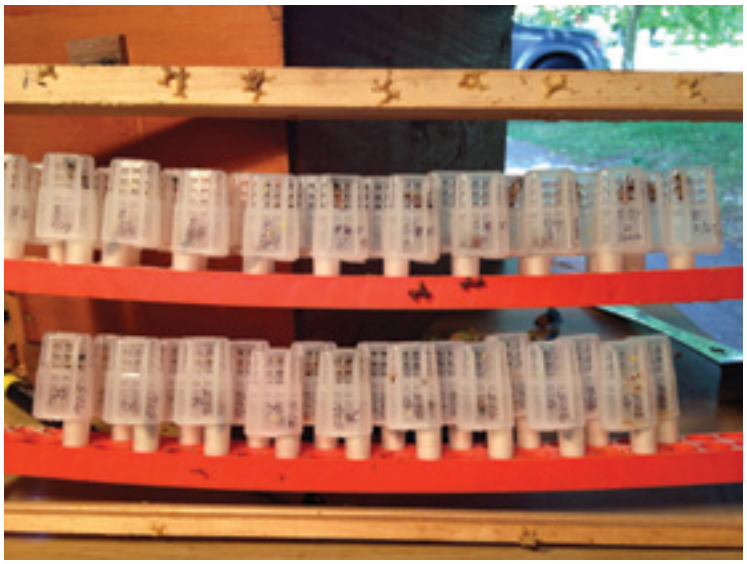
This is why it is so hard to introduce queens during a dearth, a period when there is no food for the bees to gather. Most experts recommend that you not introduce queens during a dearth, and if you must, feed the colonies starting a week in advance so they are strong and well fed. More important, they are sharing food and will quickly share the new queen's pheromone.

Queen cage with cap removed.

Why queens in package colonies often fail

If you must purchase package bees (and this is often the only option for new beekeepers), keep in mind a few facts about the queen in the package you purchase:

1. The queen is not related to the bees. This is not the mother of these bees. At best, she has been a queen of a small mating nucleus for the matter of a few days before she was removed and added to a two to four-pound box-o-bees shaken from colonies located miles away.



Virgins in cages.

2. The queen is young, and has not developed her full set of pheromones. She has produced a few hundred to a few thousand eggs before she was picked out of a mating nucleus and sent to you.
3. The queen introduction cage has a candy plug that may be removed to liberate the queen. Keep the candy plug or cork in place for three to five days after you set up the colony. This allows the bees time to spread her pheromone throughout the colony. Yes, I know the colony is small. Delay her release.
4. Feed the colony. As we just discussed, feeding increases pheromone communication between the queen and her new bees.

Why purchased queens often fail

Many beekeepers use queen cells, virgin queens and mated queens with tremendous success, between 95 and 99% acceptance. At other times, beekeepers experience a very low acceptance rate. Here are a few factors that may contribute to queen introduction failure:

1. The queen may be very different from the bees in the hive, and they may be difficult to requeen. Increase the time the queen is in the cage and make sure the colony is well fed during the requeening process.
2. The queen has been in-transit, either in a queen cage with a few workers or in a battery box with a larger number of bees. When a queen is surrounded by four to six worker bees, she is not being well fed because the workers are not being well fed. The cage probably has a small amount of queen candy (sugar and water) and is designed to keep the bees alive. Once you receive your queens, give them all the honey they can consume (in small amounts, not a bath) and water. These bees are dehydrated.
3. Queens in transit are sometimes subjected to hot, dry conditions and will never recover. This is a risk of shipping queens.
4. Off season queens are often stored and then removed from queen banks, and have lost a great deal of weight. Their ovaries are shrunken and they are not producing much pheromone. Feed and hold for a full week before releasing. BC

Read more about queen handling and requeening in the following publications:

Flottum: The Backyard Beekeeper, 3rd Edition

Connor: Queen Rearing Essentials, 2nd Edition

Connor: Increase Essentials, 2nd Edition, Using the Doolittle Concept and Chapter 9 Queen Care

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Dr. Connor is teaching queen rearing classes in several locations this season. Check it out in ***www.wicwas.com.***

2017 Price List

Gardner's Apiaries
Spell Bee Co. LLC

510 Patterson Road • Baxley, GA 31513
Ph: (912) 367-9352 • Fax: (912) 367-7047

ITALIAN QUEENS	*#2 Packages	*#3 Packages
100+ $21.00	100+ $68.00	100+ $78.00
25 -99 ..... $22.00	25-99 ..... $72.00	25-99 ..... $82.00
10 - 24 ..... $24.00	10-24 ..... $75.00	10-24 ..... $85.00
1 - 9 ..... $26.00	1-9 ..... $78.00	1-9 ..... $88.00

*Shipping prices above do not include shipping charges

Pick-up Packages
#2 . . . . . $68.00
#3 . . . . . .$78.00

Pick-up Queens . . . . . $21.00 Cells $4.00
Clipping . . . . . $4.00 Marking $4.00

Please call or write for shipping details or truck prices.
Terms: 10% down. Balance due two weeks prior to shipping.

Guidelines For Finding The Best Location

QUESTION: I'm making splits and increasing my colony numbers this bee season. I'm at the point where I'd like to set up a new beeyard. How do I go about doing so? What should I look for in a yard location?

ANSWER: Making splits is a great way to increase your colony numbers. Moving splits away from their original hive location will help avoid returning drift. When you have made a new split from hives in the same yard, those bees will have a tendency to return to their original hive rather than the new brood box you've provided. Screening the entrance of your split for 24 hours, or moving the colony to a new yard location, will help ensure its acceptance and success.

Preparing any new yard you intend to move bees into in advance will benefit you when you move colonies. Organizing your hive stands/pallets and erecting your bear fence, if required, will prevent running around in the dark the night you move bees.

Depending on your area, finding a new location for your hives can sometimes be challenging. Bees can be kept on your own property or on land belonging to others. It is standard practice to compensate the landowner with honey as a thank you for the use of their property. As a general rule beekeepers, provide one pound of honey per colony to property owners.

Speaking to family, friends, and other beekeepers can help you secure a location for your hives. In some circumstances, people will be looking for someone to keep bees on their property and have approached a beekeeper that didn't need any additional yards. Similarly you may have friends and family who are looking for bees on their own property, or have told others you keep bees, and discovered people interested in hosting you. Using online/newspaper classifieds and going door to door can also assist in securing a new yard location.

There are a number of factors to consider when selecting a beeyard location. These factors will ensure both you and your bees are kept content.

FORAGE

Forage is an important consideration when choosing a yard as bees rely on pollen and nectar for survival. Although placing your colonies next to a high-yielding crop is ideal for honey production, this proximity is not necessarily required. Bees usually forage within a two-mile radius and will find forage areas even if you don't make them immediately available. Bees require forage all season long, from spring through fall. Ensuring they have access to a variety of flowering plants will ensure pollen and nectar are available to your colonies throughout the season.

WATER

Water access is important for bees, as water is used to regulate colony temperature, dissolve honey and taking a drink. Unlike other beekeeping climates, there are plenty of natural water resources in Ontario where I am to support honey bee colonies. As a result, supplemental water sources generally do not need to be supplied. Similar to flowering forage, water does not have to be immediately available to your colonies. Issues can arise, however, if your bees begin to visit neighbouring pools, hot tubs, and bird baths. Early in the season, providing a small pool or tub of water in your yard with floating debris to prevent drowning can help encourage your bees to avoid visiting neighboring water sources. You may want to give it an odor at the beginning – Honey B Healthy, or a food flavoring, or even water from a pond. Be cautious of water sources that may be contaminated or harmful to bees.

WIND PROTECTION

Exposure to wind can be both beneficial and detrimental to honey bee colonies. A light breeze can be beneficial in helping cool the colony and ventilate moisture, as well as keeping the beekeeper cool while working colonies. During the Winter months, cold winds can chill the colony. When planning or scouting a yard location, note the location of wind breaks in the form of trees and bushes. Coniferous trees are going to provide more wind protection during the Winter than deciduous trees. Furthermore, some form of fence or snow fence, as well as wrapping colonies for Winter, will help protect them from chilling winds and encourage snow cover that will provide additional insulation.

SUN EXPOSURE

To maximize sun exposure, colonies should ideally be placed facing south, south-east. Capturing sun exposure early and throughout the day will encourage foraging. Heavily shaded places are not ideal beeyard locations. And the sun is not at the same angle all season. Your colony may be in full sun Spring and Summer, but shade in Fall and Winter. Look for a location that is sunny on Christmas Day and you'll be OK.

SURROUNDINGS

Being aware of your surroundings when selecting a new beeyard can mean more than considering surrounding forage. Neighboring facilities may produce noises, odors, or substances harmful or unpleasant to you and your bees. Vandalism and theft are also, unfortunately, something to keep in mind when selecting a location. Avoid placing your colonies too close to areas of heavy traffic and observation.

Ontario is a big province, with a lot of southern density. There are approximately 3,100 beekeepers

registered in the province, not to mention those outside the registry. With that in mind, selecting a location to keep your bees might involve investigating your proximity to other beekeepers and established yards nearby. Livestock and wildlife can also be an influencing factor. Colonies of bees can happily co-exist with livestock, but fences might be necessary to separate them, or to deter predators such as skunks, raccoons, and bears.

Finally, when considering your surroundings, nearby fields and crops can be of concern. Be aware of areas where pesticides may be used or sprayed, and crops that bees may forage or fly to during and after pesticide applications.

SIZE

When scouting for and planning your new yard, size is something to keep in mind. Although you may only be planning to place a couple hives there, down the road you may wish you had room for expansion. Finding a yard with enough space to expand your colony numbers, and to accommodate multiple people working together, will be a benefit in the long run.

ACCESSIBILITY

Ensuring your yard is easily accessible is important to ensure your own productivity. If a yard is difficult to access with your vehicle it won't be as enjoyable to visit – and it certainly won't be conducive to pulling honey or moving equipment in and out. Access throughout the season is important to consider; if you're scouting for yards in June or July, wet patches where you might get stuck in Spring may not be apparent. Consider obstacles as well – having to hop out of your vehicle numerous times to open and shut gates, or slowly maneuver over and around obstacles and rough terrain, can make visiting your new yard a challenge.

HUMAN PESTS

Keeping yourself healthy and happy is also important. Yard locations should be free of obstacles and obstructions you might trip on. Avoiding locations where mosquitoes and black flies are abundant will make your visit to the yard more enjoyable and keep your hands working rather than swatting. Avoiding locations where thorny brush or poison oak/ivy can be found will also keep up morale. Ticks and Lyme disease are receiving increased attention in beeyards as of late. Taking care to mitigate your risk of potential exposure will keep you free of these pests.

LEGALITIES

The Bees Act of Ontario provides provincial guidelines for beeyard specifications related to property lines, roads, and buildings. You can contact your local municipality or region to find out about additional laws and regulations for keeping bees in your area. Within the beekeeping community, there are also unwritten rules related to communication. Notifying neighbors and neighboring beekeepers of your presence in the area, and scouting cooperatively for yard locations, will help keep relations strong and all parties informed of the bees and beekeeping practices taking place around them. BC

Daniel Thurston is a member of the Ontario Tech Transfer Team. Originally this article was published in the Ontario Beekeepers Newsletter, special edition.

Voices of Bee Culture
September 22-24
See Center Spread

Southwest Foraging

Connie **Krochmal**

For this month, let's explore another volume in Timber Press's foraging series. "Southwest Foraging-117 Wild and Flavorful Edibles from Barrel Cactus to Wild Oregano" by John Slattery, 326 pgs., ISBN 978-1-60469-650-9.

The title covers Arizona, New Mexico, Oklahoma, Texas, and parts of Nevada and Utah. Featuring over 75 pollinator plant species, it contains a wealth of useful information for beekeepers.

This region contains many diverse habitats, which are described and discussed in detail in the introduction. That is followed by a very impressive seasonal foraging guide with page after page listing the plants by habitat for the individual seasons – even Winter. In addition, a foraging guide listing the plant part/parts consumed is included as well.

For novice foragers, the introduction to foraging is very helpful for it gives many clues to use in identifying plants. There is also a reader friendly glossary of botanical terms used in describing plants. Like the other volumes in the series, this one emphasizes sustainability issues.

The title also contains information on the equipment a forager will need. The author stresses safety issues, such as being certain about a plant's ID and potential food sensitivities. Readers will also find details on preserving and storing foraged foods. In addition, this also encourages readers to grow the native edibles.

This easy to use A-Z guide has the plants arranged alphabetically by common name. Each in-depth plant profile gives the Latin and common names, where to find the plant and which part to harvest, plant ID tips, when and how to gather, and suggested uses for each plant.

In previous articles I've profiled over forty of these pollinator plants or their relatives with one of those being pyracantha. I had no idea that pyracantha berries were edible although the seeds are considered toxic.

Some of the other plants of interest to beekeepers are edible ones that yield honeydew, which include cocklebur, elm, junipers, and walnuts. Those edible species providing nectar are elm, mulberry and wolfberry. Pollen comes from cocklebur, elm, ephedra, hackberries, mallow, pigweed, plantain, snakeweed, strawberry, and walnut.

Ones that offer both nectar and pollen are chickweed, dayflower, evening primrose, henbit, miner's lettuce, nightshade, peppergrass, plantain, tansy mustard, walnuts, watercress, and wood sorrel.

Those plants that can yield surplus honey are burdock, cocklebur, ephedra, elm, greenbrier, several hackberry species, mallow, manzanita, monkey flower, palo verde, plantain, snakeweed, and strawberry.

Of the many excellent pollinator plants featured in this title, I've chosen several to profile below in greater detail since they're outstanding bee plants.

SOTOL (*Dasylirion spp.)*

Members of the agave family, these easy to grow, evergreen perennials with a woody stem have a shrubby or tree-like appearance. With hardiness varying by species, they generally occur in the mountains and deserts of the Southwest. There are about 20 species, most of which are found in Mexico.

The plants vary slightly in height by species, and are typically up to six feet across. When sotols are young, they can resemble an agave. As the plant matures, it develops a terminal crown of long, very slender, stiff, crowded leaves with shaggy, spiny edges. Up to three feet in length, the stemless foliage looks much like that of the yuccas.

Although sotols can bloom any time from Spring through the Summer, they're most floriferous during the latter. The small, bell-like, crowded, creamy white blooms emerge on tall, branched stems that can reach six to 20 feet in height, depending on the species. The male and female blossoms open on separate plants. These form large panicles or tight clusters with the flowers being most numerous on the upper part of the flower stalk.

The edges of the flowers can be toothed. When mature, the fruits become dry but don't split.

The following species are recommended for bee gardens.

Desert spoon or sotol (*Dasylirion wheeleri)*

Hardy to zone seven, this species is native to New Mexico, Arizona, and Texas. Desert spoon grows to about three to five feet in height. The flowering spike can be nine to 15 feet tall.

The foliage forms a six-foot-wide,

Sotol. (Dasylirion spp.)

ball shaped crown. As the plant ages, the dead foliage clings to the trunk in a mass.

The stiff, sword-like, very spiny, grayish-green leaves are very slender. Three feet in length, these are spoon-shaped at the base. Brush-like fibers are borne along the tips of the foliage.

Texas sotol (*Dasylirion texanum*)

This species is sometimes called bear grass. Hardy in zones five through 10, it is native to Texas. Only about three feet of the trunk are above-ground with the rest being covered by soil.

The rounded tufts of foliage grow straight up and arch outwards. Two feet long, the linear, shiny, green leaves are only ½ inch wide. The brownish-green spines along the edges are hooked in both directions.

The flower spike rises nine to 15 feet in height. The flower bracts can be much larger than the flowers. The fruit is only ¼ inch long.

This species can be grown from seeds, which sprout in about two to four weeks. Texas sotol is more tolerant of colder, wetter soils than the other species.

Growing Sotols

Grown from seed, these prefer the same growing conditions as the agaves and yuccas. The soil must be well drained. Rocky, sandy, and light, gritty soils are ideal. Wet, slushy sites during winter can be deadly for most sotols. The sun loving plants can survive light frost provided the soil is dry.

The seeds germinate in one to three weeks, depending on the species. No watering is needed once sotols become established.

Bee Value of Sotols

Yielding yellow pollen along with lots of nectar, sotols are particularly good honey plants. They have been known to bring large honey crops. Up to a full super is possible although this doesn't happen reliably every year.

WHITE BRUSH OR BEE BRUSH (*Aloysia spp.*)

Known also as bee bush, these nectar and pollen species are members of the verbena family. Native to North and South America, they can be perennials or shrubs. Most are generally tender. All species bear very fragrant leaves. The tubular, richly scented blossoms form spikes.

White brush or bee bush (*Aloysia gratissima*)

Sometimes called Mexican heliotrope, this is native to Texas, New Mexico, and Arizona. Forming thickets, it occurs in semi-desert areas on rocky slopes. Several varieties of this species can be found.

Although this gray-barked, 10-foot-tall, wispy shrub can withstand drought, it dies back during dry spells. The tips of the branches can be sharp. Forming clusters, the inch-long, narrow, opposite foliage is greenish-gray.

Sometimes grown as a hedge plant, white brush is named for the minute, purple-tinged white blossoms. These appear in axillary clusters, three inches long, from June through December, depending on the weather. Flowering can continue repeatedly during the year for a short period after each good rain. It has been known to bloom seven times during rainy years.

The nectar flow can be quite heavy after each rain with a moderate honey crop resulting each time. Five or so pounds per day can be added to hives during the blooming period. In good years, this supplies a very large honey surplus.

The good quality, profound white to light amber, mild flavored honey has a light aroma and a heavy body. This tends to granulate rather quickly.

Wright's bee brush (*Aloysia wrightii*)

Also known as oreganillo and Mexican oregano, this deciduous desert native is found in California, Nevada, Utah, and Texas. Among its habitats are mountains, hillsides, canyons, arroyos, dry rocky slopes, and ravines. The plant is drought and heat tolerant.

Hardy to zone eight, Wright's bee brush, five feet tall and equally wide, features crowded stems. This attractive, dense, very fine textured shrub bears greenish-gray, crinkly, toothed, oval foliage, ½ inch in length. This can appear almost white at a distance.

The leaves are hairy underneath. Wright's bee brush leafs out quickly after each rain and dies back during dry weather.

This very free flowering plant blooms from Spring though the Fall. Opening on the current year's growth at right angles to the stem, the very small, white, axillary flowers are exquisitely fragrant. These appear on slender, three-inch-long spikes. The small drupes containing two nutlets are eaten by birds.

Growing White Brush

Sometimes cultivated, the various species are suitable for hedges, herb gardens, and naturalistic plantings. These sun and heat loving plants are generally grown from cuttings. Suitable for coastal areas, they require a well drained soil. A light textured, loamy soil is preferred.

The plants are tolerant of very light frost and drought. However, they're much more floriferous if they're watered during dry periods. Should the plant become scraggly, prune to encourage new growth.

Aloysia spp.

Lemon Verbena-A Related Species

White brush has a close relative (*Aloysia triphylla)* that has spread from cultivation and naturalized in a few states. These include California, Georgia, and North Carolina. This is a popular choice for herb gardens.

This shrub can be semi-evergreen to deciduous, depending on the climate. It is native to tropical South America.

Hardy to zone eight, lemon verbena reaches six to 10 feet in height. The lemony aroma is more pronounced when the foliage is crushed.

Two to three inches long, the glossy, crinkled leaves are light to medium green. Borne in whorls containing three or four leaves, the foliage is narrow to almost lance-like.

The tiny, white to pale lavender blossoms appear from Summer through the Fall on the current year's growth. These emerge in clusters on the flower spike.

Lemon verbena prefers a well drained spot in full sun. This is propagated from cuttings and seed. Prune as needed to keep this plant bushy.

Like its relatives, lemon verbena is a great honey plant. This species is a major source of surplus honey in South America.

Lemon Verbena

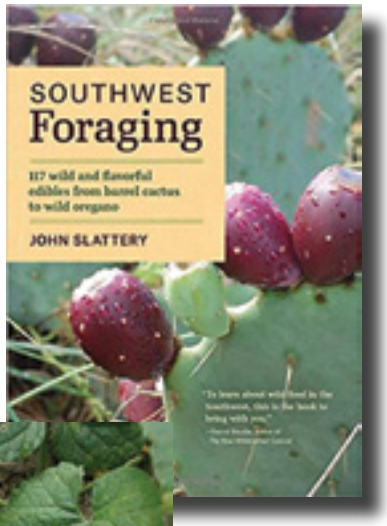
Meloncita (*Melothria pendula)*

A member of the cucurbit family, this is sometimes called speckled gourd, creeping cucumber, and Guadeloupe cucumber. Several varieties occur in different areas of the country. The range of this species extends from Pennsylvania, Illinois, Indiana, Kentucky, and Tennessee throughout the Atlantic region, the Southeast and Gulf region westward to Oklahoma, Kansas, and Texas.

Meloncita favors damp thickets, rich soils, fields, alluvial woods, fencerows, roadsides, and marshes. It grows to 8500 feet or so elevation.

Depending on the climate, meloncita can be an annual or perennial. In warm regions, it is the latter. Hardy to zone eight, the climbing, slender, smooth vine is three to six feet in length. The plant bears simple, unbranched tendrils from the sides of the leaves.

The small, glossy, rough, slightly toothed leaves contain three to five palmate lobes. The foliage is three inches long.



Meloncita

Like the other cucurbits, this vine bears both male and female blooms. The females are solitary. Flowering is from June until frost in colder regions and year-round elsewhere.

Emerging from the leaf axils, the small blooms, only ¼ inch wide, are green to yellow. These feature five lobes with notched petals and calyx tubes. Emerging on long stemmed clusters, the smaller males feature five lobed, bell-like corollas.

Borne on long stems, the smooth, oval, pulpy, dangling fruits resemble nutmegs in shape and size. Initially green, these ripen to black. The crisp-fleshed, delectable, bite-size fruits contain up to 20, small, white seeds.

These fruits are best eaten green for ripe ones can have a strong purgative effect. Meloncitas are typically served raw or pickled. Both the taste and aroma are cucumber-like.

Easy to grow from seeds and cuttings, meloncita can be grown like any other vine crop. Suitable for trellises, they thrive in full sun and part shade. The plants self-sow.

Seeds sprout in five to ten days. In cold climates, start these early indoors and transplant after the danger of frost has past. Meloncita adapts to a range of pH levels from acidic to neutral.

Like most other cucurbits, meloncitas are good bee plants and yield nectar and pollen. The flowers are an aid to brood rearing. These aren't known to yield much surplus honey mainly because they generally aren't plentiful enough. BC

Connie Krochmal is a beekeeper, writer and plant expert living in Black Mountain, North Carolina.

COOKING with Honey

The Spring months are famous for the pick-your-own strawberry patches and for ripe blueberries. Use some of your honey to enhance the flavor of those berries. Both of these berries benefit from honey bee pollination.

~ Ann Harman

STRAWBERRY HONEY PARFAITS

SERVINGS: 4

1-1/3 cups low-fat sour cream
1/4 cup honey
2 teaspoons lime juice or
1 teaspoon grated lime peel
4 cups strawberries
1/4 cup coarsely chopped biscotti or amaretti (Italian crunchy almond cookies)
4 mint sprigs (optional)

Mix sour cream, honey and lime juice in a medium bowl until well blended. Reserve 4 strawberries for garnish. Coarsely chop remaining strawberries, about 3-1/2 cups. Gently fold chopped strawberries into cream mixture. Spoon into 4 (10- to 12-ounce) goblets or bowls. Sprinkle with 1 tablespoon cookie crumbs. Garnish with strawberries and mint sprigs, if desired.

Serve immediately or refrigerate up to 6 hours.

BERRY HONEY MILKSHAKE

SERVINGS: 4

1 pint nonfat vanilla ice cream or nonfat frozen yogurt
2-1/2 cups strawberries, hulled or an assortment of berries
1/2 cup nonfat milk
1/4 cup honey
4 small mint sprigs (optional)

In blender, combine all ingredients except mint. Blend about 30 seconds until smooth and creamy.

Serve immediately in tall, chilled glasses. Garnish with mint sprigs if desired.

HONEY AND SPICE BLUEBERRY SYRUP

MAKES 2-2/3 CUPS

1-1/2 cups honey
½ cup water
½ teaspoon ground cinnamon
1-3/4 cups blueberries (fresh or frozen)
1 tablespoon lemon juice
½ teaspoon vanilla

Combine honey, water and cinnamon in large saucepan. Bring to a boil; reduce heat to low and simmer 10 minutes, stirring occasionally until sauce thickens. Cool to warm. Stir in blueberries, lemon juice and vanilla. Use syrup to top waffles, pancakes or French toast or spoon over granola or yogurt.

BLUEBERRY BUTTER

MAKES 2-2/3 CUPS

1/2 cup blueberries (fresh or thawed frozen)
1/4 cup honey, divided
1/2 cup butter or margarine, softened to room temperature

Bring blueberries and 2 tablespoons honey to boil over medium-high heat, stir constantly. Cook for 3 or 4 minutes or until mixture thickens and is reduced by half. Cool. Blend in remaining honey. Beat in butter.

Varietal Honeys Are Worth The Bother

Ann **Harman**

If the weather and the plants and the bees cooperate then you may have three or four opportunities to collect and sell varietal honeys at an excellent price. However, in order to keep these separate you have to extract each one separately. That could mean setting up extraction three or four separate times. The price for the varietals makes the bother worthwhile.

If you live in small hive beetle area it is essential to be vigilant or lose your crop. You will need to have everything – extractor, buckets, settling tank, uncapping equipment – ready to use the minute you pull the honey supers off. You cannot afford to have then sit around and wait for you to get prepared to extract. Besides, warm honey right off the hive extracts quicker than cooler honey that has sat around waiting for you. In some areas ants can be a problem. In shb areas you will need to clean up the extracting equipment and area very soon after extracting. Those shb can smell honey from a long distance away. It's easier to clean up quickly than have to cope with the beetles.

You don't have a honey house. (That's in the planning and saving-money-for-it stage right now.) So far the extraction has been done in one side of the garage and bottling in the kitchen. The basement is out of the question – 10 sort of steep steps down (and up). However installing a dumbwaiter could make the basement an ideal extraction place. It does have hot and cold running water – a great convenience when handling sticky stuff.

Basements seem to come in two types: concrete floor, some shaky shelves full of whatever fits on them and assorted boxes and piles of junk. Or the basement was finished with a nice floor, has some furniture and a pile of boxes over in a corner. Either way, with a dumbwaiter, it could become a temporary honey house until the 'real one' gets built. Your clean up to use the area will be similar to that for a garage. A basement does have one advantage – it's bee-proof.

For now the garage is the best place. One advantage to a garage is that you can use it for extracting after dark and leave the door open. No, you do not want to use a fan for air circulation because it stirs up dust. If you must extract during the day, the garage will have to be closed up. Are there some windows for ventilation? Are they screened? If not, screening is essential or you will accumulate thousands of bees. Screens have to be in good condition and fit tightly. When you consider planning a honey house, keep air circulation and comfortable working temperatures in mind.

Consider having a bee escape in that window leading outside. That way those errant bees brought inside have a way to get out and go home, rather than hang around and fall on your head when they get too close to the light bulb just above you.

Your garage is not used for parking cars and trucks. Actually there's no room for them. The extractor and other equipment take up space. The rest of the garage has the usual – mower, garden tools (if they were put back near the mower), some shelves with half-filled cans of paint, smoker and hive tools, a pile of hive bodies with and without frames of comb all in need of repair, an assortment of useful tools and a broken screwdriver.

It can be an effort to set up extraction three or four times a season but the sales of varietals make it worth the effort. If one part of the garage can be easily set aside for extraction and left alone for the rest of the year it might not be necessary to clean up, rearrange and prepare an area for extraction so many separate times.

Shelves just on one side of the garage? Is there some way the garage can be considered to have two parts – one side as your 'temporary honey house' and the other side for mower, garden equipment, and even perhaps bicycles? The parts don't have to be equal; they just have to be useful. Both areas then can have their own storage.

Actually the garage can be made into a more efficient space and much easier to clean and kept clean. Concrete garage floors are usually well decorated with grease spots from cars and mowers, paint splotches and some other unknown gunk. They can be cleaned and then given a coat of paint. The home improvement stores have lots of information on cleaners and cleaning and on suitable paints if you want to do it yourself. But there are companies who will be happy to do it for you. Yes you will have to move everything out for a few days but the garage needed a good cleanout

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anyway. You will end up with your extraction area much easier to clean up from sticky wax and honey even if you use lots of newspaper or a slippery sheet of plastic.

Before you start at the bottom (the floor), look up at the ceiling. You could be looking at beams supporting the roof, or wood rafters, or steel rafters or actually a ceiling. If it is a ceiling then clean that up of cobwebs and any other dust. If rafters, then you have a constant source of dust and other mystery debris. It might be wise to consider a ceiling or perhaps a temporary cover of plastic sheeting. Whatever you choose to do with that situation, a good vacuuming will be necessary. Keep the ceiling problem in mind when designing a real honey house.

Open shelves are another trap for dust. And, being open, tend to accumulate a remarkable assortment of useful, and not so useful, stuff. True, you can staple a sheet of plastic over them. However, the minute you or someone else needs a tool from a shelf, the plastic gets ripped. The problems with open shelves can be solved in a number of ways, some more costly than others.

Spend some time in a large home improvement store. Some of them have consultants for an assortment of projects and can show you solutions for garage and workshop storage. Tool chests on wheels come in a number of sizes. Perhaps such a chest would make it easier to do repairs on mowers and other garden equipment. Cupboards, usually sturdy plastic – with doors of course – are made for garage storage. Cans of paint, containers of motor oil and small gardening tools would have a good home in these.

There could be a cheaper way to have cupboards. Do you know someone who does kitchen remodeling? Find out what happens to the old cupboards that have been removed. Some may be in very good condition and would be suitable for your garage storage. If a few shelves are ruined from food storage, they can be replaced cheaply and easily.

If kitchen counters are being removed is there a length that can be salvaged? It could be made into a worktable or sit on top of some salvaged cupboards. All the cupboards don't have to match. They can come from different kitchens. You are just interested in closed storage to save you cleanup time. In addition your extraction equipment will not be sharing a shelf with some dirty rags, a garden trowel and that broken screwdriver.

Some items are just not suitable for cupboard storage. How about the stack of hive bodies that is sitting around waiting for repair? Have you been shoving them here and there, lifting them to get them out of the way? It is very simple to build a dolly so they can be rolled anywhere you want quickly and easily. Hardware stores carry a large assortment of wheels, some with brakes. All you need to have a custom dolly is make either a wood frame or cut a piece of wood to size and buy four wheels of your choice. You may very well end up making more dollies – one to put your honey supers on to move them around, now in the garage but later in your honey house. Why lift and carry when a dolly makes life easier. Yes, hand trucks can help with some tasks but honey supers or a heavy bucket of honey on a dolly can be moved with just a shove.

A source of water is essential. It can be done with a couple of buckets and changing the water when it gets gunked up. A hose could be handy for final cleaning. Keep cleaning in mind when you plan your honey house. Of course it will have running water. The 'on demand' type of water heater is very economical for intermittent use. Perhaps it would be easy to have running water in the garage. If that were a possibility, it would almost make the garage into a 'honey house.'

Today beekeepers are using different types of hives. Some beekeepers have only Langstroth. Other beekeepers have both Langstroth and a few top bar hives and some have only top bar hives. But even the top bar hives have variations. Some beekeepers use frames; some use a combination – bars for the brood area and frames in the part for honey so an extractor can be used. No matter what types of hives are used, the area for obtaining honey from the combs and bottling must be a clean area. After all, honey is a food.

Those beekeepers who use frames, at least for the honey storage part of the hive, can be using an extractor. Those who are using no frames may wish to use a press. Some of the presses suitable for honeycomb are small and can sit on a table or counter. Others are larger and must sit on the floor. So those will need their floor space in the garage 'honey house.' Straining or settling can be a part of honey processing with presses, just like with extractors. Our three- and five-gallon plastic buckets can make excellent settling and bottling tanks for small quantities of honey.

Give a thought to your back. Problems with back pain are not reserved for 'old people.' When setting up your garage 'honey house' and planning your future honey house give some thought to making extracting and bottling easy. Awkward lifting, twisting and carrying heavy buckets or full honey supers can put a strain on backs. Since you will be extracting more than once this year, to obtain those precious varietals, think about ways to make the whole project – from hive in beeyard to labeled jar of honey – more efficient and easier on the back.

Now you seem to be ready for the first varietal crop of the season. Wait a minute! Have you made a dirt and dust barrier between your honey area of the garage and that for the mower and gardening tools? Hang a sheet of heavy-duty plastic to separate those two areas. Fasten or weight the bottom to keep the sheet from flapping and causing more dust. That barrier will need to be kept in place at least during the several honey harvests taking place this season. The plastic sheet will make it much easier and faster to do a quick clean up before starting on the next varietal.

Your garage 'honey house' has given you many ideas for your real honey house, one only used for honey. Your customers appreciate the three or four varieties your bees gather and you appreciate the income from the specialty honeys. This season you will also appreciate using your newly organized garage 'honey house.' (It's about time you threw out that broken screwdriver.) BC

Ann Harman lives and keeps her bees and teaches beekeepers to make varietal honey from her home in Flint Hill, Virginia.

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THE EAS BEE WRANGLERS

Dewey **Caron**

The EAS conference has traditionally featured live honey bee workshops with bees moved to the conference site. To help coordinate and make these experiences safe and educational, bee wranglers have supervised the EAS colonies. For the past 15+ years, Bill Troup and Don Hopkins have volunteered as EAS wranglers.

The 2017 EAS annual conference, this year July 31-August 4 starts with a Short Course. Bee colony inspections and live bee instruction once again will be a prominent feature of the Short Course and Conference.

The 2017 EAS Short Course will be in the University of Delaware working apiary with even more colonies moved to the conference site. The University of Delaware has had a working apiary since the 1960s, when they began to provide pollination for the varieties of fruit being researched on the University farm. For the last 50 years it has also served as a teaching apiary for the popular undergraduate beekeeping lecture and lab courses.

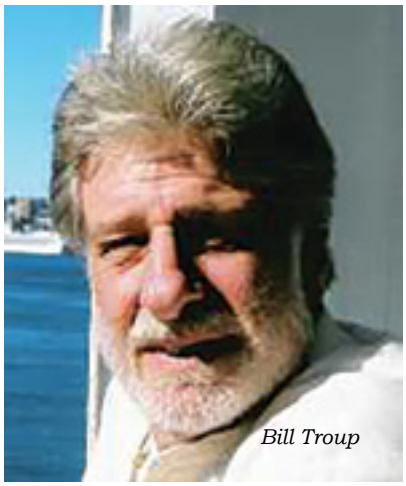
The UD apiary normally consists of up to 30 colonies and includes a small building that holds smokers and bee items plus empty supers. There is additional storage and an extracting facility in a nearby barn. Each year, the spring beekeeping class establishes package bees, captures a swarm (conveniently hung the night before class in a low hanging black cherry), make divides as part of swarm control and prepares colonies for Summer pollination.

At the annual Short Course and Conference, EAS has designated Bee Wranglers to ensure colonies are ready for instructors. Wranglers gather bee equipment and help workshop presenters "read" the colonies. This year we honor past Bee Wrangler Bill Troup. Bill passed away in June of 2016, one day short of his 70th birthday.

Bill Troup took vacation each

Summer from his State position with Weights & Measurements and, with retirement, from his part-time MD Apiary Inspector position, to attend EAS and wrangle the bees. Bill, along with wife Nancy, was owner/operator of HoneyField Apiaries of western Maryland. Both he and Nancy were EAS Master beekeepers and extremely active in training beekeepers in western MD.

Bill started bees in 1979 when a friend asked if he would like to help him move 12 colonies inherited from a family member. Bill continued his interest after his friend decided to quit bees. He moved a colony to the home site so he and Nancy could both work bees. And beekeepers know the rest of the story – that one colony grew and grew and grew until 150 + at one point. Fortunately, their two sons Bill and Dan also became involved with the bees.



Bill Troup

In 1999, Bill retired to become part-time regional apiary Inspector with MD Dept Ag. Bill became associated with a MD program to train dogs and he handled several AFB sniffing dogs over the years. In their beekeeping, Bill and Nancy produced and sold nucs from their colonies each Spring. They began queen rearing and sought to sell nucs with their own queen selected stock. They also sold Brushy Mountain bee equipment and used colonies to pollinate apples and pumpkins. Bill mastered production of honey in the comb and at one time almost exclusively produced this product. They sold their extracted honey to health outlets/resorts; most of the sales were in gallon or 50# buckets.

A second Honorary Bee Wrangler this year will be Bob Mitchell. Bob retired in 2016 after 30 years as DE Apiary Inspector. Prior to becoming Inspector, Bob started with bees to assist his dad on the family farm in Lewes DE (alongside coastal DE). The farm produced vegetables so when Bob learned bees belonging to a recently deceased beekeeper were for sale he took them over. He split those colonies which allowed for expansion of their fresh vegetable production. Honey was sold at the farm market, alongside other farm produce.

One year Bob got a call from a watermelon grower asking if he knew where he could rent colonies for pollination. Bob used his own colonies to provide the pollination service and increased colony numbers to try to fill the demand. At one time he had 150 colonies and currently continues to rent watermelon pollination bees. He is thinking of relocating to the mid-west, the family farm is currently being sold and plans to continue with bees in retirement. Bob will be judging the EAS honey show, in addition to bee wrangling.

Bob experienced his first Africanized bees in Panama with the

Don Hopkins

Bob Mitchell

Jennifer Keller

award-winning DE-PNA beekeeping project. He said he found bees after watermelon pollination to sometimes be nearly as aggressive as Panama's Africanized bees.

Our practiced bee wranglers at EAS 2017 will be Don Hopkins North Carolina State apiarist and Jennifer Keller, apiary lab technician at North Carolina State University. Both have been our EAS Bee Wranglers since the 2007 EAS in Delaware.

Don as state apiarist of North Carolina supervises a staff of five full-time bee inspectors and a lab technician and personally inspects over 2000 colonies himself each year. He, like Bill and Bob, brings lots of teaching and beekeeper experience to the EAS attendees.

Don began keeping bees at age 10 in New Jersey. He credits long-time NJ bee inspector Jack Matthenius (a former EAS Board Chairman) for his early beekeeping education. When he moved from NJ to NC as an apiary inspector, he was not able to take his bees southward – this was during the time of tracheal mites and such movement was not permitted. Since NC does not permit it, he continues only with a few hobbyist colonies at present.

Inspection of NC beekeeping bees gives him plenty enough in-hive experiences to last each week. One of his favorite demonstrations is of sugar shake for mite monitoring and discussing AFB. Don was offering a workshop in Bolivia and gathering material for the activity when he detected the AFB odor in the hive he was checking. It turned out to be the initial AFB discovery in the county. Don also found a colony moved to the EAS meeting site with AFB one year.

Don takes his vacations most years to go overseas with bee development projects. He and I went to Haiti (one of four or five visits) and we have had shared projects in Bolivia; Don has visited over 10 different times. Don has also visited and conducted disease workshops in Kazakhstan. He has been an officer and long-time member of AIA.

Our second NC Bee wrangler, Jennifer Keller has been an EAS Bee Wrangler the past nine years. When not in the EAS Apiary, she can be found in one of several North Carolina State University apiaries in and about Raleigh NC. She became interested in beekeeping while serving as a Peace Corps volunteer in Paraguay when her forestry project was not progressing. She learned beekeeping with Africanized honey bees and then spent her time helping members of her rural community in the south of the country.

Following her Peace Corps experience she enrolled in NC State graduate program under Dr John Ambrose with more manageable European bees. Following her degree she started her current NC State Apiary technician position in 2003.

Apiary technician responsibilities include setting up and maintaining the 100-200 colonies in on and off campus apiaries. She helps coordinate various graduate and research projects of Dr Dave Tarpy. The bees have to be ready for students and for a beekeeping and graduate level course. She is particularly adept at assisting graduate students and post docs with their necessary bee work and with their projects. Queen rearing and artificial insemination are a regular part of Summer research.

Jennifer also gives presentations and teaches beekeeping classes at several of the NC county bee associations and well as the state association meetings. She (with Don) has a major function at the honey show at the NC State Fair each Fall.

Jennifer continues to have interest in and an affinity for Africanized bees. She has been on Partners of the Americas bee projects to Bolivia a couple of times, where I have had the pleasure of working with her training beekeepers on how best to manage Africanized bees. She has also instructed beekeepers on how to raise queens.

In addition to their skills in disease diagnosis and *Varroa* mites, all three wranglers bring a practical, down-to-earth approach to bee colony management. All are masters at hive inspection. It is a pleasure to merely watch them manipulate a colony as they "read" the bees so effortlessly. All three are real beekeeping artists.

EAS Bee Wranglers are a great resource to assist EAS Short Course and Conference attendees learn how and why to inspect bee colonies. The extensive bee sessions during the short course and our "walk in the apiary" arranged for every workshop period, utilizes different experts, assisted by the EAS Bee Wrangler, to help make each bee colony visit an invaluable training experience. EAS is fortunate to have such skilled and highly effective bee wranglers. Come visit them – we invite you to come and experience colony inspection with the best. EAS will be held July 31 - August 4 at University of DE. BC

BIGGER PICTURE

Jessica **Louque**

Practice What You Preach – Teach What You Practice

We are currently in the midst of the Lenten season in the Louque household. We try to make sure it's a family affair, because it's easier to practice good habits when everyone is involved. If you don't believe me, try to go on a diet while your significant other eats fries and cheeseburgers in front of you. For Lent, there are three basic tenants: Praying, Fasting, and Almsgiving. The overall goal is to get your head in the game for the meaning of Easter. Even before I was Catholic, I always liked the idea of Lent. Even without being particularly religious, not having something you are used to getting makes you appreciate it more, and I think makes you more contemplative. The "fasting" aspect is not necessarily a lack of eating, but giving up something important to you or that makes your life easier. When I was in college, I had a friend that was Catholic (I'll be honest, in my pre-Catholic days, I thought she was a little weird but hey, no judgment) and I did Lent with her. We lived on the fifth floor of our dorm, and I gave up the elevator. There's nothing like hauling a backpack up five flights of stairs to make you grateful for the rickety, slightly vomit-smelling contraption that carries you to your floor. Now, the whole family participates and we try to keep each other on track. I gave up ordering on the internet (to the sadness of Amazon and Sephora), all the way down to George, who gave up having a messy room. There's also kid rewards for doing certain "Lent chores" like washing your dishes every night before bedtime (the kids' dishes are color-coded to avoid anonymous dishes in the sink, and their silverware has their names engraved in the handle) or doing chores for each other. Each day, you add candy to your jar for the tasks you complete, and at the end, the winners for various tasks get treats, and the entire family gets a reward if most of the chores were done. One task is family prayer, making the first leg of the lent trilogy part of the reward system, while giving up the time that you would have been doing something else. Not that giving up something for the Fasting part is easy, but for us, the Almsgiving is a little more difficult.

Having four kids means that even if you had money, it's long gone before you thought to look for it. The theory is that when you give up something for lent, you save the money from not doing that thing and you give it as alms. In our case, it's money we probably should have spent on something else anyway, so it's not really up for donation. We still want to hit that third point of Lent as an example to the kids, so in addition to the volunteer/service hours for things like the church food pantry or garden, we wanted to share what we do best: bees!

Our kids all go to the same school, which holds a charity auction in March of each year. We don't really have the money to bid on items or make monetary donations, so we decided that our best contribution was to throw some colonies in the mix and see what happens. We tried to do it as best we could to set someone up for success who probably was not a beekeeper to begin with. Our "package" comes with two established colonies of somewhere between five to 10 frames of bees in painted equipment – I get to pick the colors. We did solid bottom boards, 10 frame deep, queen excluder, hive top feeder, lid, and drawn frames. The colonies will come from our own bees, so we will treat them for mites before we give them away, hopefully getting the girls a head start for the season. As a side note, the *Varroa* has been the worst I've ever seen this year, with mites all over the place since our first hive check in February! As a new beekeeper, you don't really know what you will end up using, but seasoned veterans know that a hive tool and a smoker are about all you need in a hive, so we're throwing one of each of those in too. For a little bit of assistance, I figured a year's subscription to *Bee Culture* would be able to answer some questions for a newbee. The other significant part of a first-time hobbyist is the mentoring from an experienced beekeeper. We also gave two hours of each of our time for setup, questions, going through the hive, or whatever is needed/wanted to help the new person along. We all know that saying "two hours" is not likely how it will turn out when you're talking about bees, but it seemed like

Charlie won't wear a veil because it's harder to eat honey with it on.

Hive colors may change at the discretion of J. Louque.

a good starting point. The one thing that is missing is a veil of some type, and this is for two reasons. The first is that we don't normally even take a veil with us to a hive, so it's not really on our list of priorities for our package. The second is that everyone has their own preference about what they want in a veil. I have a jacket with a zip-on dome veil. I hate the round ones, unless it's the veil that has no jacket and wraps around you. Some people don't like the wrap veils and want the ones that have elastic to hold them under your arms. Other people want a full suit. A handful of people want gloves too, but I feel like you lose way too much dexterity to work the bees appropriately when you use leather gloves. I've also seen a lot of people who get a little too comfortable in their suits and gloves, and do a lot of damage to a hive in their overconfident attire. Just because you don't have to be as careful doesn't meant you shouldn't. We like to teach our new people to treat a hive like a ticking time bomb that could go off at any second if you don't use extreme care and caution. After they get a couple stings to the face, they usually abide by that advice, *or* start wearing a veil. If we're lucky, they do both. We don't have time (or the sympathy at this point) to wait on someone who can't do their job because they can't deal with stings.

If everything goes well, I'm thinking we will do this again next year for the auction and try to make some improvements. Perhaps we will throw in a veil of some sort, just to get them started. Maybe we will learn that we should have added a bale of pine straw to the mix for smoker fuel. A metal trash can to hold said pine straw is also great, but that's an additional purchase that could perhaps be put to better use by buying Kim's beginner beekeeper book as a reference guide instead. Or, maybe a blow torch or grill lighter would be a good addition. Teaching someone how to light a smoker is 9/10th of the battle in intro beekeeping, but it's a lot easier if the person is responsible enough to use a blow torch. Since it's early in the year, maybe we should add some AP23 pollen patties to beef up Spring production (Maybe Dadant would want to donate some to our cause!). *Varroa* is always a problem, and adding Apiguard tins might be the ticket to overwinter survival for the first year under new ownership. All of these things could and would be useful, but I don't know how much more money we can put into the package as compared to the success rate of the hive if we don't add it. It might be free and useful to add a catalog from a couple bee places for equipment education and ordering purposes. All of these things can be evaluated after this year's process.

I'm hopeful that this will bring in some decent money for the auction, because it's something that we can contribute that's a little different than the normal, and we get to bring a new beekeeper into the fold on our own terms. It's a lot easier to train someone from the beginning than to break bad habits. It's also a little bit easier start for a new person because they have an established colony instead of trying to haphazardly install a package of bees without really having a lot of firsthand experience, or purchasing a nuc from someone and not knowing what it should look like upon arrival. The winner will also get some nice bees too, because we don't want to see someone regularly who probably has something do to with the school telling us that we gave them crap bees (not that I'd give anyone crap bees because I think too much of myself for that). If everything turns out well, I think this is a win-win situation where we were able to fulfill the Almsgiving of lent, help out the school and contribute to the community, and give someone a good start in beginner beekeeping. As a matter of fact, by the time this issue of *Bee Culture* is published and mailed, the recipient will probably be reading this article in their first month's subscription. BC

Jessica Louque is keeping bees, raising kids and practicing what she preaches in North Carolina. Come to Medina in September and you can meet her in person.

BRAND MANAGEMENT

Review sites, bad reviews and good customer service.

Jessica **Dally**

In our last article, we discussed the Facebook algorithm. But of course, if you're on Facebook, or almost anywhere on the web, one thing you risk is the dreaded online review and online review sites. If reviews are great, business owners love these sites. But for most, it's a mixed bag. And for many, it seems unfair that people can say whatever they want.

For many a business owner, there's little that causes more terror than an online review site. Sure, the in-person interaction with an upset or unreasonable customer is frustrating, but a review site? That's something that seems completely unfair, uncontrollable and, to many business owners, just plain false.

And yet, most of us know that review sites can make or break your business.

So what do you do?

There are a few tactics business owners use when it comes to review sites. Sadly, some of these aren't great ideas.

Ignore.

A bit like that rash on your arm, ignoring reviews on a review site doesn't mean they will go away. Indeed, just like a rash or irritation, ignoring a problem may well make things a whole lot worse. It rarely takes care of itself.

Reviews don't go away on their own. Ignoring a bad review means it stays there, festering and showing it's ugly self to anyone who happens to come by it. Is it true? Is it false? Anyone who happens to read it has no real clue. They get to see that ugly wound and wonder. Many will assume that what the person said is true. Leave these reviews unaddressed, and you've essentially told customers you approve of what the reviewer wrote. In that way, ignoring a bad review is a lot more like approving it than saying you think it's wrong. It's not what you want to do.

Respond with an attack.

Tit for Tat – the tactic of the schoolyard. Another unfortunate response choice. Unlike the ignore tactic, this time the reviewer has shown that you're not great at customer service. They've managed to bring you down to their level and more importantly, they've done a good job of getting you to make yourself look bad. If their review didn't do enough damage, the response sealed the deal. You've actually made their point for them!

Sure, it's hard not to want to lash out at someone who has said something negative about your business.

But behaving in a way that is immature just goes to show anyone who reads your response that you're not someone they can trust with their business. Review sites aren't simply about reviews. You're marketing your business here. Put your best foot forward.

With the above two options out of the question, you're left with one answer, respond respectfully.

But how do you do that when someone has insulted you? The same way you would in any other emotionally charged situation.

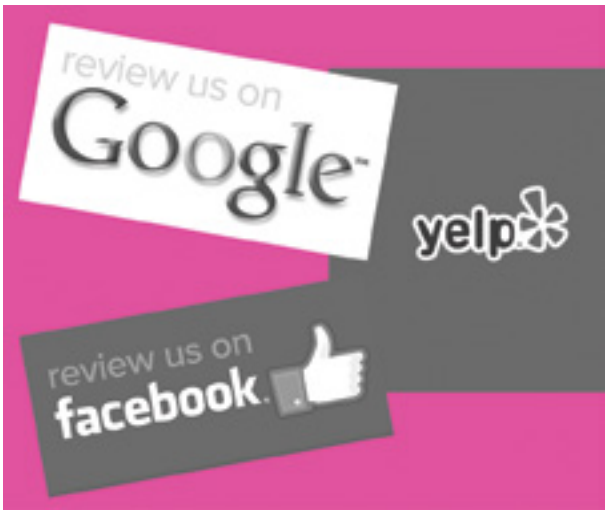
1. Give yourself a bit of time – never reply right away. When you first read a negative review, you'll likely be emotionally charged. That's OK . . . but we all know that doesn't make it the right time to write logical and reasonable responses. So don't even try. Give yourself a bit to calm down. The world won't end if you take a day or two to respond.
2. Is there someone at your company or organization who is better at this than you? Have them do it. It may well be that this is too close to home for you. Outsourcing a response or, at least, running it past someone who isn't quite so involved is NEVER A BAD IDEA. Do that. If you can't have someone else write responses for you right now, then run your final response past someone before you post it. Find someone who will tell you the truth about your writing, even if it's harsh and not what you might want to hear. I've done this type of work for many business owners as they are simply too close to the company to be able to separate themselves from a bad review. If you don't have this person, can you pretend the review is about a different business? Find a way not to take the review personally.
3. Gather the facts. Don't assume you know what happened. Get ALL the information you can. Is it possible that this person called and talked to someone else? Is it possible they sent an email that got caught in your spam folder? Look to see if there's part of the story you're missing. Only when you have the full story can you respond clearly, concisely and present yourself accurately. Remember, a cool, clear presentation of the facts can help you show what actually happened. Presenting something that isn't the full story will not win you any favors, so learn the complete details of what happened. Take people's description with a grain of salt. You're doing that with the customer. Make sure you know what you're hearing from employees isn't biased either.
4. Reply with facts NOT emotions. There are generally three types of negative reviews. How you respond to them needs to fit what actually happened. See number 3! You need to know all the facts so you can choose the right option from below.
    1. The customer was unreasonable and wants something unreasonable. Say so nicely. "It's true; we do not allow pet monkeys in our apartment complex." Sure, monkey owners looking to rent an apartment won't like this response, but you don't want to rent to them anyway. And those customers who are looking for monkey-free apartments are going to be REALLY ecstatic to see this response from you. They will see this customer's complaint as unreasonable. This review actually works to keep away customers you don't want and bring in the customers you DO want. It's a win for everyone. "No, we don't sell our honey for the same price as the supermarket, and here's why:___". Again, you're looking for customers who want your product and those who understand the value of the product you sell. Your response serves to educate and to keep away those who are looking for something you don't sell and don't want to sell. Your goal as a business owner isn't to sell to everyone. It's to sell to the right people.
    2. False story. The customer is telling a story that isn't true. Be EXTRA careful here. Tell your story as best you can and MOST importantly, stick to the facts. Stay away from inflammatory words. The more your words reflect staying calm, the better you will appear. The more you seem like you're attacking, the more credibility you give to the inflammatory reviewer. Win the battle by being calmer than the reviewer. Always strive to be and sound more reasonable. Being calm and reasonable is your goal. "I tried to return the frames I bought at the Honey Supply Store and the store would not take them back." "Unfortunately Mr. Smith brought frames to us that we do not sell. While we aren't sure where Mr. Smith purchased these frames, they are not something we have ever sold, and we were unable to return them for that reason." Remember, you're only giving the facts about the circumstances.
    3. You ARE at fault. OK, this one is very hard, because it's difficult for people to admit to a mistake. But there's something you should know about this, if you do it well it too is a marketing win. Why? Because we're all human and only the most unreasonable customers will expect that you never make mistakes. How you handle yourself here is probably the best thing you can do for your business. MAKE THINGS RIGHT and do it publicly. By showing your future customers that you'll do what it takes, within reason, to make it correct, you show them that while you might not always be perfect, you will fix any problem should something

not go to plan. Granted, if you have a ton of these reviews, you have a problem you need to solve, one or two over a series of MANY reviews will show a shop that people know they can trust. This type of negative review is one of your most important reviews, IF you handle it correctly!

"We found *** in our jar of honey" "We are SO sorry that this happened and are so glad that everyone was OK. Thank you for bringing this to our attention. Because of your notification, we have gone through all jars of honey and found them to be free of ***. We appreciate you bringing this to our attention so that we could ensure that no one else had this experience. We would love to give you several jars of honey to make up for this experience. Please contact us via our website so we can get these to you."

5. Check yourself. If you're writing your own responses, have someone check them. Have several people read each one. Have people outside of your business check them if need be. As you get better at this you'll need to have fewer people check your work, but in the beginning have people review your responses for you.
6. Post it and watch it. On some review sites, people can update their review once they see your response. You may need to update your reply. Updating isn't fun, but it can be necessary.

The true key to responding to reviews is remembering one key fact. You're not responding to the person who wrote the review. You're responding so that people who read the review, looking for your business, know more about your business. What you say, how you say it, and what you do is all about marketing your business. Sure, you might actually solve someone's issue via responding to a review. Most of the time, you're actually hoping to influence future customers and show them what kind of business you truly are. So make sure your responses show the same kind of business savvy you'd show in any marketing brochure or advertisement.



So now you know how to handle bad reviews. Can you go back and deal with bad reviews from a while ago? You bet! No need to go back many years, but going back even one or two years is fine.

And how do you go about getting good reviews? Most sites tell you not to ask for reviews, and while that is true, there is no reason you can't tell people you're on different review sites. If you have a happy customer, make sure they know where they can review your company!

Possibly the best thing you can do is give customers a way to get feedback to you outside of these review sites. For many, they will reach out to a review site because they have tried ways to contact you or can't find other means.

Today, excellent customer service is your best form of marketing. Word of mouth, usually through social media, will be your biggest marketing tool.

So don't ignore these sites. Each one allows you to reply and respond. Do it!

Jessica Dally is an online marketing consultant based in Washington.

DOWNTOWN

"Your City" Bees, LLC

About a year and a half ago, one of my favorite newbee-ish beekeepers asked me to lunch. Though she's one of my favorite people, my heart sank.

You see, Nicole Gaouette is one of those folks who got into beekeeping very seriously and insightfully, and get hooked *hard*. At the end of her very first summer, a beekeeper with nine or so hives at her outside-the-city communal garden pulled up stakes and left, and Nicole adopted five of those hives. *Five*. In August. All harvested dry in craptastic woodenware that hadn't seen paint in years. With questionable queens.

These few months later, I figured that probably she'd asked for lunch to say that she'd had enough, she wanted out, could the club take those colonies please.

Sigh. It happens.

Instead, Nicole showed up smiling, wearing a coolio honey bee pendant, and sporting a lovely idea that sounded mighty impractical to me. Luckily for all of us, my level of insight was pretty much nil concerning the whole gamut of hives, lunch and her inspiration. Why was I so ready to say, "No way?" Perhaps after few years of trying just about every foolhardy thing you can think of, ambition was wearing thin a little bit, even when someone this lovely to be with and clever and caring comes up with a good one.

Nicole's idea was this: most of the newbees around town who had finally wintered colonies and harvested honey had certainly gotten a charge out of that crop, but after sharing jars with friends and relatives, many still had the better part of a bucket left.

You Can Do This

Also, they tended to have to borrow harvesting gear, and sometimes discovered later that a second pull of frames was in order, even though they had satisfied their personal demand and enjoyed the hot-and-sticky harvest experience enough for one year.

Sure, each beek selling on his or her own was a possibility, but that means ordering jars and labels and finding a store and calculating markups and going through all that trouble to move, maybe, 20-30 jars. And what if the Health Department gets interested?! Even at pretentious city prices, that's a lot of work for maybe $200-$300 after costs.

So Nicole's idea was this: **DC Bees LLC.** She proposed reaching out to the amateur DC beekeeping community, and offering to take either liquid honey in the bucket or frames straight out of the colonies themselves, and to harvest, bottle, label, and market the jars. DC Bees would give a share of the proceeds to the beekeepers, use a share to cover fixed costs, and donate a percentage to the DC Beekeepers Alliance, our community. She wanted my permission to use our communications channels to try.

I thought she was on track to break her own heart. My own honey has never stuck around long, at least in part because of feeding it to school kids and bribing public officials (kind of). A seemingly unlimited number of hardware stores, street markets, gourmet food shops–even the local Whole Foods–wanted anything they could get. I thought she would not find an unallocated golden drop.

But I said, "OK." At some point, a founder must get out of the way, and to unlearn all the sardonic lessons that come with pushing pushing pushing all the time (and maybe not being as organized and decisive as she might need to be. Gulp.)

So a deep breath and a skeptical yes. And then I told her that she was pretty much on her own: I just could not manage one more thing.

Then do you know what Nicole did? She incorporated, she got training and advice from local incubator programs (including one with the aforementioned Whole Foods). She got permits and a bank account and access to Health Department certified harvesting facilities. She designed labels, and came up with a fantastic design that incorporates the story of the beekeeper and the source of the honey on the back. She made friends with local bakers and community markets to give her shelf space (this is valuable real estate in a city where hot spots rent at $100 per square foot). it was important to her that this very local product reach folks via intrinsically local channels. And she made it absolutely clear that supporting our community was the engine behind the whole thing.

She came to a club meetup last Fall, and gave a short talk, with

pictures, about all she had done and how she hoped she could help other beekeepers and the club. She described the powerful reaction that people had to the honey and the stories, and how she would love to create a way to make more of that happen.

And it did happen. The club already has a coupla hundred dollars in the bank from this thing, which is going to buy us one heck of a refractometer to go in the harvesting set that members can borrow. I had some half buckets around myself after some in-school programs, and I forked those over, with the stories about third graders and cemeteries and newly arrived fourth-generation Albanian beekeepers and all the other gorgeous randomness which is urban beekeeping.

This has a major impact on the people who buy the small-but-pricey jars and nonetheless feel better for it. Hope and inspiration can be thin on the ground sometimes, and the idea that you are holding the work of your neighbor and the bees in your garden in your hand, that it's delicious and sustainable and you helped make it so...well, you know? This is honey-like-a-hug and a promise of more summers ahead.

At present, DC Bees LLC is not yet cash flow positive (hey, not even a year in operation, and Nicole launched after the main pathetic flow in 2016) But next year's harvest is coming, and perhaps this model offers something to those of you in our greater beekeeping community. Our beekeepers are going into next year with the idea that they can get only those jars that they need, that they could get a little cash besides, and it all builds a sustainable community for them, their families and their neighbors.

We'd love to hear your feedback: have any of you tried something like this? Are you in a similar business which would allow you to direct us away from a very nearby cliff?

Do you want to buy some from the next batch? BC

Toni Burnham lives and keeps her bees on rooftops in Washington, DC.

GLEANINGS

MAY 2017 • ALL THE NEWS THAT FITS

SMART BEES LESS PRODUCTIVE

It doesn't pay to be smart, at least for bumblebees, a Canadian researcher says.

University of Guelph Prof. Nigel Raine has discovered that fast-learning bumblebees died sooner than their slower-learning co-workers.

He also found quick learners collected food only as fast as less smart bees in the colony and completed no more foraging bouts each day.

"Ultimately, the results revealed that fast-learning bumblebees collected fewer resources for the colony over their foraging career," Raine says.

"These findings provide the first evidence of a learning-associated cost in the wild."

The study, published in the journal Scientific Reports, highlights the potential cost of cleverness and could have implications for a variety of species beyond bees.

Co-author Lisa Evans of the Plant and Food Research Institute in New Zealand says the results are surprising.

"We typically associate enhanced learning performance and cognitive ability with improved fitness, because it is considered beneficial to the survival of an individual or group," she says.

The researchers suggest the energy demands of intelligence eat up limited resources, leaving smart bees with less energy for foraging than slower-learning counterparts.

"Neural tissue is metabolically expensive to produce and maintain," Evans says. "Foraging is energy demanding, but so is learning. This may explain the significantly shorter foraging lifespan of fast-learning bumblebees."

In the lab, the researchers used blue and yellow artificial flowers to test the visual learning performance of 85 individual foraging bumblebees from five colonies.

The yellow flowers provided a sugar reward and the blue ones did not.

The researchers observed how long it took the bees to ignore the unrewarding blue flowers, which are innately their preferred choice, and instead to associate yellow flowers with a food reward.

The bees were then monitored in the field using radio frequency identification (RFID) tagging technology to determine their foraging activity and the quality of nectar or pollen they brought back to the nest.

"This finding is particularly interesting because we know that learning is really important for bees," Raine says. "They learn which flowers provide the most rewards, when and where to find them - often in habitats containing dozens of flower species."

So why has fast learning not been bred out of the bumblebee population?

Raine says quick learning may or may not confer an advantage depending on the colony's environment.

"In a more complex or changeable environment, these enhanced learning abilities may be vital to ensure colony resilience," he says. "Then it could pay to have some smart heads in the room."

The findings may be useful for conserving habitat and pollinators that help in commercial crop production, Raine says.

"By determining how pollinators are adapted to their environment we gain insight into the aspects of the environment that are important for colony success, which feeds into habitat and pollinator conservation."

Alan Harman

NZ FACING STICKY-FINGERED CRIME WAVE

In what New Zealand Police are calling a gold rush, more than 400 thefts of honey and beehives have been reported in the last six months – spurred by the rising price of manuka honey.

National community policing coordinator Senior Sergeant Alasdair Macmillan tells Radio New Zealand the thefts are not only occurring out in the field – people were stealing honey products off the shelves of pharmacies and supermarkets,

Police began a crack down on honey crime last year and Macmillan suggested the rising number of reported crimes is because people are taking the thefts more seriously.

The manuka-growing areas of the North Island are the focus of much of the field crime.

"The honey gangs were not small operations," Macmillan tells the broadcaster. "A majority of this has to be organized ... because of the volumes of hives that are being stolen"

He says more than 500 hives were taken from a forestry block last year.

"You're not going to get someone just driving past thinking, 'Oh, there's 500 hives, I'm going to steal them.' It's got to be organized, you've got to have the person power, you've got to have the transportation."

Because of this, Macmillan says, beekeepers need to take precautions, including fencing off hives and installing CCTV cameras.

He says police now plan to on visit all honey extraction companies.

"I believe that when they are renewing their plant, we need to find out what's happening to their old plant that they have renewed," he says.

"Because this may well be bought by someone they think is a legitimate participant in the operation, but it could just as well be a member of one of these organized groups.":

Apiculture New Zealand chief executive Karin Kos says the thefts are especially devastating for the beekeepers.

"Where once we'd see the odd isolated regional incident, today we're seeing theft occur on a much wider scale," Kos tells Radio New Zealand.

"We're seeing multiple hives targeted. And clearly the increased prices we're getting for New Zealand honey, particularly manuka honey, that is undoubtedly a factor behind the trend."

Apiculture New Zealand, police and the Ministry for Primary Industries are building a database aimed at tracking every theft, and getting information that other agencies may have about the 800,000 registered beehives in New Zealand.

Police do have the occasional successes.

Two men are set to appear in court on beehive-theft related charges – one of them is accused of stealing more than NZ$50,000 (US$34,758) worth of beehives. – *Alan Harman*

CALENDAR

♦INTERNATIONAL♦

45th Apimondia International Congress will be held September 29 to October 4 in Istanbul, Turkey.

For more information visit **www.apimondia2017.org**.

♦CALIFORNIA♦

CA Honey Festival will be May 6 at the Robert Mondavi Institute UC Davis, 10-5.

A day long event including live music, carnival rides, delicious honey inspried food, arts and crafts, vendors and more.

For more information visit **www.CaliforniaHoney-Festival.com**.

Western Apicultural Society (WAS) will held at the University of Davis September 5-8.

Dr. Norm Gary will be participating. Other speakers include Eric Mussen, Brian Johnson, Elina Niño, Serge Labesque.

Watch the web page for updates, details and registration, **www.westernapiculturalsociety.org**.

♦CONNECTICUT♦

Back Yard Beekeepers Association 2017 speaker schedule – May 23, Christina Grozinger; September 26, Tom Seeley; October 31, Kirk Webster; November 14, Jennifer Berry.

For information visit **www.backyardbeekeepers.com.**

♦DELAWARE♦

EAS 2017 - University of DE Newark, July 31 - August 4.

Speakers include Larry Connor, Mike Embrey, Mary-ann Frazier, Clarence Collison, Allen Hayes.

For information visit **www.easternapiculture.org**.

♦GEORGIA♦

Beekeeping Institute will be held May 10-13 at Young Harris College in Young Harris, GA.

Lectures, workshops and demonstrations from local, regional and national speakers will be held. There are also hands on training and honey judging and more.

For more information visit **www.ent.uga.edu/bees**.

♦ILLINOIS♦

IL State Beekeepers Association will hold their Summer meeting June 10 at the Quality Inn conference Center in Quincy.

Registration is $70/members and $85/non-members. Larry Connor, Robert Sears and Scott Martin are the speakers.

For details and registration visit **www.ilsba.com**.

♦INDIANA♦

Southern Indiana Honey Bee Field Day will be July 29 at Perry County 4-H Fairgrounds in Perry County.

Featured speakers include Phil Craft and Kathleen Prough. The cost is $15/person or $25/family by July 14.

For more information call 812.547.7084 or visit **www.perrycountybeekeepers.wordpress.com/**.

Heartland Apicultural Society will hold their annual conference July 13-15 at the University of Southern IN.

Speakers include Ernesto Guzman, Jeff Harris, Dan O'Hanlon and more.

For more information visit **www.heartlandbees.org** or email **www.heartland.apiculture@yahoo.com** or 317.432.9578.

♦IOWA♦

IA Honey Producers Association will hold their Summer meeting July 15 at Wickiuphill Learning Center, Cedar Rapids.

Speakers include Dale Hill and Andy Joseph. The cost is $35/members and $40/non-members.

For more information contact Eve Vanden Broek **mrs-theo@iowatelecom.net** or 515.491.6760.

♦KANSAS♦

Northeastern Kansas Beekeepers will hold their annual meeting June 3 at the Douglas County Fairgrounds in Lawrence.

Speakers include Jennifer Berry, Scott Debnam, Judy Wu-Smart, Marion Ellis and Chip Taylor.

For more information visit **www.heartlandhoney.com**

♦MISSOURI♦

Three Rivers Beekeepers will host a Queen Rearing class with Kent Williams, May 20 Cost is $85 includes lunch.

For more information contact jerry Styczynski at 314.420.0264.

♦NEW YORK♦

The Western New York Honey Producers will host the interantionaly recognized editor of *Bee Culture*, May 20 on the topic *10 Rules of Modern Beekeeping*, at Baker Memorial United Methodist Church.

For more information visit **www.wnyhpa.org**.

♦OHIO♦

The Ohio State University Bee Lab Webinars are held the third Wednesday of the month at 9:00 a.m. EST.

May 17: Setting Up Your Extracting Line - What's Needed? – Jim Tew.

To join a webinar follow the link and log in about 8:55 a.m. – http://go.osu.edu/theOSUbuzz.

♦PENNSYLVANIA♦

The Capital Area Beekeepers' Association will hold its 30th Annual Short Course May 6 and 13. Part 1 at the Dauphin County Agriculture & Natural Resources Center, Dauphin, PA.

Part 2 will be at Strites Orchard, Harrisburg.

For additional information visit **cabapa.org** or contact John Novinger, 717.365.3215.

Delaware Valley University Queen Rearing will be held May, 20, 21 and 30.

The cost is $219. Vincent Aloyo is the instructor.

To register contact 215.489.2436 or 215.489.4848.

♦VIRGNIA♦

The 6th Annual Mid-Atlantic Organic Honey Bee Convention will be held July 15 at American Legion Post 242, 21 J.B. Finley Road, Sandston. The cost is $50/person or $90/family.

For more information visit **www.maohbc.com**.

U.S. Honey and Garlic Producers Applaud New Sanctions

The U.S. honey and garlic industries applaud President Trump's Executive Order issued today instructing Customs and Border Protection (CBP) to develop enhanced procedures to ensure that remedial antidumping and countervailing (AD/CV) duties imposed by the United States are actually collected.

As the Administration has noted, at least $2.8 billion in duties have gone uncollected since 2001, with China accounting for much of the problem. According to a recent analysis by the U.S. Government Accountability Office (GAO), the lion's share of AD/CV duties that have not been collected involve duties on imports from China of fresh garlic, honey, canned mushrooms, and crawfish. At the time of the GAO report, which included data through Fiscal Year 2014, the total uncollected duties on these four products exceeded $1.4 billion.

"With a whopping $750 million in outstanding duties on orders covering our products from 2001 through 2016, California garlic producers know first-hand the devastating impact of dumped Chinese goods," said John Layous, Managing Partner at The Garlic Company in Bakersfield, California. "We spent years getting slammed by illegally-dumped garlic, years getting remedial duties in place, years watching importers evade those duties, and still more years watching insurance companies refuse to pay bonds securing those duties. We welcome President Trump's order to better enforce our trade laws and create a more level playing field for affected domestic industries."

AD/CV duties are critical tools used to respond to imports to the United States that are either "dumped" at below-market prices or whose producers are subsidized by their home governments. Both practices put domestic producers at an unfair advantage and U.S. trade remedy laws are a critical response. Unfortunately, domestic industries and workers find it difficult to compete when these laws are not enforced fully, including the collection of remedial duties.

"We are encouraged by the Trump Administration's focus on improving CBP's duty collection efforts," said David Allibone of Sioux Honey Association, representing an industry with hundreds of millions of dollars in outstanding duties and associated interest. "It's no good to go through all the trouble of putting a dumping order in place only to drop the ball on enforcement. I'm hopeful that this executive action leads to the collection and full distribution of moneys owed to America's beekeepers."

U.S. garlic and honey producers, along with other domestic industries, have struggled for two decades against unscrupulous Chinese dumpers, U.S. surety companies, and even at times CBP itself to see these duties collected. There are a number of issues involving collection, bonding, and distribution of collected duties and interest under the Continued Dumping and Subsidy Offset Act that the industries look forward to addressing with the Trump Administration as this Executive Order is implemented.

"Uncollected duties undermine and weaken our trade laws," concluded Kelvin Adee of the American Honey Producers Association. "Failure to collect these penalties at the border means American producers must still compete with dumped honey in the U.S. marketplace. AHPA welcomes the spotlight on this issue and is hopeful the Administration will also address other long-outstanding issues of utmost importance to our industry, including CBP's distribution of collected duties and interest to injured U.S. producers in accordance with the law."

U.S. Honey & Garlic Producers are represented by Kelley Drye & Warren LLP.

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This Winter I drove over the mountains to put down a rebellion of beekeepers who thought they might secede from the venerable Colorado State Beekeepers Association, of which I am president. At the meeting, some folks questioned my leadership. I felt a little like Abraham Lincoln giving the Gettysburg Address, because we're all in this together, or we're not. I hoped my pitch went OK. Afterwards I walked out of the building into an ice storm. I took one step and did a flying Wallenda, landing on concrete on my hip. As I got up, I said, "At least I didn't hit my head!"

Thirty-six hours later in the shower, I noticed a flap of skin hanging off the end of my elbow. My gal Marilyn cut it off with kitchen scissors.

She also found a hole at the end of my elbow. I didn't think much of it, other than to wonder how I could do such bodily damage and not even notice. Maybe I did hit my head!

Within days an infection set in, one that did not respond to a common oral antibiotic. When I went in for a follow-up visit, there was no hiding my doctor's alarm. He sent me to the hospital every day for a week for IV administration of a different antibiotic. On top of this he put me on two oral antibiotics. A month later, the patient is nearly healed, but all this for a banged up elbow! There was a time when a shot of penicillin would have done the trick.

Before penicillin, infections proved all too often fatal. Penicillin came into widespread use during World War II, saving untold millions of lives. But as bugs increasingly acquired resistance to penicillin, the pharmaceutical industry came up with alternative antibiotics to knock out these resistant strains of bacteria. Yet whenever we hit them with something new, they eventually adapt. Reminds me of *Varroa* mites! Now, we're running out of drugs that work. Federal health officials this year reported that "at least" 23,000 Americans die each year from drug-resistant infections. Last August a Nevada woman died from a rare infection that proved resistant to 26 antibiotics.

Seventy percent of antibiotics administered in this country go to animals, largely healthy ones, to stimulate growth and prevent disease. Such treatment is routine in pork, beef, and poultry operations. Some beekeepers use antibiotics to prevent and control European and American Foul Brood (EFB and AFB) and Nosema.

Quoting the Centers for Disease Control, "Scientists around the world have provided strong evidence that antibiotic use in food animals can lead to resistant infections in humans."

After 50 years of use to control and prevent AFB, some honey bees have developed resistance to oxytetracycline (Terramycin). Most American commercial beekeepers have switched to tylosin tartrate, sold under the trade name Tylan.

In response to a devastating AFB epidemic, Chinese beekeepers turned to chloramphenicol, a cheap broad-spectrum antibiotic normally reserved for human infections that don't respond to anything else. Its use in food production is illegal here and in many other parts of the world. From the discovery of chloramphenicol in Chinese honey came the U.S. ban on Chinese honey and the establishment of testing for chloramphenicol as a marker for honey of Chinese origin.

It's not clear if the much-ballyhooed FDA 2017 Veterinary Food Directive rule will significantly reduce American beekeepers' use of antibiotics. Since even the experts seem confused, I won't delve too deeply. The main thrust of the rule is to eliminate the use of antibiotics added to feed to stimulate animal growth. That's never been a driver in beekeeper antibiotic use. The language gets a little technical, but basically the rule requires that antibiotic administration be done under the authority of a veterinarian with whom you, the beekeeper, have a "Veterinary Client Patient Relationship." This basically means the vet knows you and trusts your judgment. The vet can then write a Veterinary Feed Directive (VFD), which is not exactly the same as a prescription. I told you it gets technical. The vet can write a VFD for an outbreak of AFB in your bees, which means you can get an antibiotic to treat it. The vet might also be able to prescribe preventive treatment for AFB.

I took our blue heeler Pepper to the vet because he was dragging his hind end on the grass, which here at Colby Farm we refer to as "the scootie." That, and the poor little guy was up all night trying to pass stool. I learned that he had "colitis," and the vet prescribed an antibiotic.

I said to the vet, "Not now, but maybe later I might need some Tylan for American foulbrood in my beehives."

The vet said, "You know what American foulbrood looks like?"

"Sure," I said.

"Well, just let me know when you have a problem, and I'll take care of you," he said.

The gold standard for AFB treatment is burning the hive, and you don't need to consult a vet for that. But here in Colorado we generally have a fire ban during the time of year when you're likely to come across AFB. I use Tylan to keep AFB-ridden hives alive and healthy until I can re-queen and shake the bees onto foundation.

Antibiotics, used judiciously, make our lives better in countless ways. Very recently, Marilyn, Pepper and I were on antibiotics at the same time, and we all got better. If I ever get that right knee replaced, I'm going to need effective antibiotics.

In the beeyard, I treat to cure, not to prevent. I'm not here to judge my fellow beekeeper. We all do what we feel we have to. No one wants a plague of AFB. But actions have consequences. What happens when we run out of antibiotics?

Ed **Colby**

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